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BORN FROM WITHIN

Practice and Perspectives of Endogenous Rural Development

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Preface

Gianfranco Rossetto

The implementation of the new Common Agricultural Policy (CAP), which is inevitable and vital for the balancing of markets and the reduction of structural overproduction, will necessarily have far-reaching consequences for rural development. The CAP tries, indeed, by means of new accompanying measures, not only to urge farmers in the direction of diversification but also towards non-agricultural activities.

This new direction means a true revolution for the agricultural sector and thus for the future of the entire countryside. The farmer, liberating himself from his one and only role of producer, can thus profit from the opportunities and synergies offered by other local and regional activities that are complementary and alternative to agriculture. The farmer will become a rural entrepreneur and his revenues will derive from various sectors. This new function assigns to the farmer an essential role in the *valorization* of endogenous resources of the area where he exercises his activities.

Rural development thus becomes a multi-sector issue, and constitutes not just an essential element but also a major challenge for regional development. It is precisely in this sense/direction that new communitarian measures are being prepared.

If local and regional initiatives represent the starting-point, their success will depend on a framework of national and communitarian policies which offers technical extension, political orientation, and adequate financial support. And in order to plan this turnover in a well-balanced way, research efforts are fundamental.

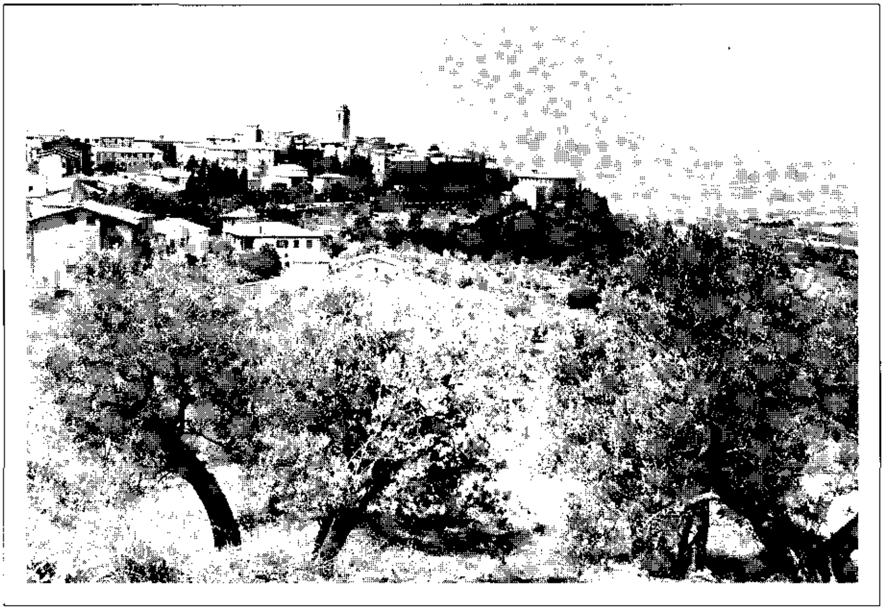
Since 1975, the European Community has financed programmes which have not only grown in size but have increasingly taken into account the *rural development* element in research activities linked to agriculture. In particular the AGRIMED (Agriculture Méditerranéenne) research programme, within the framework of the Common Research Programme, has played a fundamental role in the evolution of communitarian research on rural development. It has, in fact, developed a whole new approach to the problem of rural development in the mediterranean area, putting emphasis on the identification of endogenous potential and on *valorization* rather than analyzing the short-comings and constraints of these regions.

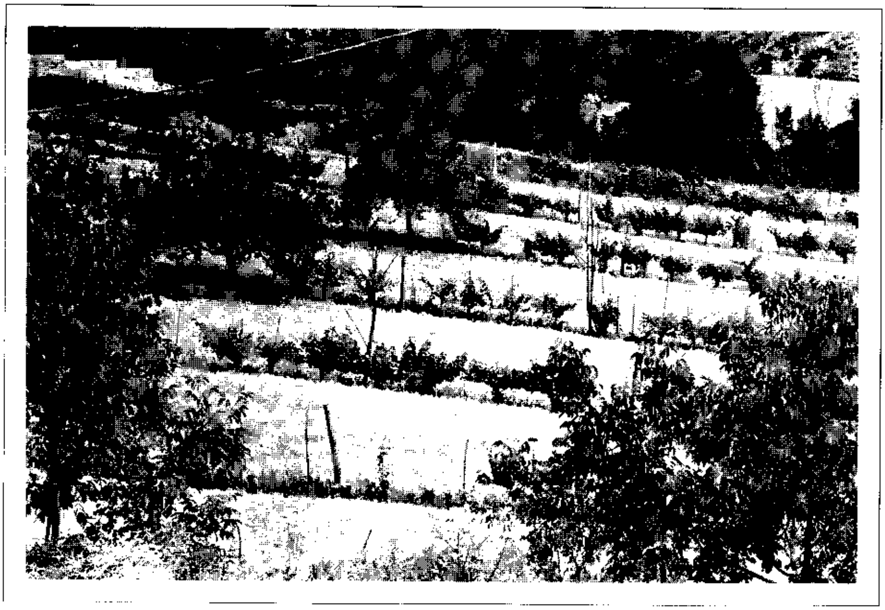
Rural development can only be a success if it relies on the cultural identity and the specifique patrimony of the areas concerned (landscape, craftsmanship, history etc.). This means that solidarity in favour of rural areas must be organized in deference to their diversity. Development actions must, necessarily, be specific, because we are dealing with various forms of diversity (the areas themselves, diagnoses, actors, institutional structures). As a consequence, one must refrain from too strict procedures of implementation and, instead, allow for a flexible intervention of joint communitarian policies and of structural funds.

Project number CT-90-0020 'Design Methods for Endogenous Regional Development', financed in 1991 under the CAMAR research programme, complies with all of these criteria and was to help optimize regional potential and promote diversification, in order to reverse the tendency to desertification. At the same time it was to help avoid the drawbacks or any damaging effects to the economies and natural environments of these areas.

The appearance of the present book, originating from the above-mentioned contract, highlights a number of priorities: diversification of activities; *valorization* of local knowledge and resources; attention to ecology; to the relationships between various economic actors etc., insisting on the fundamental importance of bringing to life and dynamizing the human resources around these priorities.

Close collaboration between groups of multi-disciplinary researchers has thus allowed for the very interesting performance of a communitarian research initiative.





Part I

The Practice of Endogenous Development

1 Endogenous Development: Practices and Perspectives

Ann Long and Jan Douwe van der Ploeg

Diversity is one of the main features of European agriculture. It is also becoming one of the keywords in the debates on Common Agricultural Policy. Any European perspective on rural development must be grounded on the recognition of such diversity and must necessarily build upon it in order to maintain the agriculture required by Europe's peoples. Diversity (or heterogeneity) might be seen, depending on one's views, as a problem and/or as a remnant of the past, or it may be seen as a major challenge. In this book we will present some strategic elements for this latter point of view.

The diversity of Europe's agriculture is not a chance phenomenon. It is due not only to differences in factors such as climate, soil, physical distance from centres of consumption, historically-created land-use patterns etc., but above all, to the basic fact that agriculture is a social construction, i.e. the way agricultural practice is organized is heavily dependent on the actors involved in it. The strategies used by these actors, the ways in which they link their practices to markets and to technological developments, the specific interaction between farming activities and regional, national and supranational policies and interventions – are all decisive elements in the complex process that makes agricultural practice what it is – a highly diversified whole. In particular, the cultural repertoires of the actors involved, their historical experiences (vis-à-vis policy interventions for instance) and the interrelations as created – in a conscious and/or implicit way – vis-à-vis local ecology, more often than not play a crucial role.

Farming, therefore, is not to be understood as simply a set of variations around one theme. On the contrary, European farming entails a wide and complex array of themes: the highly differentiated social, economic, cultural and historical relations in which it is embedded make it the richly chequered outcome of the goal-oriented and conscious activity of the people involved. It is precisely for this reason that throughout this book we use the concepts of heterogeneity and styles of farming.

Central to the book is the notion of endogenous development. Endogenous development patterns are founded mainly, though not exclusively, on locally available resources, such as the potentialities of the local ecology, labour force, knowledge, and local patterns for linking production to consumption, etc. As is argued in several contributions, endogenous development can revitalize and dynamize these local resources, which otherwise might decline or become superfluous. Furthermore, endogenous development practices tend to materialize as self-centred processes of growth: that is, relatively large parts of the total value generated through this type of development are re-allocated in the locality itself.

The renewed interest in endogenous development and the search for an adequate theoretical understanding of it may provoke some surprise. However, for those involved in, or familiar with the so-called 'modernization' of European agriculture over the past three or four decades, this renewed interest will come as no surprise.

Modernization of agriculture has become increasingly seen as originating from and driven by actors and institutions external to the producers in the agricultural sector itself. This specific focus was consolidated by a concept of modernization which stressed an essential rupture with existing practices and types of discourse of the countryside. Implicitly agriculture was considered a stagnant sector. 'Getting agriculture moving' and 'transforming traditional agriculture' were some of the telling slogans of the 1960s that reflected this specific and still persistent view. Correspondingly, those farmers who were more able than others to participate in the modernization projects, were classified as those most open to outside information, messages and innovations, an attitude which, in its turn, was perceived as being identical to an orientation towards urban dynamism.

This dominant (sociological) focus fitted well with mainstream economics, which perceived agricultural development as essentially a (re)adaptation of farming practices to (changes in) global markets and technology. While paying much more attention to regional variation, recent theories such as that elaborated by Hayami and Ruttan (1985), still follow this deterministic model.

Accordingly, the practice of modernization was (and still is) shaped by sets of external interventions, mostly centralized in state-agencies aiming to introduce new organizational models for farming, new interlinkages between farming, markets and market-agencies, new technological innovations meant to replace existing techniques and knowledge, new forms of socialization and techno-economic training, and, last but not least, new models for the definition of roles and identities for farmers and their wives.

Notwithstanding the wide differences between such sets of interventions, the deliberate effort to create an integrated policy (and model) for these interventions, implied, in the first place, that the degree of discontinuity vis-à-vis existing practices, relationships and role definitions increased considerably. Indeed, the 'application' or 'implementation' of such an integrated policy more often than not materialized as a de-facto rupture with existing practices: the reorganization of labour and production processes became, together with the introduction of new politico-economic schemes, an empirical, albeit highly differentiated, phenomenon.

In the second place, the distance created between existing discourse and practice and the new models was highly selective: under certain conditions, in particular places and at specific moments it proved to be much easier to 'apply', 'adopt' or 'implement' modernization projects than at other times or places. The same is true for heterogeneity among farmers (taking into account family situation, demographic cycle, gender relations, structure of local labour markets, local power relations, etc.). That is to say, the practice of modernization turned out to be a highly differentiated phenomenon: thus modernization not only reproduced existing differences, but increasingly generated its own differences and inequalities. In this way modernization resulted in growth as well as underdevelopment and marginalization. Consequently, the simple 'repetition' of the growth-model typical for 'growth poles', or so-called 'centre economies', became, within the 'less favoured areas', an ever less convincing policy proposal.

In the third place, it must be stressed that, since the practice of modernization revolved around the introduction of exogenous elements into the farming sector, dependency became internalized into the structure and mechanisms of growth and development – not only on a material level, but also regarding the dynamizing elements themselves.

In the fourth place, the emphasis on exogenous development produced a particular bias in our knowledge of the nature, scope and mechanisms of agricultural development. Social practice is not only shaped, at least partly, by available knowledge and theory that are, or become, part of the practice concerned, practice also shapes the scope, structure, language, legitimacy and idiosyncrasy of the theories themselves. Indeed, on the level of theoretical knowledge on rural development, a remarkable redistribution of knowledge and ignorance has been produced during the epoch of modernization. Considerable knowledge now exists on how to design and implement projects for exogenous development. However, on how to conceptualize and analyze endogenous development patterns, and of their impact and their potential, there is remarkable ignorance, expressing itself, for instance, in the widely shared belief that if such endogenous development patterns are relevant at all, their significance for resolving actual problems is minimal. It is our opinion that this historically-produced ignorance manifests itself today as one of the central features and causes of rural and agrarian questions and problems in Europe.

Heterogeneity Entailing Specific Expressions of Endogenous Growth

The heterogeneity of European agriculture reflects a wide range of development patterns, some of which are dependent on 'external' forces, while others are mostly grounded in 'local' interests, perspectives, resources and types of discourse. It is impossible to ascribe this wide range of patterns to one dominant set of 'driving forces' located in markets, agrarian policy and technology development. Agrarian development is never a simple derivate of the latter: understanding the dynamics of agrarian development implies a careful analysis of the social relations of production, as located in town-country relations, in the intersection of agriculture with local, regional, national and international economies (which usually involves specific institutional patterns and linkages), in historically-produced landscapes, in local culture, in reigning family patterns, etc. These social relations of production not only determine and therefore structure the way farming is related to markets, technology and policy, they also imply a frequent negotiation, adaptation and/or transformation of the goals, instruments, tendencies, directives and rationale contained in markets, technology, and policy. That is, the same set of market conditions, technology packages and agrarian policies might well lead to a considerable variety of responses. Consequently, as an expression of differentiated development trends, heterogeneity is reproduced.

Heterogeneity in agriculture is a multi-dimensional phenomenon. One of the criteria we can use to analyze this diversity is the degree of autonomy or dependency vis-à-vis global markets and the supply of technology. We are not, of course, saying that development patterns can be defined in ideal-typical terms as exclusively founded upon local resources, nor as only entailing external elements. What empirical research indicates is that they contain a specific balance of 'internal' and 'external' elements. What turns out decisive, for those who follow the exogenous development pattern, is that it is the outside or external elements that compose the conceptual model from which the eventual utility of local resources is judged. If the latter 'fit' with the former, they are integrated according to the rationale of the established model. If not, they will increasingly be considered as 'outdated', 'worthless', or as a 'hindrance' to change. In endogenous development patterns, on the other hand, a different balance is encountered: It is local resources, as combined and developed in local styles of farming, that figure as the starting point as well as the yardstick for the evaluation of the eventual utility of 'external' elements. If the latter can be used to strengthen both the specificity and the vitality of local farming styles, then they will be internalized (often after a careful 'deconstruction' and 'recomposition' so as to guarantee the maximum fit with local conditions, perspectives and interests). If no 'fit' can be created, then the external elements will remain what they are, that is, 'outside' elements.

Different chapters of this book highlight how rural development patterns indeed reflect a highly different balance of 'internal' and 'external' elements. This becomes not only clear when comparing regions; it is especially the case when detailed analyses are made of heterogeneity within specific regions. This is illustrated in the contribution of Cristóvão, Oostindie and Pereira, who analyze the impressive heterogeneity in the

Barroso area of north Portugal. They show, in the first place, that generic concepts, such as endogenous and exogenous development, can indeed be operationalized so as to capture the specificity as well as the diversity of local development patterns. Second, their research stresses that the essential differences between development patterns are, so to say, hidden in the subtleties of the strategically-managed balances contained in the different patterns. The same goes for the contribution of Ventura and van der Meulen. They discuss heterogeneity in Umbrian farming in Italy, focusing on the production of Chianina meat, a highly appreciated quality product. This heterogeneity is linked, as they show, to specific socio-economic circuits that link the production, transformation and consumption of meat, each circuit being characterized by its own, particular social definitions of meat quality. From this research, as well as from the Portuguese and Spanish examples, insights emerge on the farming styles involved. In this context, the Spanish case described by Remmers is especially interesting since it entails the collective action of producers.

The general argument that emerges is that, in the first place, empirical heterogeneity is neither a random nor an insignificant phenomenon. It reflects frequently a wide array of local farming styles. Second, each empirical enquiry argues that this array of different farming styles contains both those reflecting endogenous development processes, and others expressing a predominantly exogenous development trend. As will become clear, the notions of endogenous and exogenous are handled in these empirical cases as relational concepts that primarily refer to the empirical differences that are encountered in the particular regions or localities. Third, it is in the careful exploration of the more endogenous styles and associated development patterns, that specific clues are encountered that could strengthen endogenous development processes. In other words, perspectives on endogenous development arise through the comparative analysis of heterogeneity and associated styles of farming.

On a more abstract level, the opening Chapters by van der Ploeg and Whatmore in Part I, are dedicated to the methodological and conceptual problems entailed in this approach, while Benvenuti's contribution (Chapter 9) discusses the broader dimensions of the problem, that is, the general interrelations of science and practice in rural development. These are followed in Chapter 10 by Slee's argument that one needs to develop a well-grounded theory of endogenous development. In current, or, as Benvenuti would say, in 'canonical scientific approaches', it is indeed difficult to understand theoretically the empirically-relevant practices of endogenous development.

The perspectives on endogenous development are amply discussed in Part II of the book. Both Huillet and Picchi discuss, from their ample experience in policy-making, the political arenas in which endogenous practices are embedded. While Huillet (who is responsible for rural development within the OECD) argues that endogenous development emerges as a major challenge requiring new policy arrangements, Picchi (who is responsible for rural development in the Emilia Romagna region in Italy) examines the contradictory relations between central and local powers.

But it is not only policy which is relevant for the strengthening of endogenous development processes. It is also commercialization, as discussed by Ventura and van der Meulen, and the need for more appropriate tools of economic analysis, as suggested by Thomson, as well as attention to the design of adequate technologies as argued by Roep and de Bruin. Their argument is echoed in the contribution of Antonello and de Roest, two researchers linked to the CRPA research institute that operates in the area of Parmesan cheese production. If adequate technologies are not developed, then valuable endogenous practices such as the production of Parmesan cheese can quickly be marginalized. Gibbon, a well-known expert on farming systems research, offers us some methodological clues, stressing the importance of comparative analysis of relevant empirical settings. His general recommendation fits well with the work presented by Portela and Portela and van den Dries, who show, for specific areas of interest (manure and irrigation) how the empirical analysis of heterogeneity, especially as far as 'technical issues' are concerned, offers stimulating, refreshing and innovating insights for promoting more adequate technology development.

Finally, the importance of agency is brought out by Lowe, Murdoch and Ward. They link the discussion of endogenous development to the issue of sustainability, concluding that a reordering of priorities is urgently needed.

Locality is a concept that is deployed in several of the papers, but this must not to be misunderstood. Although one can agree fully with Lowe *et al.* when they claim that '*rural localities might be able to play to their strengths*', it must also be recognized that the meaning of 'locality' was largely de-activated and deconstructed during the epoch of modernization and that it has only recently been reconstituted (van der Ploeg, 1992). At the same time, it must be recognized that locality as such contains no guarantee whatsoever. One could even argue that more often than not endogenous development is blocked not by global factors but by locality itself. Again we see that there is no general scheme for endogenous development. It is only the careful and detailed exploration of farming styles and other local elements as embedded in particular frames of interaction with 'outside' factors, that can render insights into the prospects for (or the impossibility of) endogenous development. Yet having said this, one cannot but agree with the statement of Lowe *et al.* that 'rural livelihoods [and hence 'localities'] could be strengthened locally rather than weakened globally'.

2 Styles of Farming: an Introductory Note on Concepts and Methodology

Jan Douwe van der Ploeg

In this introductory chapter, I discuss the theoretical implications of endogenous and exogenous growth patterns in agriculture. I argue that such patterns can be characterized only if the variable mechanisms through which farming is linked to markets and technology are introduced into the analysis. This brings then attention to the empirical side of the question: how to identify, in the overwhelming and often confusing heterogeneity of agriculture, those phenomena that embody forms of endogenous development. Among various methodological perspectives, I suggest that 'styles of farming' appears to be one of the most promising. It allows us to conceptualize as social constructions the specific ways in which the labour process in farming is organized (that is, how the process of production is organized as well as how the farm develops through time). It is through a detailed analysis of the heterogeneity in agriculture, especially in marginal areas, that patterns of endogenous growth may be discerned and analyzed.

The Generic Structure of Farming

Whatever its location in time and space, farming always involves the mobilization and reproduction of resources in order to convert them into specific values. A particular feature of farming is that the required resources entail 'nature' and that the subsequent conversion entails, in part, the management of biological processes, that is, 'natural cycles'.

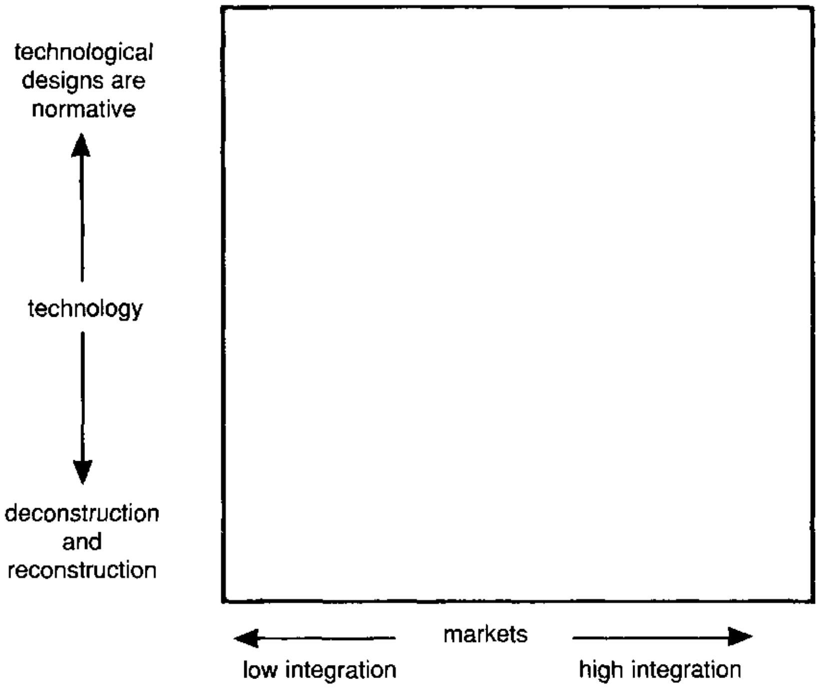
Simple Commodity Production (SCP), the now widely dominant although not exclusive organizational form in Western European farming, is just a specific expression of this general formula. The values produced are mainly (but not exclusively)[1] exchange-values, i.e. commodities, and the resources from which such commodities are produced are mobilized partly via markets, and partly through non-commodity-circuits (Long *et al.* 1986; Marsden and Murdoch 1990). The latter applies in particular to the labour force recruited within the family and therefore not subject to wage-labour relations.

On Empirical Diversity

Both the mobilization of resources and their subsequent conversion into commodities and/or use-values, imply relations between actors and institutions external to the farm enterprise itself. These relations, which from a theoretical point of view are highly variable, and which constitute, in praxis, specific social relations of production, might be discussed using Diagram 1. The horizontal axis refers to the mobilization of resources. These might be mobilized on the various markets: labour to a large extent on the labour market; capital through loans and credits on the capital market; and land through tenancy mechanisms. Cows also enter the process of production as commodities since they are acquired on the cattle-market; feed and fodder may be bought (instead of produced on the farm itself); and the same goes for soil-nutrients etc. Such a constellation represents a market-dependent scheme of production and reproduction. But an historically-guaranteed reproduction, entailing a relatively autonomous process of production can also be conceptualized.[2] Here, the required resources will be reproduced mainly within the production process located on the farm itself. The reproduction of land, labour, capital, cows, feed, fodder and nutrients, etc. is thus secured through production. Each cycle of production is founded on the previous cycle and is organized so as to create simultaneously the foundations for the cycles to come. A growing number of empirical studies have demonstrated that along this horizontal axis there is considerable empirical diversity, both between and within regions (Benvenuti *et al.* 1989; van der Ploeg 1985, 1986, 1990a, 1990b). In synthesis, farmers relate their farm enterprises in quite different ways to markets, and although markets might increasingly represent one and the same set of external parameters for farming,[3] the way in which farming is linked to this set of parameters is highly variable.

The vertical axis of Diagram 1 represents the conversion of resources into values. This conversion implies a particular technique or way of combining resources so as to obtain the required amount of value. Some empirical diversity might be viewed, especially under present conditions,[4] as determined by the unequal supply of new technologies (de Benedictis and Cosentino 1979), which are largely designed within the realm of agrarian science and imply specific models for the organization of the labour and production process, models which explicitly prescribe (and eventually sanction) the 'conversion', i.e. of the labour process, and therefore, in turn, condition and legitimize the demand for technology. Farm labour processes then become structured along the lines designed by science and agribusiness.[5]

Diagram 1 Room for Manoeuvre



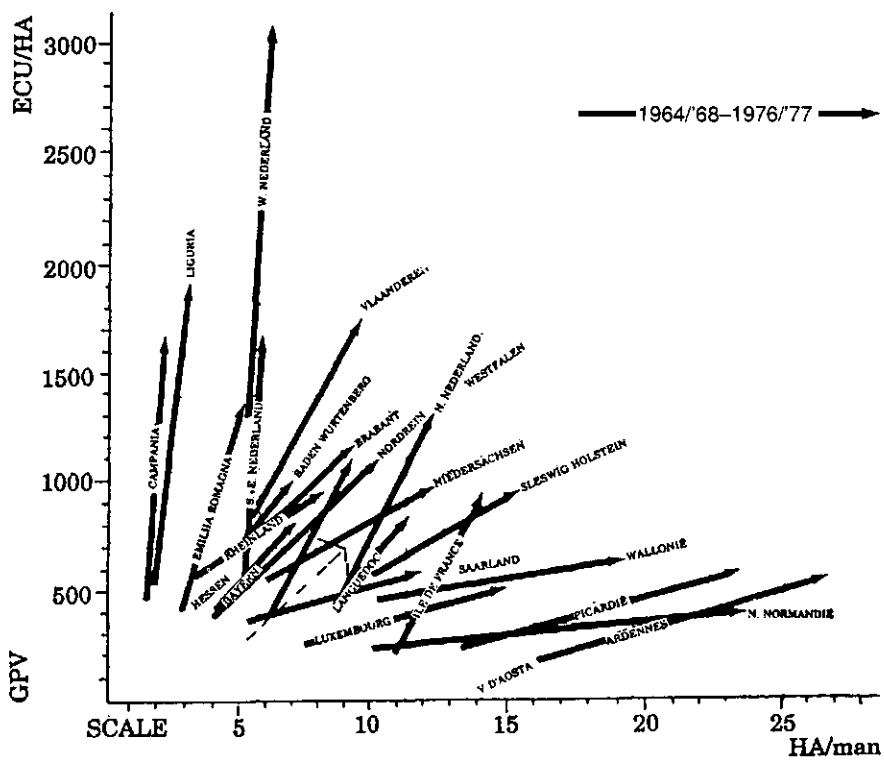
But technological designs are frequently deconstructed. Particular elements of the designs are then reconstituted and combined with elements already existing to provide the most appropriate methods for 'conversion' – methods that differ, sometimes considerably, from the original technological designs. In other words, craftsmanship replaces external technological design as an ordering principle for organizing the labour process, i.e. the 'conversion' of resources into values.

Markets and technology thus do not determine how farming will be carried out, but provide the context in which different positions are possible. Together, they constitute room for manoeuvre (Long 1984). Farmers themselves, as social actors, are able to define and influence the way they relate their farming activity to markets and technology. Distantiation from and/or integration into markets and technology is of course not a matter for capricious decision. It is the object of strategic reasoning, embedded in local history, ecology and prevailing politico-economic relations. Simultaneously, it is through such strategic reasoning that particular positions are created, that specific social relations of production are produced and reproduced and that future developments and decisions become conditioned.

Marginal Rural Areas

Starting from the premises developed above, we can now discuss the question of heterogeneity and differential development trends in marginal rural areas. Putting aside any discussion of what the exact meaning of such a concept might be, one can argue that, broadly speaking, 'marginal' areas are less market-dependent and less organized along the lines of the newest technological designs than is the case for so-called growth poles. Within the forms of development discourse now dominant, these features (in other words low 'market-integration' and 'technological backwardness') are currently used as indicators of an 'underdeveloped' status. 'Lagging behind in development', as official EC phraseology puts it, is a typical expression.

Diagram 2



It goes without saying that such a definition only makes sense in a strictly unilinear model, in which development in the 'areas lagging behind' is seen as an imitation of the developmental pattern that has already been realized in the 'growth poles'. The validity of such a unilinear model is, however, highly doubtful, both theoretically and empirically. As Diagram 2 (derived from Meeus *et al.* 1988) shows, the regions of Europe demonstrate considerable heterogeneity in their patterns of development.

The M-position

So far differences between regions have been mentioned. But within regions, again one might assume that different positions exist, also in the marginal areas. This is illustrated in Diagram 3, where M (for marginal) represents the typical position of farming vis-à-vis markets and technology in such areas. Farming, in one way or another, 'lags behind' in the adoption of technology. For example, in relation to grain-growing, the diagram shows a considerable 'distance' from technologies applied in the Paris Grain Basin, and the same goes for dairy farming when compared with Friesland.

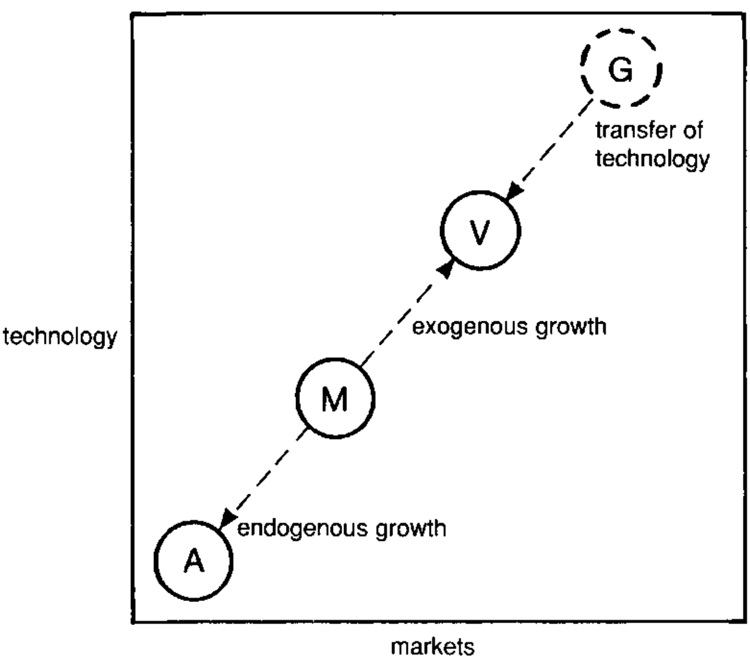
The V-position

The M position, however, is only one position, although the most important in statistical terms. Alongside this 'modal point', at least two other (possible and/or empirical) positions can be distinguished. These are the V and A positions of Diagram 3, where V stands for 'Vanguard' farming, for the endeavour to create, within the global marginal conditions, a systematic effort to apply prevailing technologies and at the same time to enter into a more systematic and more tightened set of relations with the markets. It is, in synthesis, an endeavour to apply, in the marginal areas themselves, the development model of the growth poles (G). Transfer of technology then becomes strategic, and development will materialize along the lines of the exogenous growth model (Benvenuti 1990). Outside elements (such as technologies, organizational forms, capital) and intervention (heavy subsidizing so as to create the required conditions for 'modernization', technical assistance and control to secure the correct application of the designed model) compose the crucial features of such an exogenous approach to growth and development.[6] (See also Long and van der Ploeg 1990.)

The presence of this kind of growth model in 'marginal areas' is not to be underestimated. In a recent study in Umbria we found that a specific expression of the transformation towards the V position, i.e. an abrupt and massive increase in agricultural output at farm enterprise level, was more present in the mountains (i.e. the more marginal parts of the region) than in the Umbrian plains (van der Ploeg 1990b; van der Ploeg, Saccomandi and Roep 1990). This is no surprise. 'Marginal' areas increasingly offer what are becoming structural constraints in the so-called growth poles – space and clean resources: space to expand production (through the acquisition of relatively cheap land, as well as additional space as far as quota, etc. are concerned) and clean resources, i.e. not yet contaminated air, water and land, which can increasingly be used to obtain additional value on the urban markets, now rapidly turning to 'sound' food.[7]

It is also to be noted that most intervention strategies, including those financed by EC funding, strongly stimulate the growth pattern implied in position V of Diagram 3. Notwithstanding the strong institutional support for 'exogenous growth', the results are rather meagre. In the first place it turns out to be quite difficult to create the institutional conditions necessary for the maintenance (i.e. the reproduction over time) of this growth model. In practice, this is reflected in the fact that after the 'big leaps forward', a lot of the farmers are obliged to take 'steps backward', *passi indietro,* as the Italian expression goes (IRFATA 1990). Secondly, it is becoming increasingly obvious that although this particular model might alleviate or even change one or maybe more than one aspect of the global marginality of such regions, it simultaneously deepens other aspects. Output at farm enterprise level does indeed rise steeply (which is not to say that it will also rise at regional level), but dimensions such as rural employment, landscape preservation, defence of the environment, intra-sectoral interlinkages and possibilities for tourism, might easily deteriorate.

Diagram 3



The A-position

A third position that might be encountered, implies two features (indicated by position A for 'alternative' in Diagram 3) that differ noticeably from those in the positions already described, and taken together, they comprise a unique pattern. I refer to farming based mainly on non-commoditized processes of reproduction (on resources reproduced within the farm and/or obtained through socially regulated exchange), and in which an optimal conversion (not based on a straight-forward application of exogenous technological models, but grounded on quality and quantity of farm labour)[8] is simultaneously realized. Farming, in this case (as we shall demonstrate later), is built on an active and goal-oriented distantiation of the labour and production processes from both markets and technology. In this position, a relatively autonomous and historically guaranteed scheme of reproduction and craftsmanship are the typical constructions that characterize the mobilization of resources and their consequent conversion into the required social values and commodities.

Empirical Forms Reflecting the A-position

The specific empirical expressions of such a 'model' are far from being fully explored. But some indications can be derived from the little we do know. In the first place, there is an impressive but still far from completely documented range of farms specializing in the production of high quality or ecological products that entail a particular level and composition of costs (low external input agriculture) as well as a high level of value-added per unit of end product. The particular labour process and dependency on local resources that are more often than not strategic for producing such commodities (and the associated social value) inhibit a high degree of incorporation into supply markets and – simultaneously – exclude a straightforward application of current technological models: craftsmanship remains essential. In other words, particular and presently expanding niches in the markets, not only allow for, but assume and require a position such as the A position in Diagram 3 (see for a further discussion de Roest 1990).

Second, the model implicit in producing high quality or ecological products is not limited to these products. The model of low external input[9] (and consequent low external output)[10] can equally be observed in the production of current commodities.[11] Let me illustrate this with a simple anecdote. On a particular Saturday morning, after a night of heavy rainfall, I arrived at an *azienda* in Umbria in Italy. It had been agreed some days before that I would visit to talk at length about particular topics. On my arrival, however, the owner and his wife and brother were busily engaged in an activity that at first sight completely astonished me. They appeared to be harvesting the leaves of their vineyard. I could hardly suppress my laughter. Their activity, in my eyes, was completely devoid of any sense. But they then explained that the rain had caused a high degree of humidity and there was a consequent danger of fungi breaking out in the vineyards. The current recommendation for this problem was an application of anti-criptogammici or fungicides. However, they had already experimented and determined years ago, that by taking away some of the leaves the wind would enter and clear up the humidity. They added two further observations: that in this way they were able to make the best use of their own labour force (*cosi si valoriza il nostro lavoro*)[12] and that afterwards they were able to drink their own wine with more *tranquilità* (part of production was for self consumption).[13]

That, in a nutshell, is what some colleagues have referred to as *resistenza sociale*, which is especially significant in so-called 'marginal areas'. It implies a dedication to continuing farmers' own 'practices', under difficult conditions, even though (or especially when) every 'authority' declares that it is becoming a hopeless affair (Lacroix 1981; Pernet 1982). Farmers are not the passive receivers of external doom: they react strategically and develop new responses, new lines of defence. And sometimes, such responses and defence lines come together into specific, but quite valid projects with which to tackle what seems an overwhelming marginalization.

In the third place, there is the organizational dimension which must not be neglected. Both the mobilization of resources and the conversion of resources into end-products (whatever their nature) imply specific (and highly variable) patterns in the social division of labour, of co-operation, of contradictions, etc. To be more precise, both exogenous and endogenous growth models imply specific and quite contrasting organizational patterns. Let me again give an example.[14] In the Portuguese Trás-os-Montes region, dairy farming was and still is an important element of farming. The majority of milk-producing animals were (and are) to be found on small farms keeping from five and ten cows. Milking was done manually, and was increasingly associated with two problems. The first related to the purity of the milk. When milking by hand it is almost impossible to prevent impurities entering the milk. The second concerned the problem of milking itself. Milking twice a day, every day, is a heavy burden. The solution appears self evident: mechanize milking, and increase the number of cows kept. The latter is the only way to make mechanization profitable. This would imply an unavoidable restructuration, leading to a concentration of production on a reduced number of farms. At least according to 'theory', that is the way modernization goes.

However, the solution developed in Trás-os-Montes amounted to a drastic redefinition of this organizational scheme. Milking was mechanized, but at village and not farm enterprise level. Each village created co-operative milking parlours, and several women were trained to manage and operate them. Young children (and/or carers) could now bring the cows to the central milking parlour, where milking took place according to the highest hygienic standards. So two problems were resolved at one stroke (i.e. the problem of hygiene, and the 'slavery' of having to milk twice a day). Moreover, the now clean milk (that still comes from cows fed in the 'traditional way', and thus of a superior quality) fetches a higher price, which raises the value-added at farm enterprise level.

What this example demonstrates is that through new linkages and new organizational models, a 'passage' from position M towards position A indicated in Diagram 3, is sometimes quite feasible. That is, an autonomous, historically (and in this case socially) guaranteed reproduction is maintained while the quality and quantity of labour is revitalized, offering alternatives to the current technological schemata.

I suppose that similar reasoning could be applied to the production co-operatives aimed at ecological production in Spain, to the creation of the '*veenweidekaas*' group in the province of South Holland in the Netherlands, and to the possibility of specific producer-consumer relations in Umbria, and so on.

A fourth specific expression of position A is to be found in its interweaving with so-called 'extra-agricultural activities'. The expression 'extra' here is somewhat misleading in so far as it suggests that these activities are external or only additional to farming. Pluri-activity is, of course, more often than not, strategic for the specific way farming is organized. Hence, the interlinkages, fusion and synergy of agricultural and 'extra-agricultural' activities within one and the same economic unit (currently the family) are central for understanding the particular A type indicated in Diagram 3.

Flows of Activities through Time

In the preceding section I tried to indicate that farming, as an 'organized flow of activities through time', can follow different patterns. Each pattern is based on particular driving forces, entails differently structured relations with markets and technology, and finally, evolves into a specific but coherent organization of the farm and a specific structuration of the labour process.

In order to explore and understand heterogeneity, we need specific schemes of classification. To date, these have largely been based upon a particular ordering of variables as manifested at a specific point in time. This is typically the case in FSR or Farming Systems Research, where time- and space-bound combinations of crops and/or animal husbandry are frequently taken as a starting point or basis for a decomposition of the sector into 'farming systems'. At least three problems are inherent to this approach. First, it is unable to handle the often considerable instability of patterns. From one year to the next a particular scheme of cultivation might be completely redesigned. For a variety of strategic reasons farmers might change from milk to beef production or even eliminate all animal husbandry (for a while or permanently) and dedicate themselves to grain production or to tomato growing. From an FSR perspective, these changes (which in marginal areas are omnipresent) would indicate changes in the 'systems' themselves. What, from the point of view of the farmers might constitute the continuation of a specific rationale rather than a rupture in 'the organized flow of activities through time', emerges in the 'systems approach' as a negation of continuity through time.

A second problem is that if one takes heterogeneity as the starting point, then an unnecessarily complex and confusing scheme of classification could arise, and underlying patterns might easily be missed. For example, if the meaning that the farmers themselves attribute to their activities is not taken as an organizing principle for the construction of the classification schemes, approaches such as the current FSR approach could easily generate categories and distinctions that are completely empty and meaningless.

A third problem is that classification based on particular crops (or combinations of crops) might easily obscure the different patterns used in the production of one and the same crop. As we demonstrated in earlier studies, completely different 'logics of farming' (that relate to both the mobilization of resources as well as their conversion into commodities) can be distinguished in one and the same branch of farming, such as for example, in dairy farming (van der Ploeg 1985).

What I propose, is that a classification of heterogeneity in marginal rural areas should be founded on a careful analysis of the underlying patterns of farming in terms of a strategically organized flow of activities through time (Vincent 1977). Such patterns will allow us to isolate the theoretically meaningful trends of exogenous and endogenous development and stagnation. From such patterns, specific crop combinations, phenomena such as specialization or the reproduction of mixed farming, and trends such as the abrupt change from one set of crops to another or of flexible adaptation through time etc., can be reconstructed as meaningful activities and operations. If underlying strategies are ignored, that is if the linkages between theoretical and empirical levels, between past, present and future, and between farm operators and the environment in which they operate, are eliminated from the classification, then the latter will get lost in hopeless and confusing empiricism.

Actors and Projects

Although conceiving of patterns of farming as strategically organized flows of activities through time might lead to an emphasis on the so-called structural features of agriculture and the regional economy, we should not ignore the fact that their very presence, persistence or disappearance and their specific distribution are to an important degree actor dependent. That is to say, the creation as well as the development of these patterns is and remains crucially dependent on the goal-oriented, strategic behaviour of the men and women who run farms. Defining the specific position of their farm enterprises vis-à-vis the markets and the supply of technology is a central element in this strategic behaviour.

If farming is understood as the social (and therefore goal-oriented) co-ordination of the whole range of tasks which together constitute the totality of the farm labour process, and that such social co-ordination implies the ongoing observation, interpretation and evaluation of similar and different forms of social co-ordination (i.e. one's own and the farming practices of others) then it is clear that the 'organized flows of activities through time' and their specific expressions as styles of farming, are socially constructed projects.

Again: on Empirical Diversity

The degree to which the different strategies are articulated at the level of discourse and, consequently, emerge as socio-political projects, can only be assessed through empirical inquiry. Such research will have to focus in particular on processes of communication and organization, not only among the groups of farmers concerned but also among the other actors involved (e.g. urban consumers, political movements, regional authorities, etc.).

There are interesting indications that at least in certain rural areas, the positions vis-à-vis the markets and technology, as defined by farmers, is well recognized and associated with specific modes of organizing production and development at farm level. In Dutch and Italian research on styles of farming this has been highlighted for several regions.

Styles of Farming

Style of farming is a concept that can be defined (and illustrated) from various points of view. The 'original' definition, elaborated by the founding father of Wageningen agrarian sociology, Hofstee, stresses the dimensions of culture and locality. A style of farming then is the complex but integrated set of notions, norms, knowledge elements, experiences etc., held by a group of farmers in a specific region, that describes the way farming praxis should be carried out (Hofstee 1985). Hofstee then made clear how such notions effectively constitute a specific praxis that embraces the lay-out of the fields, the architecture of farm buildings, and the social division of labour within and between farms. At the same time, from numerous studies covering mainly the pre-war period, he argued that the impressive variety in agriculture could not be understood without taking into account these 'local cultural patterns'. The latter were not conceptualized, of course, as isolated phenomena. Local cultural patterns were understood as actively constructed responses to local eco-systems, local relationships between town and countryside, and the insertion of the locality into wider trading patterns, etc. That is, they constituted specific, actively constructed responses to the structuring principles which then dominated and within which farming was embedded.

There is no need to point out that these structuring principles have been deeply transformed in the post war period. It is increasingly markets and technology that function as such. Consequently, styles of farming have changed. They have become the (intra-regional) responses adopted by farmers to technology and the markets. One could go even further. Since the structuration of markets and the orientation of technological development have become increasingly the object of agrarian policy, styles of farming have, to a large extent, consequently emerged as farmers' responses to national and international agrarian policies.

What nonetheless remain, are some of the other core elements of Hofstee's concept. First, farming styles represent a specific unity of farming discourse and practice, a specific unity of mental and manual labour (this is especially important in SCP which entails a unity and not, as is the case in Capitalist Commodity Production, a separation of design, execution and control).

Second, farming styles entail a specific structuration of the labour process, of the organization of time and space as concrete dimensions, and consequently, farming styles result in a particular organization of the process of production (including a wide range of technical, economic and social interrelations), and in a particular structuration of the development process at farm enterprise level. Consequently, styles of farming might be defined in terms of their scale, their level of intensity, the implied interrelations between capital and labour, and the specificity of particular technico-productive aspects and relations.[15]

Third, styles of farming represent specific connections between economic, social, political, ecological and technological 'dimensions'. Since each style contains a specific co-ordination of the domains of production and reproduction, the domain of economic and institutional relationships and the domain of social (i.e. non-commoditized) relations, it continually emerges as the specific nodal point between the indicated 'dimensions', a nodal point that allows for the transfer of meaning from one 'dimension' to the other. That is, styles of farming are not only pluri-dimensional entities, but also the specific locations where, for example, 'the economic' presents its 'ecological' consequences, or where, vice versa, ecological considerations are transformed into a specific position vis-à-vis the economy.

Cultural Repertoire

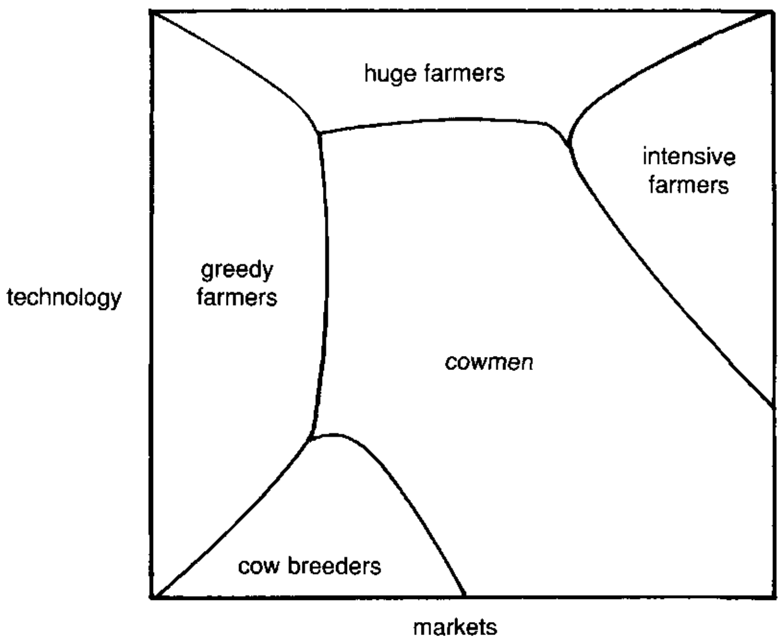
As argued earlier, linking farming to the markets and the supply of technology is a goal oriented activity subjected to the strategic reasoning of the farmers. Such reasoning evolves through a process of interaction, negotiation and renegotiation with the other actors in the various arenas constituted by the markets and by the relations between the farms and those institutions developing and implementing new technologies. As empirical research shows, farmers have a cultural repertoire at their disposal for creating linkages with markets and technological development (de Bruin *et al.* 1991; Roep *et al.* 1991; van der Ploeg 1992). The same goes for their interaction with other actors: anticipation of the meaning and activities of others; the transformation of meaning; the maintenance of a 'grey zone' between the farming unit and the surrounding institutes; the creation of confusion; feeding others with wrong information – all form part of a repertoire that quite often embraces a wide array of historical examples and experiences. The point I am making is that farmers not only have a shrewd awareness of the diversity of styles within a specific region, but frequently they also have a thorough and detailed knowledge of the interlinking mechanisms with the markets and technology on which such styles are founded and of the particular elements of the local cultural repertoires that are mobilized and used in the different styles.[16]

Friesland: An Illustration

Let me illustrate this with an example from Friesland, one of the northern provinces of the Netherlands which was once famous for its cattle, but which is now defined as an area becoming steadily marginalized. It goes without saying that its 'marginality' is a highly relative category. Friesland is – within the Netherlands at least – at the bottom as far as average milk-yields per cow are concerned. A large part of the province now seeks recognition for special help under the EC financed 'mountainous area policy', although there are no hills, let alone mountains. Yet there is considerable heterogeneity to be found in dairy farming in Friesland, a heterogeneity that can in no way be ordered and classified in unilinear terms. Farmers themselves understand and order it in terms of different farming styles. Heterogeneity for them is not a random phenomenon: it entails specific clusterings. Each 'cluster', i.e. each 'way of farming', is the outcome of the specific strategies of the actors involved. In other words, the complex 'totality' of the dairy farming sector does not represent, at least for the farmers, a chaotic reality, a total confusion, neither does it represent a not yet complete transition towards 'competitive farming'. On the contrary, it is a meaningful whole, composed of many different styles. The latter are described in an every day language that, from a strictly academic point of view, might seem confusing, ambiguous and imprecise. But to the farmers themselves, this everyday-language is quite unequivocal (Darré 1985; Kessel 1990). I refer to terms such as *cowmen, breeders, economical* or *greedy* farmers, *big* farmers and *intensive* farmers. For Frisian farmers each term is an umbrella, a metaphor, linked to very precise, detailed and multi-dimensional discourses. Taken together, these terms refer to the cultural repertoire with which Frisian dairy farmers define, reproduce, adapt and/or transform their farming practices.

A research programme which applied Bennett's (1981) 'social mapping' technique, linked cultural repertoire to the way in which Frisian farmers defined and managed specific relations with markets and technology. The results are summarized in Diagram 4.[17] Each particular style also represents a specific structuration of the current labour process and of farm development over time.[18] This double classification (that regards the specific organization of farming as a productive activity as well as a specific interlinking of farming with markets and technology) is able to capture a substantial part of the existing heterogeneity.

Diagram 4 Styles of Farming in Friesland in Relation to Markets and Technology



Umbria: Another Illustration

The different styles are not always manifest as a coherent and multi-dimensional cultural repertoire with associated metaphors. Sometimes the underlying heterogeneity is ordered only through particular aspects. This, for instance, is the case in Umbria. As research carried out in 1988 demonstrated (van der Ploeg, Saccomandi and Roep 1990; van der Ploeg 1990b), Umbrian farmers operate a classification scheme that especially focuses attention on growth patterns. Three particular patterns have been commonly identified. These are *stare calmo* (remaining quiet), *andare passo a passo* (progressing step-by-step) and finally *il crescere in un solo colpo* (growth at a single stroke, i.e. growth that implies abrupt and far reaching reorganization of the process of production and sudden 'jumps' in total output). Among these 'folk concepts' it is the second (*andare passo a passo*) that is clearly linked to endogenous growth. This was underlined by a qualitative analysis of associated concepts such as *autosuficienza* ('self-sufficiency'), *spazio*, *familia*, etc. The global interlinkages between each growth pattern and markets and technology, are summarized in Diagram 5.

These concepts were contracted into more operational categories and used to analyze a large and constant sample of Umbrian farms (513 farms over six years). A large part (73 percent) of the impressive variety contained in this constant sample (a variety that expressed itself both diachronically and synchronically) could thus be captured and explained using methodologies grounded in the specific folk-concepts of the Umbrian farmers. The 'territorial map', produced through discrimination analysis and presented in Diagram 6, may be interpreted, together with the description of the two canonical discriminant functions (see Table 1), as an illustration of the powerful kind of analysis that emerges when the 'ordering concepts' of the farmers themselves are used as a foundation for deciphering 'chaotic' diversity.

It is not possible to go into the methodological details. I prefer here to broaden the description of how, through this particular approach, specific elements are highlighted which might have remained obscured in the more traditional type of analysis. In the first place, the exogenous growth model or style, implied a tripling of total output over the years considered, to augment the income per working family member by a factor of one. To raise family income by the same amount in farming styles embodying a more endogenous type of development, production needed to be raised by only fifty percent. Equally significant is the fact that in the exogenous growth pattern, expansion of production mainly depended on an increased use of external inputs, whilst within the endogenous model growth crucially depended on an autonomous increase of technical efficiency.[19] All this implies that the styles that embody endogenous growth patterns, cannot simply be seen as a kind of 'reduced' version of their 'big brother'. They represent a model of their own, which must be evaluated with specific and adequate criteria.

Table 1 Structure of the Discriminant Functions (pooled within group correlations)

	1 function	2 function
delta production 1981-86	0.91	-0.17
delta income 1981-86	0.41	0.28
delta acreage 1981-86	0.32	-0.05
delta inputs 1981-86	0.17	-0.59
delta labour input 1981-86	0.23	0.57
delta cattle 1981-86	0.37	0.38
delta ammortizations 1981-86	0.16	-0.22

Diagram 5 Global Interlinkages Between Each Growth Pattern and Markets and Technology in Umbria

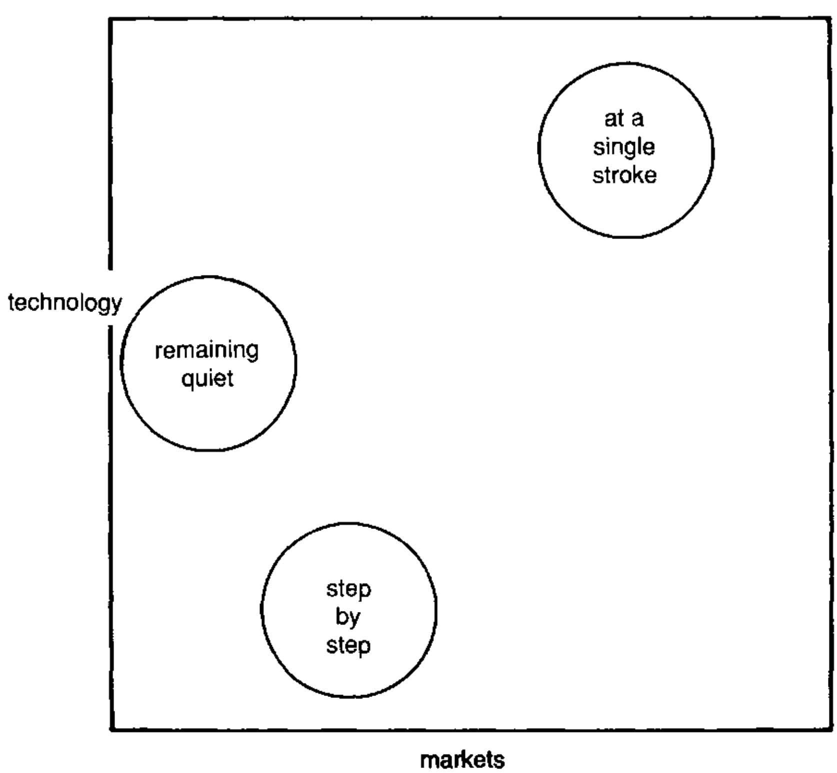
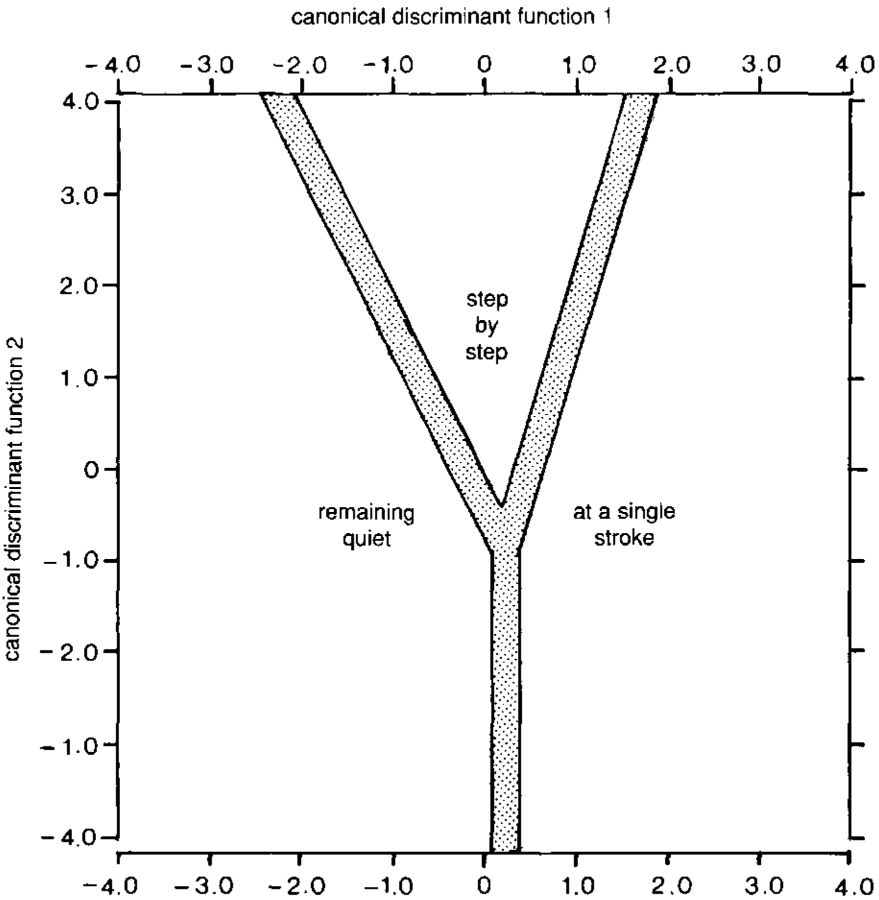


Diagram 6 Territorial Map: Umbria



Synthesis

In the discussion on the alternative or A-position in marginal areas, several methodological approaches were suggested as a preliminary identification of farming styles that possibly embody endogenous development patterns:

- the identification of high quality products that allow for a relatively high value-added per unit of end product;
- the identification of low external input agriculture that together with a high technical efficiency founded on the quantity and quality of labour, allows for additional room to achieve a reasonable income even under adverse conditions;
- the identification of specific organizational patterns that allow for alternatives to current modernization schemes;

- the identification of specific combinations of 'extra' agricultural activities, which give a particular dynamic to the agrarian process of production.

We may now add a fifth entry to this methodological repertoire:

- the local recognition and knowledge of styles of farming, their interlinkages with markets and technology, their potential and their limits.

It goes without saying that the potential suitability of this methodological approach is largely dependent on the specific culture, the patterns of communication etc., as they are encountered in each particular region. In some regions one might meet a very detailed and thorough local knowledge and expression of styles, in others a more limited knowledge of the specific expression of basic trends, whilst in others such classifications might be completely missing (Scott 1985).

On the Production of Ignorance

It is safe to assume, for several reasons, that whatever the real magnitude and impact of endogenous growth patterns in specific rural areas, their real significance is largely underestimated by the institutionalized systems for data-registration and representation (Benvenuti 1991). This clearly introduces enormous problems into the study of endogenous development patterns and their impact. Let me present some illustrations to clarify this problem.

In a specific region of the Netherlands, the Gelderse Vallei, the small farm is an omnipresent phenomenon (de Bruin 1991). Between 1900 and 1990 the number of farms remained almost constant.[20] The medium acreage of the farms of the region also remained roughly the same. From the data available (collected each May), it is almost impossible to understand how a decent living can be made from these farms. Official registration shows that there is simply not the production capacity to realize even the lowest levels of income. However, as field research has demonstrated, nearly all of these so-called small farms are engaged in a large number of 'grey' activities that are not registered in the official May census, simply because they are not allowed by law. In addition, these 'small farms' are founded on mechanisms[21] that, on the one hand, imply very low monetary costs, but on the other, cannot be represented through current farming accountancy schemes. To cut a long story short, using only 'official data', the image emerges of a stagnant, if not starving peasant economy, whilst in reality there is considerable dynamism, continuity and a wide range of strategic and valid responses through which the actors involved tackle their particular situations.

There is in Umbria, according to the sample elaborated by INEA, a persistent shift towards specialization at farm level. But field work consistently suggests indications of the opposite. The explanation for this apparent contradiction is, in the end, quite simple. To the officials (*i tecnici agrari*) responsible for the annual book-keeping schedules, the presence of mixed farms presents a major headache. Instead of having to register the facts for just one productive section, they have to analyze up to eight or ten, plus their interrelations, for every mixed farm. Thus, they obviously prefer specialized farms, especially as their work is evaluated and paid according to the number of farms that are 'followed up'. So from year to year they substitute some of these more complex mixed farms for other more 'easy' cases. The difficulty, however, is that this produces an underestimation of the number of A-type farms (see Diagram 3), since farms embodying endogenous patterns of growth are of the more mixed type.

Another bias is introduced by the simple fact that only particular categories of farms (and thus possibly only particular styles) are represented in farm accountancy systems such as the European RICA system. The interest in and utility of farm accountancy records is not the same in all styles, especially since participation in national (and hence in international) accountancy systems is obligatory for those farms that undergo abrupt restructurations (and 'jumps') through EC sponsored funding. Hence, one might assume the presence of the V-type of farming, i.e. exogenous types of agrarian development, to be over-represented in the data systems currently available, while the A-type of farming, embodying endogenous growth patterns, is under-represented if not absent.

In addition, the current methods for representing data imply that the A-type, if present, will be largely 'distorted'. Its specific rationality is likely to be obscured rather than reflected in the farm accountancy methods adopted.[22] All this implies that an inquiry into the nature, dynamics, scope and limitations of endogenous growths patterns cannot be based on a unilinear interpretation and elaboration of existing 'data-sets'. The latter are part of the problem. What we really need is a deconstruction of this kind of 'official data' – a deconstruction based on a thorough knowledge of the actual diversity existing in the agrarian sector.

Towards New Knowledge

The important, but far from easy challenge we confront revolves around two interlinked sets of questions. In the first place, around questions relating to the adequate identification of different styles of farming and an analysis of the types of development they embody, and subsequently around questions relating to an assessment of the comparative advantages of the different development patterns. Here we should ask questions such as what impact endogenous patterns of growth have on regional economies (in terms of income generation, productive employment, and links with other regional sectors, both in terms of environmental impact, contribution to regional cultural identities, etc.) compared to the impact that exogenous growth or stagnation have on such economies. This comparative analysis should not be limited to looking only at actual impact, but should, for obvious reasons, also consider potential impact. In the research on styles of farming in the Netherlands, as well as in Italian research on the same topic, one encounters an interesting range of methods that might be helpful for exploring such potential impact (van der Ploeg and Ettema 1990; Soldaat, van der Meulen and Ventura 1990).

On the Assessment of Potential Impact

Endogenous forms of rural development are not to be considered as the 'artificial constructions' of a particular group of scientists, nor are they to be treated as a '*deus ex machina*'. There is no need to talk about angels when the real richness is to be found at grassroots-level. Endogenous development trends are, and can be identified as *empirical phenomena* through a careful empirical analysis of heterogeneity in marginalized rural areas. Heterogeneity is not to be seen as unstructured 'chaos' (or as the result of the 'survival' of archaic forms of production), but as produced and reproduced through the goal-oriented, strategic actions of the actors involved. And since these actors are not isolated individuals, but related through all kinds of social networks and patterns of communication, as well as through patterns for defining and articulating interests, their strategic responses will, to a degree, be socially mediated responses. That is how and why styles of farming emerge.

These styles, then, are in no way to be considered as static entities. As a consciously organized flow of activities through time, they not only have a past and a present but they also entail specific projects for the future. Such projects for the future can also be explored, and this may go some way to assessing their potential impact. But one can go yet a step further.

The notion of heterogeneity not only applies to farming styles in their entirety but also to the variance within each style of farming. This stems from the simple, but nonetheless quite often neglected fact that some actors are more successful than others in applying a particular strategy. Let us take for instance the movement of Andalusian day-labourers and small farmers oriented towards the creation of ecological co-operatives. The various groups that constitute this movement are different. The co-operatives themselves are equally varied, some more successful than others. The main trends within sociology usually neglect such differences and the co-operatives are then represented through the 'modal' experience or through an 'ideal-typical' model. The eventual differences would thus be seen as rather irrelevant or accidental (if not confusing).

What I would propose is a different view. The co-operatives face a huge number of serious problems. Some co-operatives may find effective answers to some of these problems while failing as far as other problems are concerned. For other co-operatives the situation is different. They may solve the latter but remain 'defenseless' in face of the former. Thus, even in the relatively 'unsuccessful' cases, important lessons are there to be learned. More important, however, is the following consideration. Some co-operative groups solve more problems than others, or have proved to be particularly successful in developing certain areas such as, for example, *reproducing soil fertility without the use of chemical inputs*, or *managing* relations with the authorities, or strengthening their own position through the mobilization of political support from the surrounding communities, etc. In brief, they are more successful than others in organizing a particular praxis that embodies and reinforces a particular strategy.

It is in this particular form of variance that the assessment of the potential impact and the construction and elaboration of particular design methods aimed at consolidating endogenous forms of growth might be grounded (Glaser and Strauss 1967).

Back to Empirical Reality

I am fully aware that such a methodological approach differs markedly from the pattern now dominant in agrarian science. Those with some knowledge of the history of agrarian science will recognize my position as a 'step backwards' towards classical agronomy. Classical agronomy indeed differs sharply from the current technology-oriented agrarian sciences. Whilst the former was based on an extensive knowledge of empirical diversity, on implied 'logics' and specific sets of social relations of production, the latter stand for a far reaching 'adieu' to the empirical reality of farming, since they are mainly oriented to technological transformations. I believe it is no shame, but is even necessary, to revitalize classical agronomy in an epoch in which agrarian science is confronted by a crisis that reflects, but also reproduces, the crisis that exists in farming practice.

Notes

1 Part of total production is oriented towards consumption within the family, another part might be used for socially regulated exchange, a third, and often considerable part of total production will be used as non-factor inputs in forthcoming cycles (i.e. so-called internal deliveries) and finally, the reproduction of factors of production could also be considered as an integral part of the total 'output'. Hence, a considerable, though highly variable part of total output, might consist of specific use-values. For a further analysis see van der Ploeg (1990a).

2 An excellent discussion of different reproduction schemes is to be found in Saccomandi (1991: 489-503). Saccomandi uses the neo-institutional approach to interpret the phenomena indicated.

3 The growing centralization of markets, the underlying trans-nationalization of capital, the globalization of price and cost levels over widening areas, the increase of external turbulence, are all increasingly important factors. However, as history shows, uniformization, globalization and centralization at the macro-level more often than not go together with growing differentiation and 'distantiation' at the micro-level. See among others the historical work of Slicher van Bath (1960) and Bloch (1939).

4 Under former conditions diversity was strongly related, though not fully explained, by inter-regional differences that partly reflected different ecological settings.

5 Especially since technological development is now increasingly oriented towards the design of all-embracing 'technological systems', i.e. to technological chains in which one set of innovations presupposes the other.

6 Intensification of production is, within this model, mainly based on the mobilization of factors of production and inputs embodying additional productivity (i.e. intensification follows as a consequence of increased market-integration), whilst scale-enlargement emerges mainly as the result of the application of new (mechanical) technologies. This markedly differs from intensification and scale-enlargement as realized within the endogenous growth model.

7 The same phenomenon is to be encountered within the Netherlands, though it is more pronounced at the EC level.

8 I remind the reader that technological designs are nearly always oriented towards a reduction, if not to the almost complete elimination of both the quantity and quality of labour.

9 This does not, however, imply that the level of total inputs is necessarily low. Mostly, it is labour that replaces the use of external inputs (de Wit 1975). This particular 'substitution curve' has been described and analyzed in a considerable number of studies. This was the case for Latin America in the so-called CIDA studies. Abundant historical illustrations are to be found in the recent studies of both Bieleman (1987) and van Zanden (1985).

10 Taking into account the internal deliveries, that is, the reproduction of factors of production and non-factor inputs, the total input might indeed be quite high.

11 Empirical data can be analyzed through several indicators from this perspective, e.g. the relation between labour input and variable costs, the relation between variable costs and gross value of production, the capital-labour ratio, the relation between value-added and gross value of production, etc.

12 That is, their own labour force did not become superfluous.

13 The interrelation between self-sufficiency (which is, after all, an important feature of Umbrian agriculture, especially when socially-regulated exchange is taken into account) and the absence or at least highly reduced use of chemical inputs, is striking. This is also reflected in INEA data-sets (see van der Ploeg 1990c).

14 The need to fall back so frequently on examples is admittedly indicative of the still poor theoretical level of any discussion on the diversity of development trends in European agriculture.

15 This again offers specific operational clues for the identification of different styles of farming as well as for the identification of underlying growth patterns.

16 It is remarkable that in the blossoming attention given to local knowledge systems, considerable attention is given to the way in which farmers classify their soils, their potatoes, their cattle, etc., but very little is given to the equally important classification (one could even say 'folk taxonomy') which farmers make between themselves (Bennett 1981).

17 See Bennett (1981) and Long and Long (1992).

18 This is largely identical to the research results discussed in the chapter of Roep and de Bruin in this book.

19 This increase in technical efficiency (to be understood as autonomously produced progress) was associated with an actual decrease in the use of external inputs (See van der Ploeg 1990c).

20 This does not imply a stagnant situation. On the contrary, some farms disappeared, others emerged. Also the total output of farms significantly increased. The interweaving of farming with other economic activities also changed considerably.

21 For example, very low external financing, considerable flexibility combined with the highly mixed character of the farms, the consistent fall-back on socially regulated exchange for the realization of investments, improvements and expansion, a low degree of externalization, direct commercialization to consumers, and specific mechanisms for the intra-generational turn-over of farms (through extra-agricultural activities for instance) (Bruin 1991).

22 This bias is mainly due to (a) the introduction of specific time horizons that correspond quite well to some styles but introduce strong distortions in the understanding of others, and (b) to the fact that the essential differences between commoditized and non-commoditized circuits and resources are completely obscured in current farm accountancy practices, since every resource is evaluated according to current price-levels. A third type of problem relates to the required income-levels, which in the first place differ consider-

ably from one style to another and are, in addition, typically misrepresented by current accountancy categories.

3 Farm Household Strategies and Styles of Farming: Assessing the Utility of Farm Typologies

Sarah Whatmore

The use of typologies has a long lineage in sociological analysis, most notably associated with Weber's construction of 'ideal types' (Becker 1945). While categorising, or naming phenomena is basic to everyday as well as analytical ways of making sense of the world, typologies represent a formalisation of this sense making process which invests the categories constructed with the authority of 'science', whether in terms of claims about the rigour with which phenomena have been observed and classified, or about the explanatory significance of the distinctions made. In responding to the invitation to provide a critical overview of the utility of such typologies as they have been employed in rural sociology, I was immediately struck by the difficulties of directly comparing different typological schemes for two reasons. First, the aims, analytical objects and uses of typologies clearly differ depending on the explanatory framework in which they are located. Second, and of equal significance, these different explanatory frameworks are very unevenly institutionalised in 'scientific' discourse, with important implications for the legitimacy accorded to their analytical insights by policy-makers.

The main objective of this brief paper is, therefore, to raise some general considerations about the assumptions and limitations of typologies as a methodological tool located within a variety of epistemological frameworks. As will become clear, the typology at the centre of this collaborative European project (van der Ploeg's 'styles of farming') is located in what I call the 'experiential' or hermeneutic approach to typological construction and, in conclusion, I want to reflect a little on the problems and possibilities of securing a place for this valuable approach in the policy process.

Typologies in Rural Sociology

Typologies have been used in rural sociology primarily to distinguish the social and economic charateristics of farming. Even within this specific focus, however, farming typologies differ in terms of the unit of analysis (for example, the farmer, the farm household, or the farm business); the criteria for classification (for example, types of land-use practice, household livelihood strategy, or enterprise mix); and their analytical purpose (for example, to identify the class relations of agricultural producers (Goss *et al.* 1980; Ghorayshi 1986), or the significance of landownership relations in agriculture (eg Stinchcombe 1961; Newby *et al.* 1978).

At a more fundamental level typologies also differ significantly in terms of the assumptions they embody about how social phenomena should be conceptualised and explained. These differences centre on the relationship between observation (empirical), representation (experience) and theory (explanation); a relationship which is construed very differently within competing epistemological frameworks. As a consequence the potential utility of typologies in helping to explain, as well as describe, observed differences in social relations, their stability and change, is very variable. Figure 1 outlines three main epistemelogical frameworks, positivist, realist and hermeneutic and the characteristics of typology construction associated with each of them.

Positivism, the orthodox 'scientific method', is the most frequent basis for the construction of typologies in rural sociology. Such typologies involve the classification of correlations between observed regularities in the morphological characteristics of a unit of analysis (for example the size of a farm business in terms of acreage or business turnover) and behaviour patterns of the farm operator (for example, propensity to adopt new technologies). In this context, observation statements are privileged and treated as '(dis)provable' independent of an explicit theoretical or conceptual reference point. Such 'taxonomic collectives' equate the observable features of phenomena with structurally different types of agency (Harré 1981), limiting their explanatory contribution. However, this typological method attracts disproportionate policy interest, not only because it represents scientific orthodoxy, but also because such classifications are technically easy to reproduce over time and between places using standardised, often 'official', data sources (for example farm census material).

The realist and hermeneutic frameworks have posed increasingly powerful challenges to the 'scientific' status of positivism in terms of the methodological development of the social sciences (Knorr-Cetina 1981; Sayer 1992). However, they have only recently begun to inform research practice in terms of the construction of alternative typologies in rural sociology. Typology construction within the realist approach rests 'upon the identification of coherent patterns of economic and social relations between the object of study and its structural context, producing a structural, or 'relational' typology' (Harré 1981). The key methodological difference between this and the positivist approach is that the structural relations defining categories do not necessarily coincide with any observable, morphological feature of the phenomena being studied.

Typologies	Epistemological Frame	Basis for Abstraction	Primary Analytical Objective	Policy Implications
Taxonomic Group	Positivist	Formal/Morphological Features (eg. farm size by acreage/labour time	'Data Sorting' (ordering empirical observations)	Influential due to i) authority of 'scientific' method ii) technical replicability
Relational Group	Realist	Casual/Structural Relations (eg. extent of commoditisation of farm (re)production process)	Theoretical Development (explaining causal processes)	Influence constrained by i) 'illegitimacy' accorded to explanatory reasoning ii) lack of standardised criteria/ methods
Experiential (Folk) Group	Hermeneutic	Interpretative/ Representational Discourses (eg. self identity vis-à-vis others)	Theoretical Development (explaining behavioural processes)	Marginalised due to i) challenge to 'scientific' method ii) technical handling problems

An example in rural sociology is the typology of farm businesses in Britain developed by Whatmore *et al.* (1987a and 1987b) and recently extended by Marsden *et al.* (1992). This typology sought to identify relational, that is theoretically significant, categories of business according to the extent to which they had been directly and indirectly commoditised. This involved complex measures of the division of labour, managerial organisation, business structure and property relations of farm businesses to determine the commoditisation of their internal relations of production, and of their dependency on technological inputs/expertise, contract sales and credit to determine the commoditisation of their external relations with other sectors of the agro-food system. From this conceptualisation four ideal types of farm business were identified at the core of a matrix of relationships between direct and indirect measures of commoditisation. While now established in research terms, this kind of typology faces a number of hurdles in terms of influencing the policy process because of its unorthodox epistemology and the need for farm data which are not readily available from official statistics and so entail extensive fieldwork.

The third, hermeneutic, framework holds a similarly unorthodox status in scientific discourse, although it is increasingly well established in social science research. It centres on the role of human actors in giving meaning to the world they inhabit and acting on the basis of those meanings, and the incorporation of these subjective processes into the terms of any analysis of patterns of behaviour or relationships. The methodological construction of typologies in this framework prioritises the meaningfulness of the categories, or classes, of phenomena identified for the social actors whose experiences and activities they depict. We can call such typologies 'folk' or 'experiential' groups. An example of this approach in rural sociology is the typology of farmers attitudes and practices with respect of landscape protection developed by Volker (1992). He identifies four categories of farmer; 'agribusinessmen', 'pragmatic managers', 'conventional farmers', and 'pragmatic farmers', on the basis of the centrality of economic considerations to their motivations and the adaptation of their land-use practices towards environmental ends. The problems of translating such typologies into the policy process is complicated, as with the realist approach, by the unorthodox status of the hermeneutic interpretation of the scientific project. But, more than in the realist case, the practical issues of replicability and standardisation of the methods involved to permit comparison between places/times, make such typologies hard to reconcile with the institutional protocols and procedures of the policy-making process.

Endogenous Development Strategies and 'Styles of Farming'

The collaborative project which produced the conference papers comprising this publication is centrally engaged with the methodological problems of typology construction. Here the primary unit of analysis is the farm household; its object of classification, household livelihood strategies and their associated farming practices. The main analytical objective is to inform a policy of endogenous regional development which promotes the sustainability of local farming knowledges and practices with respect to environmental and food quality. A number of more or less formal typologies appear in different papers throughout the collection. The most substantial is the idea of 'styles of farming' espoused elsewhere by van der Ploeg (1990, 1992) and developed in relation to dairy farming in his paper in this volume and, in relation to beef production in Umbria, in the paper by Ventura and van der Meulen.

This typological method is a powerful and illuminating example of the 'hermeneutic' approach outlined above. It centres on the folk-categories used by farmers themselves to characterise important differences in farmers' orientation towards commodity markets and technologies, as the structural principles influencing farming methods. The great strength of this kind of approach is its capacity to present a view 'from the field' which reverses bureaucratic and scientific assumptions about the backwardness and, by implication, the insignificance of small-scale, non-industrialised farming and reveals the dynamism and range of strategic adaptations to technological and market change in this sector.

There are however, one or two specific issues which require further attention and elaboration in developing this kind of 'experiential' typology and its application to the specific social context of farming. Foremost of these is the relationship between what research subjects say about themselves and their experiences, and what they do. As Giddens (1984) demonstrates in his distinction between 'discursive' and 'practical' consciousness, this relationship is not as straightforward as the 'styles of farming' account might suggest. Farmers, like everyone else, construct narratives or stories through which they make sense of events and experiences for themselves, as well as for others. Such narratives are inevitably partial in the sense that they represent events in a way which reflects, and helps constitute, the authority of the story-teller and is dependent in part on audience and context. The same event may be recounted very differently in another context, or if told by another participant in the event.

This raises two further issues. The first is the importance of recognising the power relations within the farm household, by gender and generation, which structure the narrative authority of different household members in the story-telling process and, hence, the research imperative to explore the tensions and contradictions between competing accounts (Whatmore 1991).

The second is to question the unqualified translation of research subjects' narratives into an indisputable bedrock of analytical 'truth' or authenticity, pointing instead to the need for a more explicit recognition of the complexities of the 'double hermeneutic' characterising social science investigation.

Conclusions

The 'typology' of typologies outlined above highlights the significance of the diverse philosophical assumptions underlying this methodological tool, to its analytical and policy utility. It is worth emphasising at this point however, that whatever their epistemological assumptions typologies share a number of limitations. While they play an important role in mediating empirical investigation and theoretical explanation they cannot be used as a substitute for either of these levels of analysis. Moreover, as a formalised methodological technique, they are necessarily limited in their capacity to handle process and change. In short, while their utility varies depending of the epistemological assumptions they embody typologies properly constitute an aid to, rather than an end product of analysis.

This said, I would argue strongly that both realist and hermeneutic typologies have significant contributions to make to understanding agricultural restructuring and the sustainability of farm livelihoods and environments. As I have tried to point out, researchers adopting such approaches face a number of problems in registering these contributions on the policy agenda; problems which need to be addressed more directly than perhaps has been the case up to now. In closing, I would like to suggest three points for consideration as a preliminary agenda in pursuing this task:

1. Appropriate unit of analysis. The social relations structuring the farm as a socio-economic unit, whether organised around family/household or corporate structures should be central to the methodological construction of typologies. This implies a shift away from 'methodological individualism', which in rural sociology isolates the 'individual farmer' as the focus of analysis, towards 'methodological situationalism' which focuses analysis on the power relations and tensions between the multiple actors whose identities, experiences and narratives constitute the practice of farming.
2. Farming and the wider agro-food chain. The socio-economic relations of farming and individual farm units cannot be divorced from the wider social relations and institutions which structure the processes of food production and consumption. Typologies should help to identify the vital, reflexive connections between the local and the global, rural and urban, producer and consumer, such that the analytical and policy significance of endogenous development is not restricted to a series of unrelated and bounded geographical arenas.

3 Critical rural sociology and the policy process. Critical rural sociologists have a well established commitment to using their scientific skills to help translate the knowledge and interests of 'marginalised' agricultural producers onto the policy agenda. This commitment would be well served by diverting some of our research energies towards institutionalising the scientific legitimacy of the kinds of alternative research methodologies emerging from this volume, through working more closely with extension services, farming organisations and state agencies.

4 Practices of Endogenous Development in Barroso, Northern Portugal

Artur Cristóvão, Henk Oostindie and Fernando Pereira

Barroso is one of those fascinating rural areas, which, while apparently forgotten and certainly far from the centres of agrarian policy-making, holds nevertheless an amazing dynamism. Barroso is a region in the north-west of the Portuguese province of Trás-os-Montes. It could and still can be easily described in terms usually used to describie marginalized areas, that is, relatively isolated, lacking in socio-economic infrastructure, a local economy heavily dependent on the agricultural sector, and dominated by small-sized, highly-scattered farm holdings. There are several studies which describe in detail the rural societies and farming practices of Trás-os-Montes in general (O'Neill 1978; Bentley 1992), and Barroso in particular (Pires 1970; Lema 1978; Lima Santos 1992).

In this chapter we present some results of an inquiry into the diversity of farming practices in Barroso. This diversity is analyzed as the outcome of complex socio-economic processes and of the differentiated responses of farmers to recent policy interventions. The empirical diversity in farming styles in these two similar areas reflects, we believe, an important difference in underlying development patterns, some styles being grounded in endogenous patterns whilst others clearly express more exogenous forms of development. From these differences we hope to derive some suggestions on new forms of intervention which might contribute to the strengthening of endogenous development.

Historically, up to the 1950's, two types of farm-households could be distinguished in Trás-os-Montes and Barroso: The *cabaneiros*, or the 'poor', who were without the means to produce sufficient cereal (rye) to satisfy family needs or reproduce agricultural activities (cultivation of rye and animal fodder). Their limited access to land made it impossible to maintain a pair of animals for traction, thus making them dependent on the larger farm-holdings. The *cabaneiros* employed family labour outside the farm household, as servants or as day labourers (*jornaleiros* or *jeirantes*) during the peak periods, thus offering some small, local opportunity for employment. The making and selling of charcoal (*carvoeiro*) and basket making (*cesteiro*) offered them some additional income.

The farm-households of the *lavradores* produced larger amounts of cereals, not only for subsistence and reproduction, but also for the market, and their larger land holdings allowed for the breeding of suckling calves and the maintenance of more than one pair of animals for traction. Within the stratum of the *lavradores* a smaller group of *lavradores abastados* could be distinguished. The main income source for these families was the rearing of animals. These families also gave permanent employment to one or more servants.

In general, off-farm income-generating activities were few. Afforestation of the mountain areas offered (temporary) employment, as did also the construction of several dams in the region and the wolfram mines. However, with the recent closing down of the mines, industrial employment has been limited to the construction sector, and agricultural activities have been unable to offer a reasonable income to Barroso's increasing population. The lack of alternative employment has forced people to leave the region. Many left share-cropping and day-labouring to migrate, first to the Portuguese colonies and to Brazil, and from the beginning of the sixties, to France, Germany, Switzerland and Luxembourg. As a consequence of this process, the population decreased by 53 percent between 1960-1991 (PDAR 1992).

Migration, and since the 1970s, return migration, have been crucial factors in social change within Barroso. Migrants sent remittances, returned with savings, built houses and/or invested their savings in land purchase and other agricultural investments. At the same time, since emigration had drained off much of the agricultural labour pool agricultural practices changed. The importance of arable farming (rye, maize, potatoes) steadily declined, giving way to livestock production (meat, milk) which has become the main agricultural activity of most farm households. Farming continues, however, to be based on the interrelations between arable farming and livestock production for meat.

Research Methodology

The field research started with informal interviews with key-informants, such as agricultural officers from the regional office of the Ministry of Agriculture (*zona agraria*), and farmers in about 20 villages. The research area was then limited to two homogenous ecological zones in Barroso (PDAR 1992): The zones of Alto Barroso Oriental and Occidental. They were selected because of the relative importance of cattle breeding in agricultural production, with dairy farming as well as meat production in both zones. The villages were selected in such a way that diversity on variables such as orientation to livestock production (milk or meat), area of commons (*baldios*) and the number of farmers participating in the EC-797 programme, would be as high as possible. One can, therefore, argue that are relevant heterogeneity was satisfactorily covered by the ten villages selected.

In these ten villages, a total of 68 farm households were studied in depth using a questionnaire containing both open-ended and closed questions. Average interviews took about two hours and were partly tape-recorded. The farm-household was taken as our basic unit of analysis and for practical reasons the survey was directed towards the head of household (mostly male, but in some cases female), though other household members often participated during the interviews. Information was gathered on household composition, agricultural and non-agricultural sources of income for members, the farm's history, and the future plans of farm-holdings in relation to agricultural investments, succession, participation in EC-grants etc.

The data on agricultural production included a general inventarisation of animal production and arable farming (crops, crop rotation, production orientation), and a detailed study of specific elements of the farming systems, such as fodder production, the use of chemical and organic fertilizers, and the commercialization of meat production.

The research population is not completely representative of the regional agricultural structure. The study focused on diversity in livestock production and thus excluded farmers with no livestock – in most cases small farm holdings with retired household members. For this reason, the average farmsize of the research population is considerably higher than the average farm size for the whole region (13 and 5.7 ha respectively). Nevertheless, the farmers interviewed, reflected the diversity to be found among farm-households who intend to continue in farming.

Agricultural Heterogeneity at Village and Farm Level

In Barroso, heterogeneity also appears to be a dominant feature of farming that is related to different development patterns. Farm holdings and villages show a wide variation on a range of variables. Of the latter, two were selected as a starting point for the analysis of different development trends: Orientation to milk production and cattle density per hectare.[1] During the last decades (especially during the 1980s), state and EC-funded interventions in Barroso have been strongly oriented to the introduction and stimulation of milk production. Thus, the extent of milk versus (the traditional) meat production, reflects, one way or another, the impact of these interventions. The same goes for cattle density. Modernisation, more often than not, follows the path of an increase in cattle density. One might assume, therefore, that differences in cattle density or orientation to milk production would reflect differences in the rhythm as well as direction of farm development, particulary as analysis shows that neither of these variables can be considered accidental. In farming practice they are, of course, intertwined with many other variables, as will be shown.

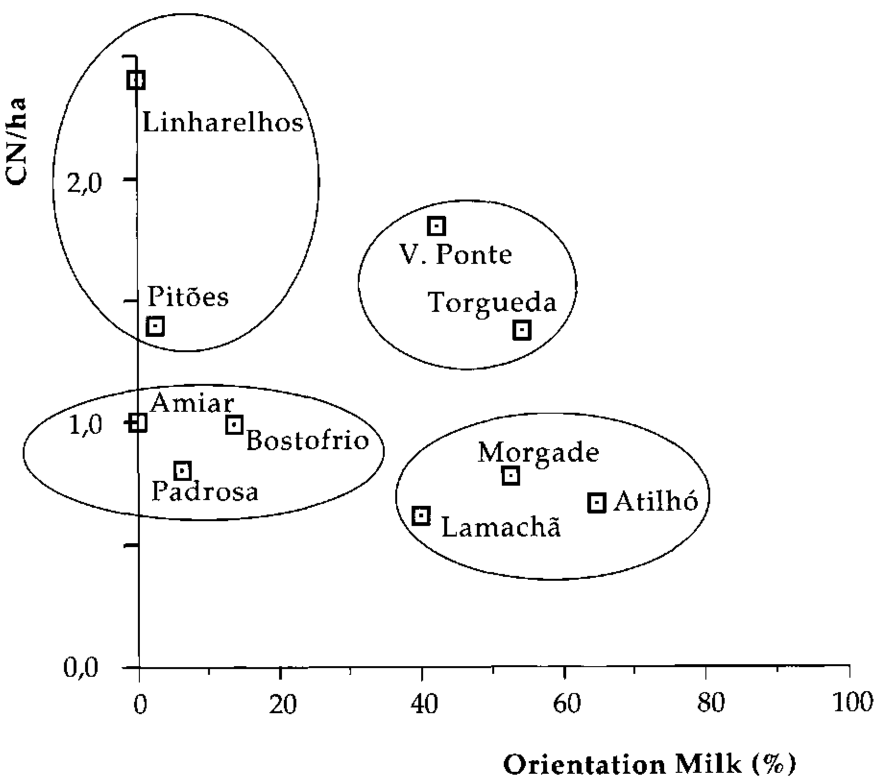
Starting with a projection of the average scores of the above variables at village level, an interesting panorama emerges. Heterogeneity exists, but in specific clusters (see Figure 1). The first cluster, which includes the villages of Padroso, Amial and Bostofrio, is characterized by a strong emphasis on meat production and relatively low cattle density. The second, represented primarily by the villages of Linharelhos and, to a lesser degree, Pitões, shows a noteable difference: traditional meat production with high cattle density.

In contrast to these clusters we find villages where farming has been reoriented to milk production. A strategic factor in the creation of this difference was the introduction of SCOM (Salas Colectivas de Ordenha Mecanica), or collective milking parlours at village level (Portela and Baptista 1991). It is significant that all the villages involved in this third cluster, have such a collective milking parlour while those of the first and second no longer have one. Of the villages which made (partly) the shift to milk production we can distinguish two different clusters: Those such as Morgade, Lamachã and Atilhõ, characterized by low cattle density; and the villages of Vila de Ponte and Torgueda, where cattle density is relatively high. We would argue that the diversity in farming expressed by the four clusters in Figure 1, is the result of development trends that took place in the 1980-1990 period: The creation of the SCOM (as an endogenous answer to new opportunities); the restructuration of agriculture as a result of EC-interventions; the revitalization of local meat production; and an ongoing, albeit not generalized marginalization, can all be seen as the particular effects of these trends, each resulting in a specific style of farming. Firstly, however, we wish to discuss the particular independence between farming and the commons.

Part of the heterogeneity noted concerns the differential use of these commons or moorland areas (*baldios*). Historically the commons were of great importance in Barroso's rural economy as pasture for goats, sheep and often livestock, and they covered three quarters of the total area. Moreover, part of the commons, i.e. the *monte*, was used for arable farming, which after the harvest were returned to communal pastureland. The commons were also used for gathering firewood, and for construction materials such as stones and wood. Poorer families especially used the scrub vegetation of the commons for making charcoal for additional income. The commons as their name implies, were managed communally and conflicts over their use, and over the distribution of the benefits between neighbouring communities were not unusual, nor were disputes over damage to crops or private land bordering the *monte* caused by grazing animals. Permission to gather firewood and the regular burning of heather plants as a form of pasture management were also communally arranged.

The continued existence of large areas of commons is one of the main reasons for the relatively high density of cattle in Barroso as compared to other Portuguese regions (Pires 1970). Throughout history, Portuguese policy has tried to turn the commons into private or State property, especially through afforestation projects (Brouwer 1992). Despite this, they remain of great importance as pastureland, although with notable differences between villages, reflecting their scarcity or uneven quality or utilization. The commons have been maintained and improved by regular pasturing over the centuries. Without pasturing, the dominant vegetation of these heathery areas, on shallow soils with mostly grasses and ferns in the more humid parts, would gradually turn to shrub vegetation, unsuitable as a fodder source. It is only through continued and well-balanced use that the commons are reproduced over time as a valuable local resource. Once active use diminishes, both real and potential value decline.

Figure 1 Heterogeneity at Village Level



Villages involved in meat production use the commons much more than other villages. In Linharelhos, farmers use the *baldios*, on average, 7.4 hours a day (in Pitões as much as 9.9), whilst for the first cluster, with low cattle density, this is, on average, four hours. The clusters oriented to milk production rarely use the commons as pastureland (less than two, and one hour respectively) (Lima Santos 1992).

For a better understanding of the differences within and between meat and dairy production, we need to shift our unit of analysis from village to farm level. Although the size and quality of a village's commons, present a more or less fixed set of possibilities and constraints, they nevertheless offer farm-households some room for manoeuvre, and their differential use of these and other local resources assures that in all villages several styles of farming can be found. In Vila de Ponte, for instance, we found examples of three different styles of farming. At the same time specific 'centres of gravitation'appear. In Linharelhos and Atilhõ, for instance, particular styles are clearly dominant, as shown in Table 1.

Table 1 Division of Farming Styles at Village Level[2]

Village	Int. dairy farmers	SCOM farmers (milk parlours)	Int. meat producers	Ext. meat producers
Padroso	-	-	2	4
Lamachã	-	5	-	2
Morgade	2	-	-	2
Bostofrio	1	-	1	4
Torgueda	-	5	1	-
Pitões	-	-	4	4
Atilhõ	-	6	1	-
Vila de Ponte	3	-	1	3
Linharelhos	-	-	4	2
Amiar/Tabuad.	-	-	1	5
Total	6	16	15	26

Cattle density and orientation to milk production were the principle ways of exploring the diversity of Barroso's agriculture. But these two variables are not isolated phenomena. They relate to other characteristics of farming practice, which when taken together create a more complete picture of differentiation in this rural area. Table 2 breaks down the dairy and meat producing enterprises and presents the degree to which the various characteristics chosen are present.

Table 2 Characteristics of the Farming Styles

Characteristics	Intensive dairy farmers (n=6)	SCOM farmers (n=15)	Intensive meat producers (n=16)	Extensive meat producers (n=26)
Average:				
Cattle density (gross animals/ha)	1.2	0.7	1.4	0.8
Orientation milk	99%	70%	8%	2%
Farm size (ha)	22.6	12.2	11.9	11.8
Number of cattle	24.0	6.5	13.9	8.3
Number of sheep	0	5.5	22.4	6.3
Number of goats	0	5.9	28.0	8.7
Number of pigs	1.8	3.1	4.3	2.8
% potato in total area	7	14	11	6
Age of farmer	32.3	44.7	48.7	54.6
Number of household members	3.3	4.7	4.8	4.4
Use of:				
Labour exchange	67%	73%	82%	96%
Temporal wage labour	50%	40%	70%	28%
Permanent wage labour	33%	6%	6%	4%
Participation in EC-grants	100%	40%	35%	20%
Use of machinery*	10.6	6.5	6.9	5.8
Owns sprinkler	100%	40%	29%	16%
Constructed irrigation tanks	50%	29%	47%	20%
Installed temporary meadows	83%	43%	18%	4%
Introduced silage maize	100%	50%	6%	12%
Use of:				
Conc. calves (kg/day)	3.5	2.4	2.0	2.3
Conc. dairy cows (kg/day)	6.0	5.7	-	-
Conc. suckl. cows (kg/day)	-	0.5	0.7	0.7
Artificial Insemination	100%	57%	40%	38%
Barrosã breed	0%	0%	20%	33%
Fatten calves	50%	27%	44%	12%
Increased meadows in total area	67%	71%	82%	64%
Renew traditional meadows	33%	43%	77%	52%
Average pasture time in commons (hours/day)	0.7	2.5	6.2	5.1

* Indicator reflects the use of machinery including renting.

Intensive Dairy Farmers

One of the most striking characteristics of intensive dairy farmers is their use of 'external' elements. All have taken advantage of EC-grants, constructed modern cowsheds (*vacaria*) and built individual milking parlours. They have imported Frisian milk breeds to replace local meat breeds, and their reproduction has become dependent on the use of artificial insemination. Forage production has been intensified by the introduction of silage maize and the use of temporary meadows. In the ecological setting of Barroso, with its dry and hot summers, this required a thorough reorganization of irrigation practices.[3] It is not surprising, therefore, to find that all the intensive dairy farmers have purchased a sprinkler, and that half of them have also constructed irrigation tanks. In synthesis, the introduction of milk production on these farms has involved a clear rupture with traditional farming practices, and depends on high capital inputs. Only the young farmers with access to first-time installation grants are able to pay for these capital inputs.[4] The limited availability of family labour in the smaller households is partly substituted by a high level of mechanisation. But not entirely. These farmers, more than in any other group, employ permanent wage-labour from outside the farm. The importance of traditional labour exchange (*troca* or *por favor*) between neighbours is relatively low.

Though milk is the main income-source for dairy farmers, meat production remains of considerable importance. The fattening of calves until one year old has often been an integral part of EC investment grants. In general, however, a process of specialization has been taking place, with a decrease in the average number of goats, sheep and pigs as well as a decline in the importance of potato production.

Although the development of intensive dairy farming has been, until very recently, the main project of EC and state interventions, discussed in more detail later, it must be stressed that in the socio-economic and ecological reality of Barroso, its scope has been very limited. It applies to only a minority of the farm households in the whole zone (RAC 1989).

The SCOM-farmers

For most farmers, the investments needed to develop intensive dairying is impossible to realize. The construction of an individual milking parlour, for instance, is only possible with a relatively large scale of production. Thus collective milking parlours at village level have been an excellent solution. The average farm-size of a SCOM-farmer is almost half that of the intensive dairy farmer and for him, the introduction of milk production did not go along with high investments, but with the replacement of existing meat-breeds by Frisians. The smaller farmers in particular did not shift completely to dairy production, but kept some traditional breeds which are used for traction. Furthermore, milk production remained integrated into the farming system as a whole, and after a period of 5-6 months cows are released from the twice daily visit to the milking parlour in order to be used to suckle and fatten two or three calves. Other farmers use their less productive dairy cows during the whole lactation period for this purpose. For that reason it is of little value to compare the milk production per cow of SCOM-farmers. Average lactation periods vary considerable between farm-holdings, expressing the difference in emphasis on meat or milk production. Nevertheless, to give a general impression of the technical results realized by SCOM farmers, a sample of 650 dairy cows in 31 'SCOMS' showed that 56 percent produced more than 4000 liters, and eight percent produced more than 6000 liters (Portela and Baptista 1986 and 1991).

It is difficult to compare these results with those of the intensive dairy farmers. Most of the latter only started producing milk one or two years ago. The dairy stock is still in a phase of development, and differences in fodder production are quite pronounced in that SCOM-farmers do not depend on an intensification of fodder production as do the intensive dairy farmers, and their utilization of the commons as a fodder source has remained of greater importance. Only some of the larger farmers among them have introduced silage maize and/or temporary meadows and also the purchase of concentrates for their dairy and suckling cows is relatively low. Agricultural activities are more diversified, demonstrated, for instance, by the importance of potato production. Also their participation in EC-grants schemes is low. Those who participated mostly invested in machinery related to potato production.

The Meat Producers

Farmers orientated to meat production are not completely unfamiliar with dairy production.[5] Several had recently purchased Frisians but have since abandoned dairy farming. Sometimes this has been due to external constraints, as in the village of Pitões, where about ten years ago the cooperative dairy industry stopped milk collection for economic reasons. However, their abandoning of dairy production cannot be explained solely by limitations in commercialization. In several villages, the implementation of a collective milking parlour turned out to be unsuccessful. The reasons for these failures are various, but our own field data confirms the dominance of economic motives. Most of the meat producers stress the poor adaptation of dairy breeds to the local climate and physical conditions and their low yields when pasturing on the commons. Certainly the milk producers decreased their use of the commons with the introduction of dairy farming. Meat producers on the other hand stress their importance. '*O baldio é a nossa força*', the commons are our strength, they say, making it possible to increase the number of cattle well above the limits of their privately owned land. In Pitões and Linharelhos, for instance, some of the farmers pasture animals without young for 6-7 months night and day on the commons. The shift to dairy production would impede such an intensive exploitation of the commons, and imply a reduction in the number of cattle, or an intensification of the fodder system. The latter does not fit with the dominant strategy to reduce production costs. Most farmers prefer to continue in meat production with low costs, which also involves keeping the use of industrial concentrates to a minimum (see Table 2).

The geographical division in the production and reproduction of meat between Entre Douro e Minho and Barroso, which existed in the 19th century, is still expressed in the dominance of veal production. The majority of the farmers do not like fattening beyond 5-7 months (*vitelos*) because it implies the purchase of extra concentrates. The *vitelos* are mostly sold to local traders or butchers, who differentiate the price by age and not by breed. This makes the birth weight of the calves an important criterion for breed preferences, and is the main reason why the majority of farmers now cross-breed the traditional Barrosã breed with other breeds. The difference in birth weight between a Barrosa and a Charolais calf, for instance, is estimated to be between ten and fifteen percent. Nonetheless, the Barrosã is still found in the region, especially in the parish of Salto. Here farmers appreciate the Barrosã for its resistance to diseases, its vitality and adaptability to pasturing on the commons which make the Barrosã a truly endogenous resource.

The relatively large households (see Table 2) supply the main labour force for the various farm activities themselves, though labour exchange, the *troca*, is still of great importance for mobilizing extra labour in peak periods. The existence of communal flocks (*vezeiras*) is another example of a social arrangement which reduces the monetary costs of labour required. Farm households supply a shepherd or the wages for a shepherd, in proportion to the size of their share of the flock.

As well as the pastures of the commons, privately owned meadows are also essential for the feeding of the livestock. Farmers distinguish three types of natural meadow; haylands (*lameiros de feno*), pasture lands (*lameiros de pasto*), and grass (*lameiros de erva*), on small plots (some hundreds of square meters) near the village, grown with an abundance of irrigation water. The use of these plots is limited to the cutting of fresh grass for additional feeding in the stables. In general, haylands are also found in locations with relatively high availability of irrigation water, or on soils with a capacity to hold their humidity for a long period (*terra lenta*). This contrasts with the *lameiros de pasto*, where the availability of irrigation water is limited, or where the soils dry out more rapidly (*terra areneira*), both major constraints to hay production.[6]

One of the traditional ways to improve the productivity of natural meadows is to integrate them into arable farming. After some years under cultivation, the fields are allowed to revert again to meadows, sometimes by sowing grass seeds collected from the haybarns, but mostly through the cultivation of rye and the self-seeding of natural grass vegetation. The purchase of improved grass seed is highly uncommon, as is the cultivating of temporary meadows. The latter is excluded since it would imply a counter-productive change in crop rotation schemes (one of the reasons for the stimulation of temporary meadows is the more frequent inclusion of potato in rotations). Farmers with a limited arable area in particular would not find this attractive. Of the few farmers who had experimented with temporary meadows, several concluded that after two or three years the difference in production between these and the natural meadows were negligent. In their opinion the temporal increase in fodder production did not compensate for the extra costs of buying grass seed and chemical fertilizers.

The production of silage maize is also rather limited among meat producers. Besides the lack of machinery, farmers often point to local ecological conditions, which do not favour growing silage maize. Some had experimented with hybrid maize but concluded that it needed a longer growing period compared to traditional varieties. Also, in villages near the National Park of Geres, this led to problems with wild pigs (*javalis*) destroying the harvest. For that reason they preferred the cultivation of ryegrass (*ferrã*) as an additional fodder source, which is also cheaper and less labour demanding.

So far, we have considered meat producers as a more or less homogeneous group. Differences in cattle density, however, are striking. With almost the same average farm-size (11.8 to 11.9 ha respectively), the group of intensive meat producers possess 6.3 more cattle units than those on extensive farms. This difference cannot be explained completely by a more intensive use of the commons (respectively 6.3 and 5.1 hours per day). Regional ecological diversity (e.g. availability of irrigation water) could also play a role but Table 2 establishes that there is more at stake. There are several indicators that point to differences in dynamics between the two groups. For example, the percentage of farmers who have improved the irrigation system by constructing tanks, or improved the natural meadows by 'renewing', is considerably higher among intensive meat producers. The higher utilization of machinery, the higher average number of sheep, goats and pigs, as well as the percentage of farmers who fatten calves for one year or more, are other indicators. This brings us to the farm-household typology as mentioned earlier. A large number of the extensive meat producers have reduced their cow number (as well as goats and sheep) in the last decades, due to the migration of household members (or, to a lesser degree, their participation in higher education). This decrease in family labour has not been compensated for by off-farm labour or the utilization of machinery. As a consequence, the farms are in a process of extensification of agricultural activities. One of the ways in which this is expressed is a relatively low cattle density. The same goes for the reduction of potato cultivation and/or chosing not to cultivate the poorest soils, which are today extensively used as pasture lands, or left uncultivated (*de luto* which means literally 'mourning').

In contrast, an examination of the intensive meat producers establishes that they have often increased their livestock numbers, and have invested in the purchase of extra land or machinery often financed from farm savings, or from savings from a period of migration, or from their greater participation in EC grants, though for both groups this is relatively low.

The differences in dynamics between the two meat farming styles are sometimes quite visible at village level. In Padroso, for instance, a village where extensive meat production is dominant (see Figure 1), a large number of houses have been abandoned. About 80 percent of the total agricultural area belongs to the *Americanos*, a reference to the main destination of the migrants from this village. These *Americanos* sometimes lend out their land, but often just leave it uncultivated, due to a lack of interested farmers. The lack of agricultural dynamism is also expressed in the dependence on animal traction by the large majority of farm-households and a decrease in the number of livestock. In the period 1972-1992 the total number of cattle-units in the village decreased from 359 to 303. Thus the extensive meat producers reflect to a certain degree the marginalization of agricultural activities in Barroso. This does not justify the conclusion that these farms are doomed to disappear. Extensification could be seen as a by-product of migration, whereas a reversal could emerge as a consequence of re-migration.

A far more dynamic development pattern can be distinguished in the village of Pitões, with a relatively high percentage of intensive meat producers. Here migration has slowed down in the last decade, and the situation regarding the availability of agricultural land is completely different. There is no abundance of land for farm-households who want to expand their farm-holding, but the number of livestock in this village increased in the same period (1972-1992) from 831 to 1,198[7].

Sustainability and Reproduction of Soil Fertility

The two main variables used to distinguish the different farming systems (cattle density and orientation to milk production), are also relevant to soil fertility practices. Table 3 shows the factor loadings of these variables in relation to the use of organic manure and chemical fertilizers. Meat production (factor 1) is strongly associated with the use of organic manure and shows a negative association with the use of chemical fertilizers. In turn, dairy production (factor 2) is positively related to the use of chemical fertilizers. Thus, the more farmers are orientated to dairy production, the more they are likely to use chemical fertilizers to reproduce soil fertility.

Table 3 Factor Scores in Relation to Chemical and Organic Fertilization

	factor 1	factor 2
Cattle density	0.79	-0.08
Orientation milk	-0.32	0.67
Application of manure	0.71	0.42
Application of chemical fertilizer	-0.79	0.28

Traditionally, farmers in Barroso utilized the high quantities of manure originating from the rearing of livestock on bedding derived from the commons. This transport of nutrients was crucial for maintaining and improving the soil fertility of privately owned land. For this reason, farmers still cut all kinds of scrub vegetation, mostly at random, but with a clear preference for the specific characteristics of such vegetation. Gorse and heather are appreciated for ease in cutting, whilst leguminous shrubs like broom and wing broom are known for producing a high quality and long lasting manure. The cutting is labour intensive, the more so if it is done with a scythe, although most farmers now use hand mowers. Manual labour, however, is still indispensable to organic manuring. For cleaning out the stables and spreading the manure on the fields, for instance, most farms totally depend on manual labour. Black (1992), studying the Serra de Alvão in Trás-os-Montes, mentions the decrease in available labour as the principle reason for farmers searching alternatives to shrub vegetation, such as the litter beneath pine forests and maize straw. Our own field data do not confirm such a shift to alternatives. In Barroso, *o mato* continues to be the major source of animal bedding.[8]

However, another process of change relating to the reproduction of soil fertility is taking place. All the intensive dairy farmers have installed modern cow sheds which are equipped with cesspools, thus reducing the labour time spent on the collection of shrubs and the spreading of organic manure. The shrubs for animal bedding have to a large extent been replaced by rye straw, and the spreading of liquid manure has been mechanized by the use of tanker wagons. As a consequence, the quantity of organic manure produced on these farms is rather limited. As Table 4 shows, all the available organic manure is used for cultivating (silage) maize and potatoes, and (less frequently) in establishing temporary meadows. On hay and pasture land liquid manure has replaced organic manure, and to a certain extent also chemical fertilizers though, in general, we see that fodder production is obtained by high levels of chemical fertilization, especially of maize fields, and temporary meadows this is often supplemented with limestone powder for correcting soil acidity.

Compared to their colleagues, the SCOM farmers apply more organic manure as well as more chemical fertilizer to hay and pasture land, but use much lower quantities of chemical fertilizer in the production of maize. This confirms the relatively limited importance given to maize in their overall fodder system, and the dependence on hay as the main fodder for the winter period.

In the case of meat producers, the application of chemical fertilizers is in general limited (except in potato cultivation) not only in quantity, but also in frequency. These farmers often emphasize the irregularity in their applications, motivated by specific weather or crop conditions. They depend primarily on organic manuring.

Table 4 The Use of Organic and Chemical Fertilizers per Farming Style[9]

	Int. dairy farmer	SCOM farmers	Int. meat producers	Ext. meat producers
Manuring (tons/ha)				
• haylands	0	8.3	9.0	6.2
• pasturelands	0	4.8	1.3	0.9
• temp. meadows	30	24	-	-
• maize	28	23	25	24
• potatoes	27	24	29	27
Chemical Fertilizers (kg/ha)				
• haylands	160	266	159	129
• pasturelands	83	237	100	96
• temp. meadows	280	300	-	-
• rye	175	141	84	58
• maize	608	396	127	169
• potatoes	833	857	626	741

At first sight one might think that substituting chemical fertilizers for organic manure would be attractive to farmers, because it reduces labour input. According to a recent study (Lima Santos 1992), this would explain the growing importance of chemical fertilizers in Barroso, but almost without exception, farmers stress that it is impossible to substitute organic manuring completely, particularly in arable farming. Several farmers have experimented with this (mainly in potato production), and observed that after a few years soil fertility decreased. *A terra precisa de comer* (the soil needs to eat), an expression often heard among farmers, denotes the importance they attribute to organic manure. Its importance is reflected in common speech in such popular sayings as *uma pessoa bem estrumada* (literally a 'well-manured person' but meaning a person with abundant financial resources).

In some ways, the use of the term 'man-made soils' is appropriate in Barroso. The application of high quantities of organic manure for centuries has formed a thick, organically rich top layer over what, in general, are poor acidic soils. Organic manure has improved the soil structure, and is also important in the prevailing climatic conditions, as it warms the soil, stimulating biological activity, and offering protection against frost. Goat and sheep manure, known as *estrume quente* (hot manure) is especially efficient in this respect. Chemical fertilizers lack these characteristics and are basically considered supplements to organic manure, able to *puxar a erva ou a cultura,* to stimulate growth during a particular period, but not ideal as a long-term source of fertilization.

Opinions about the necessity of organic manuring of the meadows are less unanimous. The intensive dairy farmer, for instance, considers liquid manure (*chorume*) to be a good substitute, while a lot of meat producers stress the positive influence of regular organic manuring, saying that this not only increases productivity but also improves vegetal composition. These farmers also consider cowsheds with cesspools to be inappropriate, given the climate of Barroso. In their opinion, deep-litter houses offer the animals better protection against the cold winds during the winter period, and provide the large quantities of manure needed. Despite the labour saving advantages of modern sheds, they prefer to stick to the traditional cowsheds, or build new deep-litter houses with larger entrances, making it possible to enter them with a tractor to muck them out mechanically.

Endogenous Versus Exogenous Development

Looking at the main differences between the farming styles distinguished, it should be clear that the concepts of exogenous and endogenous development cannot be defined by using opposing ideal types, where one is founded mainly or exclusively on so called 'external' elements, and the other on 'internal' elements. Such a conceptual framework would miss the basic point that development always entails an articulation of both 'internal' and 'external' elements. The issue is more a question of the definition (and redefinition), the negotiation (and re-negotiation) as well as the practical elaboration of the required balance and mutual interaction of both internal and external elements. Starting from this consideration, endogenous development may be defined as a preponderance of internal, or local elements, which combined into a coherent model, constitutes the point of departure for the interpretation, evaluation, and selection of those external elements to be integrated, so as to enhance, consolidate and/or strengthen the set of internal elements. In exogenous development patterns it is the other way around. It is the introduced set of external elements (a specific technological model and/or the integrated set of rules implied in external intervention) that is used as the starting point for a reconsideration of the available local (or 'endogenous') resources. It is precisely this point which distinguishes the styles of farming described. The exogenous character of the development pattern of the intensive dairy producers, is especially underlined by the fact that the balance between the 'internal' and 'external' swings to the latter side of the equation. It is the introduced technological model which functions as a yardstick for re-evaluating the utility of internal resources such as the commons. And since the latter hardly fit, their utilization becomes a marginal phenomenon.

The opposite trend is to be encountered among the intensive meat producers. Their meat production is an illustration *par excellence* of endogenous development, not only because it relies heavily on the utilization of local resources, but because it is also the model through which to filter decisions on whether specific 'external' innovations should be adopted (introduction of Frisians, adapted cowsheds, etc.). If they fit, they will be integrated. The same applies for the farmers who introduced dairy production without increasing cattle density. It is the availability of a local response (i.e. the SCOM) which allows new and initially 'external' elements (such as the production of milk) to be integrated into the existing set of relations and practices (the correspondence between farming and ecological setting, the interrelations with meat production, etc.).

EC grants represent for several reasons an exogenous development pattern, particularly because of the selective way in which they are applied. Agronomic and technological innovations such as the introduction of silage maize, temporary meadows, modern cowsheds, etc., can only be implemented by a small minority of farmers. Such innovations are not adapted to the ecological setting, scale of production, experiences and perspectives of the overwhelming majority of farm-holdings. The 'external' character of modern dairy technology is also expressed in its threat to the ecological equilibrium of soil and water resources in the zone.

In addition, the socio-economic selectivity of EC-fundings has increased social differentiation between farm-households. The actual feasibility criteria of investment proposals exclude the majority of farmers, of whom a considerable number have actually invested in farm development, but in a step by step approach, avoiding the risk of indebtness. EC grants do not fit into this perception of agricultural development, clearly reflected in the limited number of project proposals within the EC-797 programme. In the period 1986-89 the number did not exceed 230. If we look at the number of accepted investment proposals, it becomes even more obvious. No more than 80 of the 230 proposals were approved according to Isolina and Poeta (1990), who also explain this as being due primarily to the feasibility criteria of the 797-programme. A large percentage of the rejections could be explained by a lack of skill on the part of the 'technicos' to develop investment proposals to fit the step-by-step approach preferred by farmers (see for a more general discussion van der Ploeg, Saccomandi and Roep 1990).

Notwithstanding their limited access, such programmes are strongly present and often an important factor in the decision of farm-households to continue farming. No access to EC grants is often perceived of as 'no agricultural future'. In other words, we should seriously ask whether the overall impact of the way EC-funding is implemented does not actually serve to enforce rather than counterbalance the marginalization process (IRFATA 1992).

Alternative Intervention Strategies

As shown, there are important differences in the extent to which the various farming styles reflect endogenous development. We take the strengthening of endogenous development potential as our starting point for an exploration of alternative intervention methods. We will discuss some elements which, in our opinion, are essential for such alternatives.

First, the nature of EC-funding programmes. We have already mentioned that the way such programmes are implemented creates selectivity and negative consequences. If small-scale investment projects were to be integrated into such programmes then this would certainly lead to an increase in farmer participation and to a more proportional division of the funding between farm-households. This could be stimulated by more flexibility in terms of the content of activities to be subsidised, such as integrating of all kinds of agricultural activities and farm diversification into the broad framework of utilizating local resources. This would imply a rethinking of the dominant modernization paradigm (scale enlargement, and the increase of productivity by external inputs), towards a policy which focuses more on the existing comparative advantages of the region. In Barroso's ecological setting it is not only impossible to achieve the production increases 'more favoured areas', but the attempt to do so could signify that the existing comparative advantages of the region are lost. The low dependency on external inputs of the majority of the farm-households, for instance, could be the base for an agricultural production in which the environmental benefits are explored in new emerging market segments.

The recent shift in local agricultural policy towards the production of Barrosa quality meat could be seen as a first step in this direction. It is as yet unclear whether the concept of quality will include more than just the breed itself. Such a limited definition of quality may not strengthen endogenous development but may benefit most intensive and/or large-scale meat producers outside Barroso. Local farmers closely associate meat quality with the fodder system. More than 80 percent of these interviewed expressed the opinion that feeding is at least as important as the characteristics of the breed for producing quality meat. Meat raised on local forage (*produtos caseiros*) such as hay, ryegrass, rye and maize grain, is considered superior to meat raised using industrial concentrates. The inclusion of the forage element in the quality definition is essential to guaranting that the smaller farmers especially are able to produce Barrosã meat. They are the ones who, after all, feed their animals on the natural meadows and pastures of the commons, and furthermore, produce fodder with low inputs of chemical fertilizers.

The idea of regional-specific, high-quality products, can be extended to other products such as goat and sheep meat or cheese. In Pitões, for instance, a group of farmers have already expressed their interest in the production of goat cheese. The smoked hams (*presuntos*) and other smoked products (*fumeiros*) originating from pork, are other examples of high quality regional-specific products. These home-made products, based on local craftsmanship, are highly appreciated within and outside the region. Such products were traditionally consumed at home and offered to relatives and friends (researchers too), but their commercialization has become steadily more important.

The reorientation of agricultural output markets could also include valorization of the local nature and landscape. These, and all kinds of other local resources could be explored for agro-tourism and initiate a process of diversification of the rural economy (Cristóvão and Tiberio 1992) from which farm-households could perhaps also benefit. It is their practices that help preserve local nature and landscape, but to date farmers have not been rewarded for these activities and are excluded from discussions on how to preserve such values. Initiatives could be developed which remunerate practices related to the maintenance of specific landscape values like, for instance, the typical stone walls between fields (*muros*). Again, some farming styles are better able to integrate this into their farming practices than others. It is difficult in a development pattern which demands scale enlargement and therefore a 'reshaping' of the small-scale landscape.

Institutional Support

The alternative interventions outlined above, demand specific conditions at the institutional level. Local organizations and institutions could play a crucial role in creating favourable conditions for endogenous development. Three major actions can be suggested: local organization development; articulation between research-extension-training and information; and development of appropriate support mechanisms and programmes.

In Barroso, farmers' associations, cooperatives, and other local groups represent an important human resource potential. Endogenous development requires the predominance of local actors in local democratic decision-making, local control of resources, and in the sharing of local benefits. An example is the Association of Barrosã Breeders. This organization was created in 1988, to define and implement strategies to preserve this local breed, and to add extra value to meat production. The Association, is a clear example of an endogenous initiative that needs to be assisted and promoted. Local organizations can be strengthened through leadership development, technical training, and the facilitation of networking at different levels, from local to international. At the same time, such processes require, in many instances, new styles of intervention from state services and agents, who were trained and socialized under a modernization framework, in which strengthening of endogenous development, the building of local organization and participation are elements that are mostly absent.

Agronomic research also needs to be reorientated to the specific technological and agronomic problems and requirements of endogenous styles of farming. Thus, the setting of the research agenda needs to be done *with* farmers, and not *for* farmers as is more common in current research programmes. The results of our research point to several topics which could be used as a guide. Such topics might be:

- The improvement of the Barrosã breed. Until now little research has been done on the improvement of this breed, which in the opinion of the farmers is essential to the eventual success of its rehabilitation. The initiatives taken in this direction tend to isolate the breed from its fodder system. In improving the breed, adaptation to local conditions (pastures on the commons) should play an essential role, and farmers have the knowledge to do this.
- Redefinition of selection criteria for milking breeds. Dairy breeds in Barroso are specifically geared to milk production, but for most dairy farmers meat production continues to be an important criterion in breed preference. The practice of crossbreeding dairy cows with the Charolais breed often leads to birth problems. Research related to 'double-purpose breeds' could alleviate this problem.
- Improvement of sheep and goat keeping. In the opinion of farmers, goat and sheep keeping is at present one of the most attractive agricultural prospects. Nonetheless, little research has gone into the possibility of improving local breeds.
- Research on the improvement of the natural meadows and pasture lands of the commons instead of intensifying the fodder system by creating temporary meadows and introducing silage maize. To what extent is it possible, for example, to improve the productivity of such local resources, using only low external inputs?
- Development of labour saving technology related to organic manuring. Instead of cowsheds with cesspools, alternatives are needed that are more in tune with the traditional, but labour intensive, deep-litter houses, along with appropriate technology for reducing the drudgery of farm-practices related to organic manuring.
- Broadening the concept of high quality meat. This could be supported by agronomic research into the relation between meat quality and forage systems: between the use of industrial fodder and fermentated products like silage maize, as against the use of the vegetation of the natural meadows and the commons; the relation between chemical and organic fertilization of the vegetation of the natural meadows.
- Characterization of other high quality products, goat and sheep cheese, smoked hams, mountain honey, etc. The production and processing of these potential high-quality products should be studied, to arrive at quality definitions and 'labelling', which offers protection against (industrial) imitations.
- Support for local initiatives geared to producing local high-quality products. Groups of farmers who have expressed an interest, for instance, in the production of goat cheese, or mountain honey, could be supported by research and their production function as a pilot study.

- Research on market 'niches' for quality products to promote their commercialization. An example of such a market 'niche' could be the communities of regional migrants in France or Luxembourg, eager to consume products from their home regions. Further research is needed on market strategies to create commercialization channels that might provide higher returns.
- Farm diversification, and experimentation at farm level of alternative products such as mushrooms, aromatic plants, horticulture, etc. Farm diversification could be stimulated by on-farm research related to alternative products, adopted to small scale production and the local ecological setting.

In addition to the necessity for a reorientation of agricultural research agendas, the fields of extension and training also need to move away from the dominant technology transfer paradigm of modernization theory. Training and extension programmes primarily reach a particular group of farmers (large scale, and orientated to milk production) and have promoted an agricultural intensification strategy. Other farming systems have been noticeably neglected. New clientele and fields of training should be envisaged.

The availability of information on markets, appropriate technology, forms of organization and management, experiences elsewhere, funding and other support instruments, is another critical ingredient. The use of local media could and should be increased, as well as the exploration of technologies and involvement in new networks, such as the ones found in the LEADER programme.

Finally, endogenous development implies appropriate support mechanisms and programmes. As stated, policy instruments such as EC funds are not adjusted to local conditions. In this area, it is not only important to take advantage of existing mechanisms, to seek synergic effects and to fight for more appropriate measures. Action in this area leads, once more, to the importance of local institution building. In fact, the capacity to influence decisions, in Lisbon, Porto or Brussels, requires the participation of local and regional institutions in networks and other forms of organization at national and European levels.

Notes

1 We wish to thank J.D. van der Ploeg for his contribution to the analysis of the field data.

2 The different styles of farming represent the following dimensions on orientation to milk production (OM) and cattle density (CD); intensive dairy farmers (OM>0.40 and CD>1.1); SCOM farmers (OM<0.40 and CD<1.10); Intensive meat producers (OM<0.40 and CD>1.10); extensive meat producers (OM<0.40 and CD<1.1).

3 For a detailed description of the importance of irrigation in Trás-os-Montes and the diversity in traditional farmer-managed irrigation schemes, see the chapter by J. Portela and A. van den Dries.

4 Older farmers are seldom selected for EC-grants, and although remittances from migration play an important role, the transformation of existing farms into the large scale, intensive and highly mechanized dairy farms go far beyond the reach of these remittances. Hence, external fundings such as EC grants, are crucial.

5 Dairy production was also of importance in some villages in Barroso at the beginning of this century, when farmers transformed milk at farm level into butter and commercialized this through local markets (Freund 1970).

6 The characterization of haylands and pasture lands based on soil quality and water availability is in practice not always that clear. Other factors such as the inclination of the fields and accessibility for machinery play a role as well.

7 At this moment it is only possible to compare the increase of livestock in villages which form an administrative parish, the minimal unit of aggregated agricultural data collection.

8 For a detailed description of the importance of organic manuring in Barroso's ecological conditions, see also the chapter of E. Portela in this book.

9 The quantities of chemical fertilizers refer to the total amount of fertilizers. In potato and maize cultivation it refers mostly to *Composto* (7:14:14). In the pasture lands *Nitrato* (20.5 percent N) is the most common fertilizer.

5 Manuring in Barroso: a Crucial Farming Practice

Ester Portela

In Barroso, sustainable agriculture is based upon diversity of crop and animal husbandry, nutrient cycling and utilization of all available endogenous resources. One of these resources is manure. Soil fertility has been improved by application of large quantities of farmyard manure and sheep, goat, and pig manure. Barroso farming has not been dependent on large inputs of fertilizers. However, those farmers who possess the conditions for higher crop intensification are increasingly applying larger amounts of fertilizers, frequently in inadequate quantities or inefficient proportions of nutrients. A more efficient fertilizer-use (energy consuming) could be reached if more was known about the fertilizer value of the several types of local manures and the methods and practices related to manuring. As J. Portela (1991) has emphasized, research is needed for a thorough characterization of the evolution and current conditions of Trás-os-Montes farming systems. Manure, a crucial endogenous resource, has been neglected by researchers, advisors of state laboratories and extensionists alike. Yet, it deserves much attention. Manures have a lot to do with the farmers' conditions of work, with energy saving and with ecologically sound agriculture. Obviously these aspects are closely related to the future of farmers and farming, both in southern and northern Europe.

The study of Barroso manures and manuring practices is part of the Vila Real research into endogenous development patterns. The specific research on manure consists of two components. One, a general study of the diversity of agricultural practices, assesses the relevance of animal manuring versus chemical fertilization in the different farming systems and was carried out in ten villages of Alto Barroso. The preliminary results are presented in Chapter 3 of this volume. The other, our own study, is a more in-depth approach to an understanding of manuring practices: how manures are 'manufactured'; how much is applied; which materials are used; which crops benefit the most; how endogenous; how labour intensive and onerous; what are the main constraints; and what is the fertilizer value of manures. The study is focused in only one village, Paredes do Rio (Alto Barroso) and is of an exploratory nature and as the research is not yet complete, the results presented here are preliminary in nature.

The persistent application of significant amounts of manure to soils with an already high content of organic matter, like those of Barroso, is intriguing. The paper reviews available data on manuring and fertilization and presents some hypotheses to explain that puzzling farming practice. Finally, the main constraints for the maintenance of manuring practices are discussed. The results and ideas presented here are based on several visits to the village of Paredes do Rio, on a review of the literature, and the results presented by Cristóvão, Oostindie and Pereira in Chapter 3.

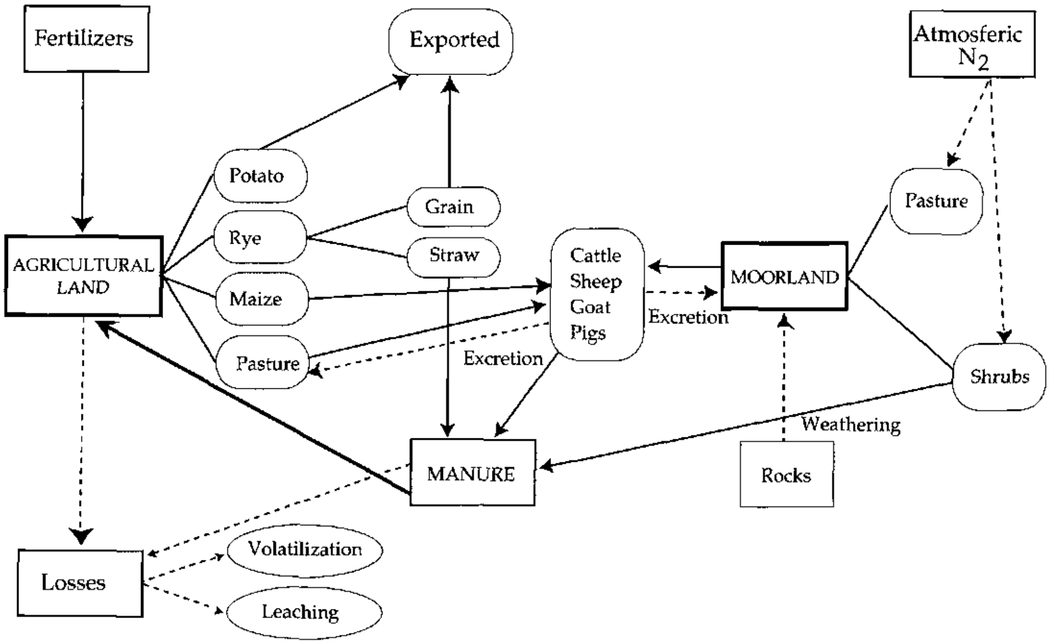
The Climate, Topography and Soils of Barroso are Unfavourable to Agriculture

Barroso is located in the western part of Terra Fria (Cold Land) in the Trás-os Montes region, in a range of altitudes between 700 m and 1300 m. Most arable land is located on hillsides with slopes < 15 percent and pasture land which is ascribed to steeper areas where slopes may reach > 25 percent. Mean annual rainfall varies from 1200 mm and may reach values higher than 1400 mm, with mean annual temperature from 12° C to values below 8° C. In spite of the ecological homogeneity, Barroso encompasses three climatic sub-zones: Terra Fria de Planalto, Terra Fria de Montanha and a Terra Fria de Alta Montanha.[1] The study was particularly focused on these two last subzones, which broadly coincide with the so-called Alto Barroso.

The high precipitation and low temperatures, particularly in autumn and winter, explain the high content of organic matter in the soils. The average value of organic matter in arable land is about six percent[2] and may often reach ten percent (Agroconsultores-Coba 1991). The most significant soil units are Umbric Leptosols, Umbric Cambisols and Umbric Regosols derived both from granites and schists. They might be described as coarse-textured, with high acidity, a low content of exchangeable bases and a high content of exchangeable aluminum.

Very cold temperatures during most of the year and erratic rainfall with dry spells are the main climatic constraints. The high rainfall is concentrated in autumn and winter, which can create poor aeration conditions, particularly in the depressions, and water stress in summer. Steep slopes restrict the area for arable crops because of the susceptibility of the soils to erosion and the lack of conditions for mechanization. The coarse texture of the soils and high acidity are the main soil-limiting factors. The former soil characteristic is responsible for the low water-holding capacity and the low reserve of nutrients. Acidity decreases availability of some nutrients and solubilises the aluminum, which reduces root growth. Both climatic and soil conditions restrict microbial activity, so the degradation of organic matter is slow-paced.

Figure 1 Relationships Among the Components of Barroso Farming System and Main Physical Flows



The Local Farming Styles Cope with Physical Constraints

The physical environment of Barroso imposes certain limits to agricultural production. However, farmer responses to such physical constraints are rather unique. The local styles of farming are diverse, complex and dynamic. J. Portela (1991) has described in detail the main components of farming activity in Terra Fria as well as their interrelationships. Most of them are common to those of Barroso. Figure 1 depicts in diagrammatic form the relationships between the components of the farming process: arable land, pasture land, moorland, livestock, manuring and also the main physical flows in the system.

Agricultural production is diverse and the intensity of land use is variable. The main produce is livestock and fodder to feed the animals. Cattle provide draught power and manure. Pig-raising, goat and sheep herding also provide manure for agricultural land. Pasture land (*lameiros*) provides fodder; arable land the potatoes, rye, maize and fodder; and household gardens provide vegetables. Rye, rye-fodder and potatoes (or maize) are cropped in a two-year rotation. More recently a four-year rotation was introduced in Barroso, which included two years of temporary improved pastures. The other extensive component of crop production is the moorland or commons (*baldios*), vast uncultivated lands where Leptosols, shallow and stony soils with some rock outcrops, predominate. The *baldio* is mainly perceived as grazing land, but it also supplies the shrubs (*mato* or *roço*) for bedding the animals.

Farmers try to use all available resources. Farmyard manure (FYM, *esterco*),[3] pig, goat and sheep manure are the principle sources for supplying nutrients and organic matter to agricultural land, which are mainly provided by the moorland which produces the fodder and the shrubs for bedding the animals. In addition rye and maize straw are entirely used for bedding. The greater part of the natural vegetation of the moorland area consists of Leguminosae, such as brooms, winged brooms and gorses, which have high nitrogen content, and constitute a significant source of nutrients and organic matter for the arable land. Irrigation water is used to increase grass growth and contributes to a better composition of grass species in the pasture (Prins 1991). Irrigation water is also used as a vehicle for transporting considerable amounts of nutrients and organic residues. Heavy rainfall drainage, in the spring, is diverted from the stables, pathways and yards along with cattle excretion to the fields (*água de surro*).

Nutrient recycling has been an important element of sustainable agriculture in Barroso. Such recycling not only reduced the need for additional fertilizer elements but simultaneously provided organic matter. Utilization of maize stalks, rye straw and shrubs from moorland for livestock bedding has been crucial for maintaining soil fertility. Animal bedding keeps the cattle clean and dry when they lie down in the stall and helps to soak up the urine and faeces, preventing nutrient loss from ammonia volatilization or leaching of nutrients. In this manner there is an improvement of the soil fertility of agricultural land, which results in the transference of organic matter and nutrients from the *baldio*. Mineral weathering constitutes a permanent supply of nutrients from the moorland. Soil acidity and high rainfall are favourable to this natural process. Depending on weather conditions, the cattle, sheep and goats are driven to the *baldio*, the commons, for grazing. During grazing, animals leave considerable droppings on the permanent pastures and natural vegetation of the *baldio* which, although uneven in its distribution, contributes to a degree of recycling of nutrients.

Application of wood ash from fire stoves to household gardens is another way of recycling wastes. Pig-raising is a manner of using waste from household and livestock food, and in turn the pig manure is applied to household gardens and maize fields.

Soil Fertility and Crop Productivity Have Been Maintained Through Manuring

Barroso farmers have perceived FYM and other animal manures as the main source for supplying nutrients to arable or pasture land. Animal manures were so important that sheep and goat herds were kept mainly for their manure (Gusmão 1964; Pires 1970). Prins (1991) also mentioned the relevance ascribed by farmers to the quality of sheep and goat manures. The reduction of goat- and sheep-raising, and the decrease in price of fertilizers has led to an increase in fertilizer application. However, farmers still apply significant amounts of FYM. In Barroso, livestock production is the main activity and the animals are kept in the stables long enough to provide significant amounts of manure. Prins (1991) indicates 10 m^3 of FYM per year per cow. As to Paredes do Rio preliminary results of this research indicate a mean value of 9.6 m^3 of FYM per year per cow.

The crops more abundantly manured are potatoes and maize and less frequently rye and pastures. According to Pires (1970) the average quantities applied are 25-30 t/ha^{-1} of FYM to potato and maize fields, and 12-18 t/ha to rye when not preceded by potatoes. More recent data collected by Cristóvão *et al.* (see Chapter 3) in 68 households of Barroso, confirm these rates of FYM application, and there is almost no difference between the four farming styles identified, 24-29 kg/ha^{-1} applied to potatoes and 23-28 kg/ha^{-1} to maize. Although pasture land is sparingly manured, those who apply it prefer well-matured and finely-divided manure (Pires 1970; Prins 1991). The data of Cristóvão *et al.* reveal that dairy farmers apply reasonable amounts of FYM for creating new temporary meadows. The authors also show that SCOM[4] dairy farmers apply more FYM in pastures and haylands than is observed in other styles. This might be due to the fact that they have substituted some of the arable land for pastures and hayland and have some FYM available that has not been used for enriching potato fields.

In the last decades the intensification of milk-oriented systems has led some farmers to build modern cowsheds, where the animals do not lie on shrubs and straw, and the slurry (faeces plus urine and wash water, *chorume*) is collected in large underground cesspools. In these systems the amount of FYM produced has been reduced and the more intensive dairy farmers no longer collect *mato*, but use rye and maize straw only in the traditional stalls that have been maintained to supply FYM for arable crops (Lima Santos 1992). The value of slurry as an organic amendment is negligible.

Intensive dairy farmers who have partially substituted FYM for slurry recognize that this type of animal manure (with its low content of organic residues) has a diminished effect on crop productivity. That is why most of them maintain some traditional stalls to produce FYM for arable land, reserving the slurry for pastures and haylands (Cristóvão *et al.*, Chapter 4).

Barroso Farmers Apply Low Amounts of Fertilizers

The actual amount of fertilizers applied by most farmers remains low. In general, it appears that fertilizers have failed to bring higher productivity, at least in low revenue crops like rye, maize and pastures. Fertilization of potatoes, the most marketable crop, is widespread now, although often in quite inadequate quantities or inefficient nutrient combinations. The relatively large quantities of FYM available, together with tight profit margins may explain the low consumption of fertilizers. The low profit margins may be related to a lack of information due to inadequate advisory services about what type of fertilizer, how much and when to apply. Very few farmers have analyzed the soils and fertilizer recommendations that are usually made by the cooperative salesperson. Lima Santos (1992) referring to the data of Gomes (1945) mentioned that the mean consumption of fertilizers[5] in Barroso in the 1930s was 11 kg/ha P_2O_5, the use of N fertilizers being zero. As to Montalegre county, Pires (1970) estimated that the mean consumption of nutrients in agricultural land for the year 196465 was 15 kg/ha N, 35 kg/ha P_2O_5 and 11 kg/ha K_2O. From the data collected by Bernardo (1988), in 18 households in the village of Morgade, it is possible to estimate the mean consumption of nutrients for the year 1986: 37 kg/ha N, 44 kg/ha P_2O_5 and 28 kg/ha K_2O. It is worth noting that farmers applied more phosphorous than nitrogen. In fact the input of N from biological N fixation on the moorland indicates that, in this system, phosphorus limits yield more strongly than nitrogen.

Data from 1982 to 1985 suggest that most farmers do not apply fertilizers to rye (Portela *et al.* 1986): only one fourth of the farmers interviewed applied nitrogen as top dressing at a rate of approximately 25 kg/ha N in 1982-83 and 1983-84 and two thirds applied a mean value of 40 kg/ha N in 1984-85. It must be pointed out that in this last year the rainfall during the winter was 400 mm above the mean value, whereas the two preceding years were average years. Farmers are unanimous in saying that application of ammonium nitrate depends on the year and whether the rye has a look of nitrogen starvation. They are very parsimonious in applying N, because most fields are preceded by potatoes, this crop being abundantly manured and fertilized. If additional fertilizer is applied the cereal might lodge. The same tendency was observed by Pires in 1970 and recently by Cristóvão *et al.* .

During the 1960s, there was no use of fertilizers in pastures or haylands. However, with the intensification of meat and milk production it became a more common practice. Bernardo (1988) mentioned the use of ammonium nitrate in permanent pastures in the village of Morgade. Lima Santos (1992) also referred to the intensification of milk production which was done by increasing fodder by introducing fertilizers in permanent pastures. Data by Cristóvão *et al.* show the utilization of higher rates of N fertilizers by milk producers. However, beef producers apply it at rather low rates and frequency.

In the past, maize fields only received FYM, the application of fertilizers being almost nil (Pires 1970; Bernardo 1988). Nowadays, farmers in the milk-oriented systems, use both the FYM and some fertilizers, the 7.14.14. Based on data of Cristóvão *et al.* it is possible to calculate an approximate value of 30 kg/ha and 60 kg/ha for P_2O_5 and K_2O respectively. However, fewer meat producers use it, and in low quantities too, and with less frequency.

Potatoes were the most marketable crop and it is the one to which the great majority of farmers abundantly, and many times excessively, applied fertilizers. Pires (1970) mentioned as an average fertilization of potatoes, 60 kg/ha N, 143 kg/ha P_2O_5 and 46 kg/ha K_2O for a mean production of tubers of 12.8t in Alto Barroso, and Bernardo (1988) mentioned average values of 60 kg/ha N, 80-100 kg/ha P_2O_5 and 70-100 kg/ha K_2O for 1986. Calculations based on the recent data of Cristovão *et al.* are not far from these latter in the milking systems, 60 kg/ha N, 120 kg/ha P_2O_5 and K_2O and somewhat lower in the beef systems, 50 kg/ha N, 100 kg/ha P_2O_5 and K_2O. Application of fertilizers depends, obviously, on the price of crop/cost of fertilizer ratio. Some farmers related that the amount of fertilizer applied to potatoes reached, in some years, 1 kg of fertilizer (7.14.14) for 1 kg of potato-seed. That means an average application of 120 kg/ha N, 240 kg/ha P_2O_5 and 240 kg/ha K_2O, which is very excessive, even taking high potato yields of 15-17 t/ha into consideration. This rate of application was observed some years ago, when potato prices were high and there were no market constraints on the demand side. These fertilizer rates were reduced to half when the price of crop/cost of fertilizer ratio was unfavourable.

In spite of the partial substitution of manure by fertilizers, the actual amount of N provided to crops is relatively lower than that supplied by manuring. According to the rough estimates of Lima Santos (1992) from three case-studies in 1989-90 of agricultural land, the contribution of N fertilizer depends upon the production system. 16 percent of the nitrogen applied came from N fertilizer in the beef-system and about 47 percent in the milk system. The results of Cristóvão *et al.* show clearly that, with the exception of potatoes, the inputs of fertilizers by meat producers are rather limited, both in quantity and in frequency. The irregular application of fertilizers to crops other than potatoes is related to any surplus left over from the potatoes, or to weather conditions.

Manures are Appreciated for Effects That Cannot be Expected From Fertilizers

In spite of the decrease in the price of fertilizers, dressings on agricultural land remain low. It is recognized by farmers that these cannot substitute for FYM. Farmers stressed that if they do not apply FYM, but use fertilizer instead, the productivity of arable or vegetable crops is drastically reduced over a two or three year period. This means that the effect of FYM is not limited to providing nutrients to crops but that it also increases nutrient availability. The effect of organic matter in reducing the intensity of phosphate fixation by soil Fe or Al hydroxides has long been recognized. The presence of gibbsite in the soils of Barroso is well documented by Silva (1980, 1983). Complexation of Al and Fe reduces the fixation of phosphate to hydroxides.

The dual role of organic matter as a microbial substract and as a determinant of the physical/chemical conditions in the soil environment is undeniable. In general, the organic matter has a significant effect on physical soil properties such as the increase of water-holding capacity or stability of soil structure. These soil properties are often mentioned by farmers as important aspects ascribed to the application of FYM. However, it seems that the immediate effect of FYM in promoting growth is more related to chemical and microbiological reactions that occur after its application. In fact Prins (1991) also mentions that farmers emphasize the rapid effect of manure on crop growth.

Few available data on the organic matter of Barroso soils refer to the C/N ratio and content of humic substances. Data from Agroconsultores-Coba (1991) and Coutinho (1989) show that the C/N ratio tends to be high (12-25) in most soils, and the percentage of humic substances is only 50 percent of soil organic matter. These data suggest a reduced degree of humification of organic matter, which means that the process of degradation is slow, therefore the mineralization of organic matter is also slow-paced. The slow rate of decomposition of organic matter is obviously due to reduced microbial activity. Low temperatures, soil acidity and poor aeration are related to the slow rate of decomposition of organic matter. Climatic constraints are particularly relevant from October to April, when temperatures are low and precipitation is high.

Although Barroso soils have a high content of organic matter, the application of reasonable amounts of FYM is seen as the only means of getting profitable crop yields. Jansen (1984) has shown that N mineralization is the more closely related to the amount of young organic matter than to the total N content of soil. The addition of young organic residues is also important to stimulating microbial activity, which accelerates the decomposition rate of native soil organic matter. Organic matter, as a nutrient store, releases nutrients gradually, providing essential nutrients that cannot be retained by soil for long. This is particularly relevant for nitrogen in the coarse-textured soils of Barroso, where leaching of N may not be negligible. Moreover, organic matter buffers growing plants against sudden changes in their chemical environment. Aluminum toxicity is a major problem in many soils of Barroso, restricting root growth and root ramification. However, it might be ameliorated by manuring, since Al is complexed by humic substances, reducing its solubility, and so its phytotoxicity.

Not all the energy released during oxidation of organic residues is captured by decomposing microbes, a considerable amount is dissipated by heat (Reddy *et al.* 1986). We admit that a possible rise in the temperature, due to enhanced microbial activity, hastens germination and encourages early growth. In fact, in Barroso, the planting of potatoes is a simultaneous operation with incorporation of FYM into the soil. The farmers assertion about the immediate effect of FYM on crop growth might be related not only to the increase in nutrient availability but also to the rise in soil temperature. The possibility of crop growth being stimulated by the application of FYM due to an increase of soil temperature is supported by the farmers' opinions about the quality of goat and sheep manures. They are known as 'hot manures' (*estrumes quentes*) due to the fact that when incorporated into the soil they provoke a noticeable rise in temperature.

Fertilizers lack many of these effects on the soil environment and are actually a complement to animal manures and are utilized mostly to supply phosphate, and for stimulating growth in the spring, as is the case with the application of ammonium nitrate as top dressing on pastures, hayland or rye.

Is There an Alternative to Traditional Way of Producing Manures?

FYM includes shrubs collected from the commons or moorland, the greater part of which consists of Leguminosae, which are able to use the nitrogen from air. So, in the cattle systems the nutrients that are supplied to the cultivated area are actually provided by the moorland that produces the fodder and the litter-bed. In this manner there is an improvement of the soil fertility of arable land, which results from the transference of organic matter and nutrients from the *baldio* to the arable land.

The research by Cristóvão *et al.* shows that farming systems oriented to milk production hardly use *baldio* for pasture. Lima Santos (1992) has also observed that the contribution of *mato* reduce has been reduced in milking systems, being almost nil in the most intensive ones. In these, some of the traditional stalls have been substituted by modern cowsheds where cattle slurry is collected in large underground tanks and animals are not supposed to lie on litter-beds. This results in a big loss of nutrients and organic matter as compared to the traditional method. An important input of N into the system is misspent: the N coming from the moorland, ascribed to nitrogen fixation in Leguminous shrubs. Besides, there are losses of ammonia inside the stables and losses also after spreading manure on the land. The utilization of cattle slurry represents a very high cost practice because it encompasses a tremendous waste of N and it could become an environmental threat. The loss of ammonia when animals are bedded is very much reduced because the shrubs and straw have a great capacity to soak up the urine and fix the ammonia (Kirchman 1985).

Today, a lot of concern exists about ammonia emission and data is available on the issue. According to Oosthoek *et al.* (1991) the emission of ammonia by cattle slurry during the housing period is approximately 1 kg of NH_3 per month per cow. Losses of ammonia during and after land spreading of slurry on arable land can vary from 20 to 80 percent of the NH_4-N and occur mainly in the first hours after spreading (Neeteson and Wadman 1990; Amberger 1991; Döhdler 1991; Vlassak *et al.* 1991). According to the measurements of Klarenbeek and Bruins (1991) the loss of ammonia (NH_3-N) due to the spreading of cattle slurry was 1.1 kg per m^3 of slurry applied.

Construction of modern stables with slurry tanks seems to be more attractive to farmers because it reduces labour for collecting *mato* and for most of the operations described above. Moreover, spreading of slurry is a mechanized operation, using a vacuum tanker with a spreader. However, building modern cowsheds has been associated only with milking systems and, in fact, these systems have low expression in Barroso as yet. The last official estimate indicates that milking cows represent less than 12 percent of all cattle (RGA 1989). According to Lima Santos (1992) the low number of milk producers is related to topographic limitations that restrict mechanization and the availability of land for producing hay. The limits to mechanization was favourable to the maintenance of animal traction and to the better use of a more available resource, the *baldio*. It has also been observed that some farmers dislike the new system of housing the animals for reasons of climate and hygiene. Bedding the animals offers better protection against the cold. In fact, some farmers are using straw for litter-beds in these stables for the comfort of the animals as well as for getting more FYM.

In conclusion, we would say that the substitution of FYM by slurry is perhaps not a good alternative, due to the physical constraints, the wasting of nutrients and the jeopardizing of the environment.

Can Farmers Maintain the Production of Farmyard Manures?

The traditional way of producing FYM seems to be correct from a technological and ecological point of view, and should consequently be maintained. But, can farmers maintain its production?

The answer, ultimately, will be linked to the following considerations: a) to the crops that benefit the most; b) to landscape conditions; c) to the farmers working conditions; d) to the labour needed. While the three last factors constitute the driving forces in the decline of manuring, the increase or maintenance of both maize and potatoes hectarage will likely sustain the practice. This situation occurs in relation to a possible expansion of both seed-potato hectarage and the local cattle breed. But the factors pushing the decline of manuring are powerful. Indeed, the production and application of FYM to the fields is highly time-consuming and requires a lot of unpleasant, hard manual work, which is increasingly intolerable for old farmers. The effort to obtain *mato* seven to nine times per year and spread it in the stalls is a laborious job and involves many operations. For example, it consists of going to the *baldio*, cutting, collecting, loading, tying with rope, transporting, unloading and spreading in the stalls. This process is repeated several times a year for new layers of *mato*, and almost daily with straw, which takes time, and requires hard physical effort. Moreover the accessible areas of the moorland are also those which have been over-exploited. So, farmers have to drive further and further afield for shrubs. The most attractive areas for obtaining *mato* are the more levelled-off areas with no stones or rocky outcrops. There, the work can be done quickly without risk of damaging the blade of the mechanical mower.

The chore to load wagons or ox-carts with FYM, to drive them over bad paths, between narrow walls, and up and down steep slopes is also hard, unpleasant and time-consuming work. The stalls have small entrances which therefore cannot admit wagons. So, FYM has to be manually shifted out of the stalls with a fork and loaded onto wagons, and since all fields are fenced in by walls and many paths are narrow, they do not always allow for the transit of the wagon by tractor, which means that farmers have to push an ox-cart with the FYM.

Although many farmers use a mechanical mower to cut *mato*, some still use a hoe or a scythe. For the village of Corva, Prins (1991) relates how 'middle farmers' still make use of traditional methods, using no equipment for spreading FYM. The manure is dropped off in small heaps and later on is spread all over the field and ploughed under with a tractor.

Conclusions

It seems that building modern cowsheds for producing slurry is not an appropriate solution in Barroso for reducing labour or the hardship of work. Few alternatives are left, beyond improving the tracks to the *baldio* and the paths to the fields, widening the paths by moving the walls, building new stalls with larger entries and a search for adequate equipment for the special landscape of Barroso.

Future work under this research programme could contribute to highlighting some of the hypotheses raised in this paper or others related to the lack of quantitative data such as nutrient budgets, amounts of N and other nutrient inputs supplied by the moorland, the amounts of nutrients leached out by rainfall, etc. or on other effects of FYM on the soil environment, and of course on crop productivity such as controlling the soilborne diseases of potato tubers.

Notes

1 According to Agroconsultores-Coba (1991), Terra Fria de Planalto has rainfall > 1200 mm and mean temperatures 10°C-12°C, Terra Fria de Montanha (rainfall > 1200 mm and mean temperatures 8-10°C and Terra Fria de Alta Montanha (rainfall > 1400 mm and mean temperatures < 8°C.

2 Mean value of 60 surface soil samples collected in fields in the two years rotation, potato-rye (Portela *et al.* 1986).

3 FYM is described here as the mixture of urine, faeces and animal bedding that has suffered some microbial decomposition. Animal bedding is composed of shrubs (mainly brooms, winged brooms, gorses and heathers) and straw. The final product is a wet solid product stored in the stalls.

4 Milk-oriented system in which the villages were provided with collective milking parlours (Salas Colectivas de Ordenha Mecânica).

5 The term fertilizers will be employed here as chemically processed products which are used to supply plants with readily available mineral nutrients. It is employed in opposition to the term manures which are products originating from animal or plant residues.

6 Revitalization of Farmer Managed Irrigation Systems in Trás-os-Montes

Adri van den Dries and José Portela

Trás-os-Montes, a region in northeast Portugal, has an important farmer-managed irrigation sector, constructed, managed, maintained and improved by the farmers themselves over the centuries. This chapter presents the results of past and current research of such farmer-managed irrigation in two agro-ecological zones of Trás-os-Montes. The final objective of the research is to develop a typology of Farmer-Managed Irrigation Systems (FMIS)[1] which can serve as a tool for improving institutional interventions and designing adequate intervention strategies. The research focused on all aspects of irrigation water management, identifying the common as well as the features that differ in the functioning of communal FMIS. Water allocation principles, water availability and water distribution practices are considered determinant in explaining the enormous diversity among communal systems and their environments. This heterogeneity has a direct influence on the rigidity/flexibility of water use at farm level, which leads to a variety of farmer responses and interventions both within and outside the communal FMIS. Currently a government programme aimed at the improvement of FMIS is being carried out. The diverse reasons, forms, features and effects of intervention by water users as well as the government have been identified. It is concluded, taking into account the heterogeneity and dynamics found in FMIS and their environments, that institutional interventions could be improved. For this goal intervention strategies have been formulated.

Stating the Problem

Irrigation in Portugal has followed two very distinct development patterns. First, state policy and public investment in irrigation show a socio-economic bias in favour of the large-scale farmer; an ecological bias in favour of river plains with uniform natural conditions; and a geographical bias mainly since the 1930s, towards the southern part of the country. In contrast, for many centuries farmers have developed their irrigation schemes to serve the many small scattered areas in mountainous terrain with harsh physical conditions and a marginal aptitude for agriculture.

Traditional FMIS serve an area of 550,000 hectares or 83 percent of the total irrigated area in continental Portugal (DGRAH 1987). The importance of farmer-managed irrigation is underscored by its use on small to very small family farms (<10 ha) mainly in the northern and central parts where the majority of the farming population of the country lives.

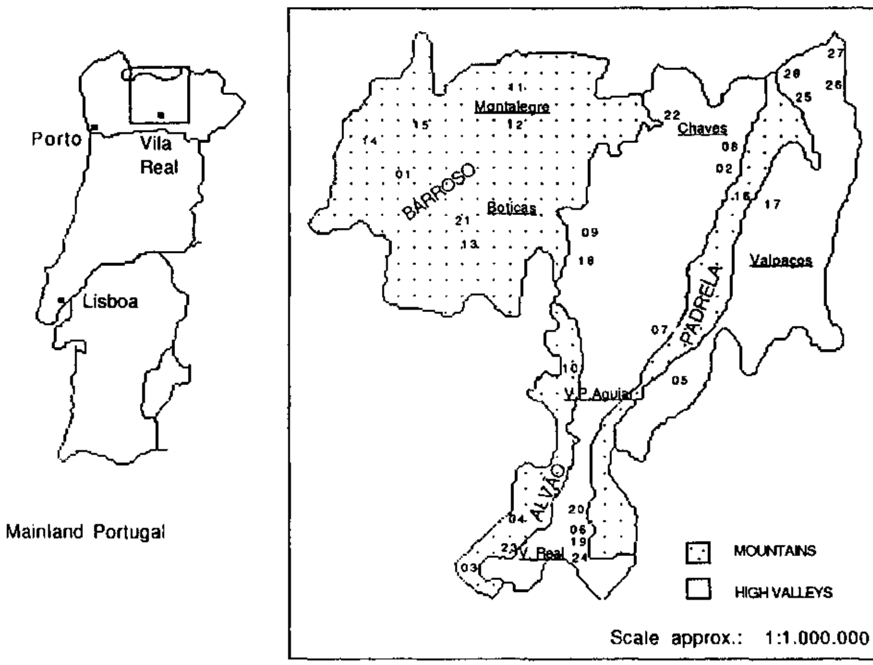
In these mountainous zones, FMIS are really an *endogenous resource* in the sense that they were created and developed by local actors without external intervention, in response to local farming needs. Each particular scheme emerged and developed, in a specific local context, characterized by three fundamental dimensions: the physical environment, the structure of social relations of production, and the agricultural setting. Irrigation cannot be understood as an isolated phenomenon. It is an integral part of farming practice and local rural society. Irrigation development can be interpreted as both a condition for and an outcome of land use intensification and increasing labour productivity, which are components of specific patterns of agricultural development.

Public intervention may potentially contribute to the development of farmer-managed irrigation, but it will constitute a rupture with space and time specific practices and dynamics if it is not linked to specific local needs, context and resource management. Public interventions world-wide have tended to neglect local complexity and diversity and have tried to change local conditions, traditions and practices in the interests of the (technological) exigences inherent to a uniform external development model/blueprint, instead of supporting locally-driven development and adapting technology to the specific situation.

Contrary to the policy predominant until recently, the Trás-os-Montes Integrated Rural Development Project (PDRITM), launched by the Government in 1982, has defined the improvement of FMIS as a basic condition for agricultural development in Trás-os-Montes. In this region of northeast Portugal, more than 1000 FMIS were identified, serving an estimated 30,000 hectares. The schemes are small, and concentrated in two agro-ecological zones: the mountains, and the high valleys, which form the research area (Figure 1). Small and very small family farms whose areas are divided into numerous plots constitute the prevailing production units. Effectively 116 FMIS had been improved by March 1990 (Portela 1990). A second phase of this programme is being contemplated over a period of seven years.

In this chapter, we focus on these public interventions; their character, their effects, the conditions under which they will contribute to ongoing irrigation development and how they can be improved. To be successful, these interventions must fit into existing local situations, needs and initiatives and link up with existing farming and irrigation practices. Thus, some key issues have to be examined: How to link institutional support to farmers' initiatives, knowledge of the local situation, farmer's needs, objectives and resources, and how to integrate irrigation development into local rural development. A crucial point is the role of irrigation in farming and the interactions between these activities. Development is characterized by a local focus which has led to a large heterogeneity among irrigation systems. Another point is the dynamics found in FMIS and the interventions implemented by the farmers themselves. We think that lessons can be drawn: intervention strategies have to be based on the way the farmers themselves intervene in their systems and environments.

Figure 1 Research Area with Selected Villages



Selected villages:

01 Corva	08 Tresmundes	15 Fervidelas	22 Soutelo
02 Sesmil	09 Sobradela	16 Adães	23 Galegos da Serra
03 Vila Cova	10 St. Marta do Alvão	17 Santiago	24 Vilalva
04 Lamas d'Olo	11 Meixedo	18 Vilela	25 C. de Vila de Castanheira
05 Covas	12 Torgueda	19 St. Marta	26 Vilar de Lomba
06 Bouça	13 Romainho	20 Aboboleira	27 Brito de Lomba
07 Seixedo	14 Pincães	21 Bostofrio	28 RORIZ

The FMIS intervention programme executed by PDRITM in Trás-os-Montes was set up without detailed knowledge of the complex functioning of traditional irrigation, schemes prior to improvement. The CAMAR research project 'Intervention Strategies in Traditional Farmer-Managed Irrigation Systems in Northern Portugal'[2] aims to examine the functioning and dynamics of FMIS, the intervention process as implemented by PDRITM and the effects generated by the interventions. The final objective of the research is to develop a typology of FMIS which can serve as a tool for improving institutional interventions and for designing adequate intervention strategies.

The research activities on irrigation systems include an ongoing inventory study to identify key elements relevant for intervention purposes, and case studies at village level to study certain aspects in depth. This paper is based on the findings of research efforts in 28 villages scattered over the research area (see Fig. 1). The context within which FMIS operate is the subject of the next section.

The Research Area: Environment, Farming and Irrigation

The physical environment of Trás-os-Montes is characterized by an extremely indented topography with considerable differences of altitude over short distances and a harsh climate with large spatial and temporal contrasts.[3] Most soils are acid, thin and stony except in small areas near the villages which have been heavily manured for centuries.

Of the regional socio-economic environment in which farming and irrigation takes place, we want to highlight the following points:

- Trás-os-Montes is commonly presented as the most depressed area of Portugal. It has an underdeveloped social and economic infrastructure (education and health facilities, roads, markets etc.).
- Historically, social stratification based on unequal access to land resources was sharp. Until the 1950s some landless groups were hit by periodic food shortages and seasonal hunger.
- Employment opportunities in Trás-os-Montes outside of agriculture are limited. In 1970, more than 70 percent of the labour force was still engaged in agriculture (Census 1970). According to the census of 1981 this value had decreased to about 60 percent.
- These factors contributed decisively to the massive emigration from the rural zones since the late 1950s.[4] According to preliminary data from the 1989 census, in the last ten years the population of Trás-os-Montes has diminished by more than 50,000 people, i.e. by more than 10 percent. In some rural zones decreases of up to 30 percent took place in this same period. Such massive emigration has transformed the social landscape and profoundly influenced the management of farms and irrigation systems. Emigration drained off many of the agricultural labour resources, but at the same time returning migrants invested in further farm development.

Within this regional context agriculture is still by far the most important economic sector. Household strategies in agriculture have the following common characteristics:

- Making the best use of the fragmented plots and different land qualities and microclimates within the same farm. This explains, in part, the polycultural character of farms and the integration of agriculture and cattle raising. It also explains the very intensive land and labour use on the most accessible and productive land with irrigation facilities.[5]
- Use of the communal commons (*baldios*) for grazing, collecting firewood and raw material for cattle bedding and organic manure. A marked differentiation in the importance and use of *baldios* for grazing exists depending on production orientation (milk versus meat production) and the number of small ruminants (goats and sheep)
- Production for household consumption[6] (agriculture) and/or the market (cattle raising). The specific balance between these production components depends on factors such as household size, stage of the demographic cycle of the farming household, off-farm labour and the resources (labour, land, water etc.) that farming households control or have access to.
- Negligible dependence on external inputs (i.e. from outside the farmer's community) for farm operation. Exchange relations for resources (principally labour but also irrigation water) between farming households are crucial in the operation of farms.
- Pluri-activity and (temporary) migration of farming household members to supplement income, to improve living conditions (house) and to invest in the farm (land, cattle, machines, irrigation facilities).[7]

Within the region of Trás-os-Montes a large diversity of ecological conditions, farming systems and irrigation potential exists. Some relevant differences between the mountain and high valley areas are shown in Table 1.

The Importance/Role of Irrigation in Farming
Irrigation in Trás-os-Montes is a crucial resource[8] in local farming. Staple foods (potatoes, maize) for household consumption, horticultural production, forage production for cattle (meat and milk), and agricultural intensification and development, all depend on it.[9] Two climatological factors determine the need for irrigation. In the dry summer big water deficits occur (up to about 200 mm/month). Water availability in the mountain areas is significantly higher than in the high valleys, where summer irrigation thus plays a more crucial role. This is further accentuated by production orientation. In the high valleys where milk production is dominant and more and better cattle feedstuffs are required, irrigation of annual forage crops is very important. In the winter period (night)frosts occur frequently (60-80 frostdays/year). Irrigation of natural meadows (*rega de lima*) is thus very important for frost protection, especially in the mountain areas, and, from the farmer's viewpoint, for the manuring value

of the water[10] and for management of the meadows (control of vegetative growth and flora composition).[11]

Table 1 Some Relevant Differences Between the Mountains and the High Valleys

Characteristics	Mountains	High Valleys
a Altitude	800-1200 m	400-800 m
b Annual Rainfall	700-1500 mm	500-1000 mm
c Irrigated/total cultivated area	56% (Barroso) 40% (Alvao/Padrela)	21%
d Farm size	77% of farms < 5 ha	81% of farms < 5 ha
e Production	Rye/(seed) potatoes rotation Permanent meadows (*lameiros*) and forage crops. Communal lands (*baldios*) used for grazing and forest. Cattle raising oriented to producing meat.	Rye/potatoes rotation. Forage crops and some *lameiros* Chestnut trees. Vineyards and olive trees. *Baldios* less important for grazing. Cattle raising oriented to producing milk.

Farmer-managed Irrigation

Generally, a multitude of water resources and irrigation facilities exists within a village – small streams, springs, galleries (Arab influence), shallow and deep wells. In the mountains surface water sources such as streams and brooks (*ribeiro (a)s, Corgos)* are dominant, while in the high valleys scattered sources (springs, wells) originating from subterranean water exist and are used. As the summer progresses, water availability decreases, especially in the high valleys (scheme flow generally: < 5 l/s).

This chapter focuses on communal systems, here defined as FMIS to which all or at least the majority of the households in a village have access in the summer period. In the sample of villages studied (Fig. 1), the irrigated area (summer and winter included) of the most important communal system of a village ranged from 2 to 35 hectares per system; the number of water users from 8 to 104 per system. Generally the areas irrigated by communal systems are limited to the village domain, thus the geographic and demographic dimensions of the irrigation systems normally coincide. It should be stressed, however, that besides the main communal system, other small communal systems and many smaller group, family and individual irrigation facilities can often be perceived at village level, whose importance may on the whole surpass that of communal systems, especially in villages in the high valleys.

Summer irrigation areas are always located near the villages. In areas with steep slopes they form an authentic man-made terraced landscape with numerous walls. Plots are small (most frequently 0.05-0.1 hectares with extremes from 5m^2 to 0.5 hectares), often irregularly shaped and with varying slopes. The plots consist of man-made soils which have been heavily manured for hundreds of years with a mixture of cattle dung, straw and vegetative material gathered from the *baldios*. These plots are cultivated very intensively in a way that can best be compared to gardening.

Almost all irrigation water is applied by gravity methods: controlled flow irrigation (often locally called *rega por embelga*) on sandy soils and furrow irrigation on more heavy soils. These methods require considerable skill and labour. Low flow rates imply a very intensive labour input in field irrigation (20-80 hours/ha for one irrigation turn depending on available discharges). Application efficiency is near 100 percent (Rego *et al.* 1990), i.e. there are no water losses in water application caused by runoff and deep infiltration. This implies farmer awareness of the scarcity of water but it also points to under-irrigation. Irrigation intervals in many schemes are too long from an agronomic viewpoint (up to 30 days).

In general, winter irrigation does not take place on areas irrigated in the summer.[12] Usually winter irrigation perimeters are located more upstream and along nearly all permanent and temporary surface streams. The use of irrigation infrastructure by (small) groups of farmers (*consortes*) is predominant. The way in which permanent meadows (*lameiros*) are irrigated is diametrally opposite to that for food crops: Irrigation of food crops is labour intensive and field application aims at using small quantities of water in the most efficient manner; irrigation of meadows is labour extensive,[13] irrigation canals and field irrigation methods (contour ditch irrigation or wild flooding) are suitable for transporting and spreading large quantities of water.

From the analysis of data on the 28 systems some general features relating to the construction and management of FMIS can be deduced:

- *Simplicity of irrigation facilities.* An irrigation system normally consists of a diversion structure at the water sources: canals and in most cases reservoirs, unimproved or (partially) improved. Water distribution structures are absent.
- *Simplicity of operation.* Apart from a few exceptions, (summer) waterflows are not divided. Every farmer uses the whole flow in the system when it is his/her turn. In winter, dividing of (large) water flows is quite common.

- *Few head-tail problems.* Many farmers have small parcels scattered all over the irrigation perimeter(s). Individual water sources often supplement the communal scheme flow.
- *Collective resource mobilization* needed for operation and maintenance is minimal. Normally, water users participate in the collective maintenance efforts during only one day before the summer irrigation starts. At the individual level, however, a lot of labour is needed for operation, routine maintenance, water application and sometimes source and canal patrolling in order to prevent water theft.
- *Absence of formal water users organizations.* The day-to-day functioning of irrigation is informally organized. The importance of local leaders, (interest) groups and organizational issues comes to the surface at strategic moments (e.g. fixing the beginning of the summer irrigation period) and for strategic decisions concerning the future of the scheme (e.g. improvement of scheme facilities, change of water allocation). The relevance of these specific organizational issues in intervention are taken up later.

Besides these shared management/design features, every scheme has emerged and developed in specific historical and local circumstances that have led to an enormous diversity in the functioning of FMIS.

Diversity in FMIS: Key Elements

An analysis of the data of the communal systems studied shows that the diversity of functioning of FMIS is most clearly related to water allocation and distribution[14] in the schemes. The development of irrigation is linked to the creation of property rights which define users access to water.

In Trás-os-Montes, the traditional irrigation systems were constructed over the centuries by farmers, who mostly obtained rights over water through their contribution of labour and other resources in the construction of the systems. These original water rights changed by inheritance, marriage, buying/selling of land and/or water, by negotiation and the external socio-political process, resulting in the present *rights of access* to water among users. However, in other systems, the relation between the (original) user's resource contribution and the present user's access to water is nonexistent or less explicit, e.g. only separating those who are, from those who are not entitled to use water from a particular source.

In the heterogenous physical and socio-economic environments of Trás-os-Montes, the historical process of irrigation development has resulted in different water allocation principles and water distribution practices in farmer-managed irrigation. The following water allocation principles in communal schemes[15] during the summer period[16] have been found (see Table 2):[17]

Table 2 Summary of Water Allocation and Water Availability in the Communal Systems of Selected Villages

Village (For location, see Fig. 1)	Water Alloc. (1)	Water Avail. (2)	Agro-Ecolog. Zones (3)	PDRITM Inter-vention ending:	Remarks/Interventions in System by Water Users (indicating only the most important)
1 Corva		++++	M	1992	Conflict with Neighbouring Village
2 Sesmil		+	HV	1983	Change in W. Rights (1983-85)
3 Vila Cova		++++	M	1986	
4 Lamas d'Olo		+	M	1990	
5 Covas		+	HV		
7 Seixedo		+	HV		Improvement by Water Users
8 Tresmundes		+	HV		
9 Sobradela	Group	+	HV		Improvement by Community
10 Sta. Marta da Alvao		+++	M	1989	
15 Fervidelas	1				
16 Adaes		+++	M	1992	
18 Vilela		+	HV		Improvement by Water Users
19 Sta Marta		+	HV		
20 Aboboleiro		+	HV		Upstream of Bouca (06)
21 Bosto Frio		++	HV		Improvement by Community
27 Brito de Lomba		++++	M		
28 Roriz		++	HV	1991	Hybrid Water Allocation type 1/2
		++	HV	1990	
11 Meixedo	2	+	M		'92 Change in Water All.type2 to 5
12 Torgueda		+++	M		Past Change in Water All.type1 to 2
26 Vilar de Lomba					+ Improvement by Community
		++	HV		Past Changes Water All. type 1 to 2
17 Santiago	3	+	HV	1987	Discussion Water All. type 3 to 1
24 Vilalva	4	++	HV	1991	Discussion Water All. type 3 to 1
6 Bouca	5	+	HV		
22 Soutelo		+	HV		Past Change in Water All.type 1 to 5
25 Cimo de Vila Castanheira		+	HV		Hybrid Water Allocation type 4/5
13 Romainho	5L	+++++	M	1989	Simplification of Water All. discussed
14 Pincais	6 TP	+++++	M		Improvement by Commission *Baldio*
23 Galegos	TP	+++	M		Improvement by Community

(1)		(2) Scheme source flow:		
1:	Time shares			
2:	Equal shares	+	0-0.5	litre/sec
3:	Parcel based	++	0.5-1	l/s
4:	Free-to-take	+++	1-5	l/s
5:	First come, first served	++++	5-15	l/s
6:	Multi-level	+++++	15-25	l/s
	5L: 5-Level	(Based on Discharge Measurements		
	TP: Time-Parcel	in August 1992)		

(3) Agro-ecological Zones
HV: High Valleys
M: Mountainous Areas

1 *Time shares*. The water user is entitled to use the whole scheme flow for certain time period(s) in a fixed irrigation interval. Rights are (very) unequally divided among water users. Originally the acquisition of these rights was linked to the contribution of the user's resources (labour, location of the water source, land necessary for canal construction, right of way etc.) in the construction of the schemes.

2 *Equal shares*. Irrigation water is considered a type of public good. Every *social unit* in the village (usually a resident household, but not necessarily so in some villages) is entitled to use the whole scheme flow for a certain period of time which is equal for every water user. To re-establish this right one has to participate in the maintenance of the scheme and/or to contribute to certain tasks of common interest. In some cases, one must also be resident in the village. As a consequence, migrants lose their water rights till they return to the village. In other cases, even village inhabitants without land are entitled to the same share, which can then be transacted.
3 *Plot based*. The owner of a specific plot is entitled to use the whole scheme flow until his plot is irrigated sufficiently. In this context, 'sufficiently' is a socially defined concept. One cannot continue irrigating indefinitely, arguing that the plot still needs more water. The plots are contiguous and are irrigated in a fixed sequence.
4 *'Free-to-take'* (*a pilha*). The owner of an irrigable plot has the right to use the whole scheme flow whenever he or she wants. No rules exist. In practice, owners of plots at the head-end, or owners of pumps profit most from the water. However, this allocation principle in the purest form does not occur frequently. This principle is frequently found between systems which depend on the same (surface) water source, giving rise to conflicts (e.g. Corva and Paredes) or where water users of neighbouring villages depend on the same canal (e.g. Cimo de Vila de Castanheiro and Sanfins).
5 *'First come, first served'* (*a vez*). Like 'free-to-take' but with agreements. One basic rule exists: as long as one person is irrigating, he/she will be respected. The other water users wait until that person is finished.
6 *Multi-level types of water allocation*. Different allocation principles also have been found at various levels of some schemes. Irrigation systems have been found with a very complex water allocation (e.g. Romainho). Within this category, most frequently a 2-level distribution is found in which water is distributed to groups of water users on a time basis and within the group from plot to plot. These multi-level types probably did not exist when the schemes were constructed; their emergence was certainly a consequence of an ongoing fragmentation of land and water rights.[18]

Water allocation in FMIS has also clear temporal and spatial dimensions. In the winter, other plots (with permanent meadows) in most schemes outside the summer area, are irrigated with the same water source by less right holders. Generally, water allocation principles are different in the winter (October-March) and summer (June-September). The same applies to the transition period between winter and summer. During these periods, in most schemes the free-to-take or/and the 'first come, first served' type of water allocation are gradually applied. These temporal changes are clearly related to water availability and the importance of permanent meadow irrigation. In some communal schemes (e.g. Bosto Frio) 'winter' rights and the beginning and end of the 'winter' period are rigidly fixed, while in others there is much more flexibility.

Water Distribution

In general, one could state that distribution practices have been developed to meet the requirements of the distinct water allocation principles, but water distribution is necessarily complex in the conditions of Trás-os-Montes. In the first place, discharges from the water sources are often too low to irrigate directly, and transport losses in the canals are high. In the second, to obtain a manageable flow rate, farmers in many cases need to store the water. And third, through sale and inheritance, water rights have become fragmented, which is directly associated with the division and scattered nature of plots.

In many cases, the result of these factors is that water for an individual water user becomes almost unmanageable. For example, it is impossible to irrigate a plot for half an hour which is located 800m from a water source with a discharge of 1 l/s, by means of an unimproved earthen canal. Water would never reach the plot. This problem is enlarged by the fragmentation of plots and water rights, which has resulted in an increased relative water scarcity. Formerly, a landowner had more room to manoeuvre in making plans for the summer period: which plots to sow with what crop in relation to water availability (Bleumink and Kuyk 1992).

To cope with these problems water users developed a set of complex mechanisms, rules and practices to distribute the water and to manage irrigation.[19] They are products of history and tailored to the specific local situation and conditions of each irrigation system. That makes the management of these systems a truly local art. Although this constitutes a very rich field of study, the scope of the paper does not permit us to go into details.

Water distribution practices are essentially the outcome of both water allocation and water availability. In spite of their interdependence, we identify these three parameters as key elements which can be changed by intervention, and as such constitute building blocks in a typology for intervention purposes.

In the next section, we attempt to interpret the meaning and assess the significance of the diversity found in these three key elements in relation to farming.

Rigidity and Flexibility in FMIS: Effects on Farm Water Use

Water use at farm/field level is a function of farmers' access to irrigation water in a specific system whose productive potential depends on locally available water resources and social arrangements between water users. A specific water distribution pattern has emerged/developed, based on farmers' water rights and how these are structured by the locally existing water allocation principles. Interest in the distinct water allocation principles lies in the different degrees of flexibility/rigidity of water use at farm level, and water application at plot level which have certain implications for farming practice.

In Table 3 the different water distribution principles are compared in relation to conditions for water use at farm level (freedom/restrictions on crop choice, plots and transactions) and water application parameters (variability/fixedness of length of irrigation interval, flow rate and irrigation time for one turn) at plot level. It clearly shows how the different water distribution principles influence the degrees of flexibility/rigidity of water use at farmer level and water application at plot level.

Water availability (or to be more exact the balance of water availability and water needs) is obviously also a key factor in determining flexibility/rigidity of water use at the farm level. The availability of larger water quantities increases the farmers' room for manoeuvre. In the final analysis it is an important determinant of the historic sustainability of irrigation systems. Empirical evidence shows that systems with small to very small water availability tend to be vulnerable to (partial) abandonment and undermining.

Table 3 Summary of Wateruse Parameters at Farm/Plot Level in Relation to Water Allocation Principles

Water allocation/ distribution principles	Water use at farm level (restrictions or not)			Water application variables at plot level		
	crop choice (a)	plot bound	exchange or trade in water	flow rate (b)	irrig. time	length of interval (c)
1 Time shares (d)	free	no	free	var.	fixed	fixed
2 Equal shares (e)	free	no	free	var.	fixed	fixed
3 Plot-based	restr.	yes	restr.	var.	var.	var.
4 Free access	free	no	restr.	var.	var.	var.
5 First come, first served (f)	restr.	no	restr.	var.	var.	var.
6 2-level: time-plot	restr.	yes	restr.	var.	var.	fixed

a In schemes with water allocation principles 3, 5 and 6 irrigation of pastures is forbidden. The method of irrigating pastures (contour ditch irrigation/wild flooding) uses too much water compared with the irrigation of food crops. Pasture irrigation is to the detriment of other water users without pastures.

b As summer progresses, water becomes scarcer. Consequently, in the case of plot-based distribution, irrigation time and length of interval (up to more than one month) increase. In type 5, competition for water will increase.

c In water distribution type 6, a distribution group receives water at a fixed interval. If water is becomimg scarce, not all plots in the group can be served during one turn. There are normally specific rules in a group for sharing water shortages among the members over longer periods. The fixed interval in types 1, 2 and 6 may constitute a rigidity and be experienced as an obstacle by groups of water users if it is a long period (more than one week).

d The holders of water rights in types 1 and 2 are, in principle, free to irrigate every plot. In practice, however, the dispersion of a farmer's plots in the scheme, coupled with the obligation to have the water at the entrance to the next user's plot at the beginning of his or her time period can seriously limit this freedom. Because of the fragmentation of land and water rights, in some schemes holders of water rights also have their total time share fragmented into short periods during the length of the irrigation interval; this affects the organisation of labour resources on the farm.

e In type 2 systems, rights are temporary and village bound. They may be temporarily transferred but not definitively (by sale or purchase). Another feature is the variation of shares from year to year. This variation can be considerable (e.g. where every resident adult and even child is a potential holder of water rights).

f This principle has some characteristics of a demand system but households with more resources than others (e.g. labour to wait for other water users finishing irrigation) probably also profit more.

In conclusion, allocation/distribution principles and water availability determine whether water can be obtained at the right moment, in the right quantity and with a sufficient degree of certainty. They constitute a crucial element in farming households' decision making concerning land use (crops, plots, intensity) and resource management and allocation (labour, inputs) on the farm. Small available quantities of water and rigidities caused by social agreements about the use and management of this scarce resource are the cause of deviations between actual water use and aspired water use. Farmers are perfectly aware of that. Over a long period of time and by experience they have developed and 'discovered' a variety of responses and strategies to cope with and to match water supply with the water demand of their crops. How water users and government programmes intervene in FMIS is the theme we take up next.

Interventions in FMIS

Farmers Strategies and Interventions in Irrigation Development

FMIS in Trás-os-Montes are relatively successful in achieving the objectives for which they were created. Evidence of this is their long existence and the continuing use made of them, which proves their sustainability.

FMIS are dynamic systems, having to respond to the (changing) needs of the users. Insofar as the functioning of FMIS does not correspond to the changing objectives, resources and interests of farmers, they will try to adapt, change or improve their schemes. Attempts to overcome constraints in the environment and rigidities in the functioning of the schemes will be made. If the schemes do not or cannot respond satisfactorily to the needs of (groups of) water users, farmers also look individually or in small groups for opportunities outside the communal schemes to develop their own water resources and strategies to obtain water.

Empirical evidence shows that water users themselves actively intervene in irrigation development, both inside and outside the communal systems. In this paper we will distinguish the following types of interventions:

• *Adaptation.* Within the limitations and rigidities of a particular system, water users try to make the most out of the generally small quantities of water available. Many strategies can be distinguished. Water distribution is made more flexible through exchange of water turns, or, more general, the exchange of various resources (e.g. labour against water etc.).[20] Water users explore opportunities to make individual or group arrangements among themselves within the limits set by the management and physical constraints of the systems. Water and/or the land of migrants is used by other water users through various arrangements[21]. A range of local agronomic practices are used for adaptation to or escaping from various degrees of water scarcity, whose combination is another element of a truly local art. Examples are (combination of) crops, rotations, varieties, planting, sowing and harvest times, plant densities[22]. Irrigation facilities, both traditional (shallow wells and earthen reservoirs) and recent (concrete tanks, sprinkler irrigation) at farm level have a strategic importance for making water use and labour flexible.[23]

• *Changes in Water Allocation* (principles) and water distribution practices. In some schemes farming communities have changed management principles, and in other schemes discussions are taking place to change water allocation (see Table 2). It is understandable that these changes are the outcome of a complex social process, because these types of changes imply changes in social relations and resources which farming households control. For some (groups of) water users the actual water allocation-/distribution is more beneficial than for others. Usually long time periods are needed, but changes nevertheless occur, especially at specific events that offer opportunities for change. For example, in the village of Sesmil, the improvement of the communal system by PDRITM was used as an opportunity by a group of water users headed by a local leader to change the distribution of water rights through linking the new distribution of water rights to the labour contribution of water users on the improvement works.[24] Events such as transactions and division by inheritance of land and/or water are likewise used as opportunities for change.[25]

In some systems we have observed that the water allocation/distribution is experienced by an increasing number of water users (principally young people) as too complicated. For example, in Vila Cova, young water users consult regularly with some of the older farmers about the periods for which they have access to water. Besides being complicated, water distribution is very time consuming. Some water users have fragmented water rights over short periods during the length of one irrigation interval (11 days).

• *Improvement of Irrigation Facilities.* The largest physical constraint in many irrigation schemes in Trás-os-Montes is the scarcity of water at the scheme and field level. Numerous (partial) improvements of irrigation facilities implemented by the farming communities themselves have been found. Two types of improvements can be distinguished: first, to limit losses in the canals and reservoirs by means of lining; second, to get more water by developing actual and potential new water sources.

These improvements in many cases are supported by local organizations such as the *Junta de Freguesia* (the political-administrative unit of the Portuguese State at local level) or the *Commissão de Baldios* (Management Commission of Communal Lands). Mostly improvements are implemented in steps, that is to say, one year lining of a reservoir, another year lining some parts of the canal etc.

• *Individual Water Resource Development*. For many years, farmers have also developed their own water resources, traditionally springs, wells and old mine galleries.[26] Concerning the quantity and density of individual water sources, a remarkable difference exists between the mountain and high valley areas. Hydrological conditions in the high valleys, in which small scattered sources originating from subterranean water dominate in irrigation, were more conducive to development of water sources on an individual basis: discharges from many of these sources are too low (in the order of 0.05-0.3 l/s) to permit communal use. Recently, two factors have enormously accelerated the search for water and the development of private water sources in some regions. They are the impact of migration and the availability of modern technology.

One of the effects that returning emigrants have had on local society, principally in the 1970s and the early 1980s, was that they brought back with them capital that was used to invest in developing water sources on an individual basis. At the same time, new technology became available that supported this type of development (Davidse 1991). Long PVC tube lines made it feasible to transport small quantities of water from distant water sources to the best plots near the villages and so reinforce available water from the traditional systems and/or decrease dependence on traditional communal systems. This stimulated the creation of small enterprises to develop water sources and to dig trenches for the tubes. Another technology generally used in Trás-os-Montes to reinforce available water quantities is the deep well and use of the electric pump.

The development of sources for drinking water and the construction of home connections by State institutions is also quite recent. The rush to exploit water sources has even led, in certain villages, to existing irrigation schemes being undermined and to a decrease in the available water for these schemes to such a degree that, in some cases, communal systems have virtually died.[27] This undermining is further aggravated by the effect of migrants spending August holidays in their villages. At such times the population of an ordinary village will double or sometimes triple. The combination of this sudden population influx with their more demanding water consumption habits, leads to high requirements exactly in one of the driest months.

From an analysis of the functioning and dynamics found in farmer-managed irrigation, as expressed by farmer interventions, we have deduced what we believe to be the relevant elements for defining intervention strategies:

• *Contents of Intervention:* The specificity of local FMIS, both in functioning and context. The very large heterogeneity among FMIS includes such interrelated aspects as:

- The relative importance of and the particular balance between communal, group and individual irrigation facilities (high valleys versus mountains)
- The relative importance of winter irrigation (high valleys versus mountains)
- The rigidity/flexibility of water use
- The balance of water availability/water needs

These factors have a profound influence on how and to what degree farmers intervene in their own irrigation schemes or take initiatives in irrigation development. The need and willingness to change things, and the contents of change will be highly dependent on particular local conditions at specific moments. This has consequences for public interventions both in the selection of schemes, the contents of intervention, and the time horizon.

• *Methods of Intervention:* The intervention process. Characteristics of how farmers intervene are:

- Timing when need exists and opportunities appear
- Stepwise, in phases, testing out results, experimental
- Based on local knowledge
- Decision making is an informal process involving local actors who have most interest in intervention
- Use of local resources (labour) with support of local organizations
- Use of local construction methods and materials (half circular concrete elements: *meia manilha*)

State Interventions

An important development since 1982 is the involvement of the Portuguese Government in irrigation development in Trás-os-Montes, financed by World Bank loans and structural adjustment funds of the EC. In the Trás-os Montes Integrated Rural Development Programme (PDRITM), irrigation is seen as a basic condition for agricultural development. Globally this government supported programme consists of three components. Two minor components are:

• *Implementation of New Small-scale Irrigation Perimeters.* The most relevant differences with traditional irrigation schemes are:

- The process of planning, design and construction of the scheme is essentially an external intervention with nearly no involvement/participation of those who will be future water users.
- An enormous increase of summer water availability through the construction of small dams and respective storage (in the order of a million m^3 per scheme). In this sense the intervention is an adequate response to one of the most felt needs of farmers: more water. This option is very relevant for high valley areas. Not much experience is yet available with these schemes but PDRITM will in the future focus on such schemes more and more.

• *State Subsidies for Creating Individual Irrigation Facilities.* Access is limited to larger farmers. How far such facilities undermine other existing schemes needs to be questioned.

Until now, the most important component of the PDRITM programme has been the improvement of traditional irrigation schemes (*Melhoria de Regadios Tradicionais* or MRT). The PDRITM intervention programme for the improvement of communal FMIS aims at developing intensive dairying based on increased forage production. The interventions are conceptually not very different from the initiatives already undertaken by the farming communities themselves. Contrary to many other rehabilitation programmes worldwide, this approach respects the existing local situation with its intricate complexities and does not change the functioning of existing irrigation schemes but focuses on the improvement of the physical infrastructure of the schemes, essentially by limiting water loss by lining canals and reservoirs. Another guideline is that improvement will only be implemented if at least two-thirds of the water users agree and subscribe to the respective protocol. Direct resource contributions (labour or other) of the water users are also required (5 to 20 percent of the value of the total investment).[28]

The implementation process and the effects of the interventions of the PDRITM programme for improvement of traditional irrigation systems are extensively documented (Portela et al. 1985; 1987; 1990). In this paper we will summarize the most important findings:

- In general, water users readily agree that the PDRITM interventions produced multiple benefits, appreciated at scheme and village level because of diminished summer water scarcity and labour required for operation and maintenance, and at farm level for their general beneficial effects on land-use intensification, increased labour productivity and less drudgery.
- Conceptual errors are pointed out by water users in some villages (principally in the mountain zone). Canals have been designed for summer irrigation only, or have been substituted by tubes. The canals which are under-dimensioned and positioned too high and therefore hinder surface water to stream and tubes, disrupt winter irrigation

(which has to be done with much and 'dirty' water), reducing the yields of permanent natural pastures.

- Interventions are of a very limited character: the increase of water availability at scheme source level is very small or nil. In the case of a (much) reduced water availability, as in the high valleys, the productive effects of intervention are small or negligible.[29] One might question whether the resources used in the investment would not have had greater benefits used in alternative projects.
- The often isolated and unintegrated nature of intervention in relation to local development, needs and priorities.[30]
- The selection/prioritization of schemes for intervention is not very clear and subject to pressure from (political) power groups. Selection criteria are centred more on the convenience of the implementing agency. Actual water management and the productive potential of a scheme plays a minor role.
- Usually (groups of) water users are not, or are minimally (or selectively) involved in the planning and design phases of the intervention. This leads to conceptual errors in the design and to unnecessary problems and delays in the implementation phase.
- Improvement of the (supposed) largest village scheme without knowing the relative importance of this scheme for the village farmers.[31]

Effects of Improvement on Water Distribution and Water Use

The overall effect of PDRITM interventions is increased water availability at scheme level, which signifies an increased room to manoeuvre at farm and plot level. A crucial question is how and by whom this incremental water may be used, depending on the water distribution allocation in specific schemes.

Table 4 shows which changes occur in access to water after improvement. In type 1, water users with big shares profit much more from the improvement of the scheme. In types 3 and 6 the irrigated areas of water users do not change, but improvement makes a more intensive land use (higher yields) possible. In types 4 and 5 the absolute access to water has increased, but it is not clear to what degree users profit from it. Probably households with more resources (e.g. labour force to wait for the water in type 5), also profit more.

Another important question is how far improvements constitute an incentive for changes in water use, especially use linked to the production objectives of PDRITM, namely, increased forage production. The incremental water can be used to intensify land use (more water on the same plot) and/or to extend the irrigated area. Schemes of type 1 and 2 offer the highest flexibility to farmers to use the incremental water quantities adequately. No restrictions exist in relation to parcels, crops or exchange or trade in water, thus it is to be expected that water will be applied in a way which corresponds to the most suitable use of water under the given circumstances.[32]

Table 4 Effects of Improvements in Relation to Water Allocation Principles

Water Allocation Principles	Changes in access to water as effect of intervention				
	(a)	before improvement	after improvement	gain	criteria
1 Time shares	a	Q	2Q	Q	Quantity
	b	10Q	20Q	10Q	Water
2 Equal shares	a	Q	2Q	Q	Quantity
	b	Q	2Q	Q	Water
3 Plot-based	a	A	A	-	Area
	b	10A	10A	-	Irrigated
4 Free access	a	?	?	?	?
	b	?	?	?	
5 First come, first served	a	?	?	?	?
	b	?	?	?	
6 2-level: time-plot	a	A	A	-	Area
	b	10A	10A	-	Irrigated

Water Allocation Principles	Effects of interventions on production parameters (c)		
	Increase irrig. area (d)	Increase pastures	Exchange or trade in water
1 Time shares	incentive	incentive	incentive
2 Equal shares	incentive	incentive	incentive
3 Plot-based	restr.	restr.	restr.
4 Free access	?	?	restr.
5 First come, first served	?	? ?	restr.
6 2-level: time-plot	restr.	restr.	restr.

(a) Comparison of two water users, a and b, with different water (Q, 10Q) or land (A, 10A) resources in schemes with distinct principles of water distribution.
(b) It is assumed that water availability at scheme level doubled as a result of improvement.
(c) The more water becomes available by improvement, the more pressure that can be exerted from groups of water users to change the distribution rules in types 3 and 6. In general, all rules can be made more flexible if water users agree among themselves.
(d) However, in types 3 and 6 the increase in irrigated area is restricted, irrigation of existing plots may be intensified (shorter length of intervals, larger water gifts).

In schemes of type 3 and 6, water use is conditioned by more or less rigid rules, thus no incentives and/or possibilities exist in these types to increase irrigated areas and pastures. However, irrigation of existing plots may be intensified. In schemes of type 4 and 5, changes in water use are difficult to predict and very dependent on the local situation.

Thus, it can be concluded that a uniform type of intervention, namely, the improvement of irrigation facilities, works out differently in irrigation schemes with different water allocation principles. This implies differential production effects of incremental water in the various schemes.

Having identified the various reasons, forms, features and effects of intervention by water users as well as the government, the next question is – what lessons can be learned? Starting with the heterogeneity and dynamics found in FMIS and their environments we will formulate intervention strategies for improving public interventions.

Linking Institutional Support to Farmer-managed Irrigation: Intervention Strategies

Trás-os-Montes is a so-called marginal region whose rural areas are seriously threatened by human depopulation. To stop this tendency, rural development in Trás-os-Montes is of the utmost importance. The implementation of exogenous development models from the growth poles is not recommendable because of negative environmental and economic side effects. Moreover these external development models/modernization blueprints are virtually impossible to implement because of the physical and socio-economic conditions in Trás-os-Montes. So, an alternative must be searched for in the development of the local potential of human and natural resources and infrastructures.

Starting from the premise that building upon and improving the local potential of human and natural resources is the basis for sustainable rural development, then institutional interventions and support may play an important role in strengthening local development. In the foregoing we have shown that farmer-managed irrigation constitutes a local resource of crucial importance for agricultural development. Although actual state interventions in communal FMIS respect the local situation and limit themselves to a physical improvement of the infrastructure, they are of a uniform character and do not take into account the heterogeneity/diversity in functioning and the local dynamics found in the farmer-managed irrigation sector.

Based on the diversity and local dynamics found, the following intervention strategies (concerning both the contents and the process of intervention) are, in our opinion, vital for improving existing and designing new institutional interventions:

1 An integrated approach to local (irrigation) development. Public interventions in FMIS are often isolated actions and not systematically linked to local development, specific needs and priorities. The same is valid for

interventions by other (public) institutions that are often not adjusted to the local situation and coordinated from a local perspective. Integrated development needs to be defined at local level according to the specificity of the local situation (existing development tendencies, use of local resources) and local needs. Various dimensions can be distinguished:

- The importance of irrigation versus other forms of water use in the local situation. Priorities for local development may envisage that irrigation development, to be effective, needs to be complemented by other interventions.
- A crucial point is the integral role that irrigation plays in farming. It cannot be understood as an isolated phenomenon. Irrigation development can be interpreted as both a condition for and an outcome of land use intensification and increasing labour productivity, commonly associated with the modernization model. Key questions are: what is the role of irrigation in the specific agricultural practices of particular (groups of) actors? And which irrigation interventions are a condition and/or a stimulus for local agricultural development patterns?[33]
- Concerning irrigation development a whole range of interventions need to be considered from a local perspective, not only a uniform type, i.e. the *improvement of the physical infrastructure* of the communal system of a village, supposed to be the most important.
- As we have already seen interventions by water users are much more diverse, context dependent and space/time specific. Moreover, there are linkages between factors. For example, an increase in water availability will (again) initiate local discussion about water distribution, i.e. whether the distribution pattern will fit the new situation created by the intervention.
- An integrated approach implies that all the aspects and effects of intervention need to be considered, which are not necessarily limited to one village. Where various irrigation systems depend on the same surface water resource, adequate interventions need to consider a whole catchment area or even a whole region if subterranean water development is involved. A constraint at the national level related to water resource development is the obsolete Portuguese water legislation and its deficient application (Matos Ferreira 1989).
- Local implementation capacity. Social organization. Local potentials and constraints.

2 The use of a typology of FMIS as a resource for mapping the heterogeneity of FMIS and their local environments. A typology constructed on:

- The relative importance of and particular balance between communal, group and individual irrigation facilities/systems at village/local level.
- The relative importance of winter and summer irrigation.

- The key factors/determinants of heterogeneity in the functioning of FMIS and the related rigidity/flexibility of water use at the farm level.
- The balance of water availability/water needs.
- Local dynamics as expressed by farmers' interventions, ideas and discussions but also in an indirect way, e.g. requests for support from public institutions.

A constructed typology would enable one to focus the content and process of intervention on the specific situation at local level, and to abandon uniform blueprint models and intervention methods. Fundamental dimensions of the contents of intervention are the different interests of local socio-economic groups, the importance and actual functioning of the local irrigation schemes and related farming practices. Irrigation presents different interests for the different social groups, which may eventually clash with each other. In the section concerning farmers' strategies, the existence of a strong tendency to develop individual water resources was revealed, related to particular conditions (hydrology, impact of migration, production orientation, the balance between water needs/availability), especially in the high valleys. In some places this tendency resulted in the undermining and subsequent abandoning of communal systems, prejudicing vulnerable groups with few resources. In the mountain areas farmers invest also in individual irrigation facilities, but communal systems are still the most important at village level. The differing significance of summer and winter irrigation is related to the importance of locally dependent, specific farming practices. As mentioned earlier, interventions neglect the local importance of winter irrigation of permanent meadows and in some locations interventions are directly prejudicial to this farming practice. We showed earlier how the heterogeneity found in the management/functioning of FMIS is related to the diversity in three identified key variables.

This diversity has a direct influence on the rigidity/flexibility of water use at farm level, which leads to a variety of farmer responses and interventions both in and outside the communal FMIS. These key factors are operational elements in the sense that they can be changed. As already mentioned, interventions implemented by water users themselves nearly always involve changes in one or a combination of these elements. Finally, it was shown that the uniform character of public intervention (improvement of the physical infrastructure) in FMIS with distinct management features has different effects in terms of access to water and in terms of potential changes in water use. This may help us to assess the different effects that are likely from this type of intervention.

A constructed typology would constitute an instrument for planners, designers and implementers at various levels for mapping heterogeneity, complexity, flexibility/rigidity, dynamics and potentialities of irrigation at village and scheme level. On a more aggregate level, the typology might also be linked to (certain) contextual/environmental factors (e.g. agro-ecological, production orientation etc.) that would be useful for global planning purposes. Such a typology would contain crucial guidelines for intervention purposes and as such constitute a tool for focusing on the most relevant features of local irrigation development. Which leads to the following intervention strategy.

3 Improved inventarization is a first step to, and condition for improved interventions. Until now, inventarization of FMIS was limited to technical constraints, and was based on information from a very limited number of local informants. Improved inventarization needs to include actual functioning and dynamics of FMIS, specific local needs and local initiatives in order to avoid external proposals being unrelated to the local reality. This requires exhaustive consultation with different actors at the local level. In this way, inventarization is fundamental in designing interventions suited/tailored to the local situation, and to the needs of different (groups) of actors. Selection criteria for intervention can be derived or established leading to the next intervention strategy.

4 Improved selection and prioritization of sites considered for intervention. Up to now, the selection of which FMIS to improve has been based mostly on technical criteria (access paths, length of main canal, size of weirs, water flows, irrigated areas, soils, size of village population),[34] biased towards quick implementation. Selection criteria need to be derived that are based on a typology with a focus on local dynamics. For the selected villages to intervene, the following intervention strategy appears on the horizon.

5 Defining the decision making process as a joint venture of institution and local water users. To date, water users have virtually been excluded from the planning and design phases of the intervention. The contents (what to do) and process (who, how, when, where) of intervention need to be defined and discussed at the local level by all actors who have an interest in the intervention. A constructed typology could be used as an instrument to focus the discussion on the essentials. This would avoid conceptual errors related to neglecting the specificity of agricultural practices, such as irrigation of natural meadows, the *rega de lima*. In this way, intervention might be a suitable moment and opportunity to initiate debate and to establish new rules which enable the highest local benefits to be gained from the envisaged intervention.

6 Defining intervention as support to ongoing local dynamics and as strengthening local initiatives, helping with means, resources, technical assistance which are not within the reach of local actors. This implies the creation of a new relationship between local initiatives and central intervention programmes,[35] which signifies in practical terms an important rupture with usual interventions. Institutional interventions are not linked to local initiatives.

The fact that, in many cases, farmers (communities) themselves, supported by local organizations,[36] actively intervene in irrigation development is of crucial importance. It is an indicator of the capacity and decision making of water users and their organizations to create and change things. It represents a potential that is actually not used by institutional interventions. We think that this resource can be combined with institutional efforts to improve interventions through an approach similar to what Coward (1985) called 'the indirect investment approach'. Through indirect investment, critical resources are provided by state agencies to local irrigation groups to create and improve those locally- owned and managed systems.[37] If the groups of water users, who ultimately are the risk-takers of irrigation investments, are given the due status and roles, they can make themselves accountable to the institutions which supply these resources. Strongly related to this is the following intervention strategy.

7 Start with the assumption that farmers avoid excessive risk taking, and experiment on a limited scale. This links up with the way farmers intervene in their systems i.e. partial step-by-step improvements. This signifies a rupture with actual implementation of interventions.[38] It implies that the role of external agents, e.g. constructors, will decline and be of a different nature, i.e. the implementing of specific parts which are not within the reach of the local community. Also relations between these external actors and the local community will change. In the first place they will be accountable to the local community instead of the intervening institution.

8 Start with the farmers' local knowledge of the area, physical conditions and farming/related irrigation practices. PDRITM intervention consultations with farmers are minimal and biased towards local bosses, big farmers etc. Using local knowledge will point to better suited solutions (adequacy, cost-effectiveness) to specific local problems, e.g. the lining of canals (where is it most necessary? etc.). Farmers' knowledge of specific local farming and related irrigation practices is of crucial importance in avoiding conceptual design errors (e.g neglecting winter irrigation practice) and in creating adequate designs adjusted to these practices.

Notes

1 The term 'Farmer-Managed Irrigation Systems (FMIS)' will be used for all those schemes which are constructed, maintained and managed by farmers, both collectively or individually. The qualification 'traditional' indicates that these schemes generally have a long history. Until recent times State intervention in 'traditional' FMIS was nil or minimal.

2 The paper is based on the contributions and experience of the many people who are or have been involved in this research project, which is a joint venture with the Department of Economics and Sociology (DES) of the University of Trás-os-Montes e Alto Douro (UTAD) in Vila Real, Portugal, and the Department of Irrigation and Soil and Water Conservation of Wageningen Agricultural University (WAU) in the Netherlands.

3 People frequently characterize their region by the proverb: 'Trás-os-Montes, nove meses de Inverno e três meses de Inferno' (nine months of Winter and three months of Hell).

4 State interventions by the Salazar and Caetano regimes from the 1940s to 1974 contributed to an acceleration of migration. The forestry policy of the government took a lot of the communal moorland area (*baldios*) out of the control of local communities, which principally affected the poorest, landless people. In many cases their source of subsistence in herding sheep and goats or in the cultivation of small plots in the *baldios* was cut off, leaving them few alternatives but to migrate. Although farming did not offer possibilities for survival to these people, it is ironic that many migrants are working in agriculture, e.g in Switzerland.

5 A case study (Baptista 1989) of one village, Cimo de Vila de Castanheiro near Chaves, revealed the existence of an agro-pasture-vineyard-forest area of 500 ha, property of 125 farming households, divided into 2700 parcels scattered over the whole village domain, of which 550 parcels, occupying a total area of 75 ha (15 percent of the total cultivated area), have some form of irrigation.

6 A case study of the production strategies of dairy farmers in the village Cimo de Vila de Castanheira (Baptista et al. 1990) shows that production for household consumption represents about 50 percent of the total production value of the most common group of small farmers (with one to two cows).

7 The small-scale farming sector in Portugal has an importance which goes far beyond the level of agricultural production realized. Among other contributions to the Portuguese economy, it is the main supplier of cheap industrial labor. A remarkable case study of two parishes in the neighbouring Minho region (Fragata 1989: 169) reveals that about 60 percent of farming households have a member working in nearby industry. It was calculated that the contribution of farm production for household consumption and the locational value of the farmhouse represented 67 percent of the industrial wage that these workers earn. Thus, should these households dispose of these use values, industrial wages would need to increase by 67 percent to maintain the same level of income.

8 Until recently, conflicts over water was one of the most frequently occurring causes of death among Portuguese farmers.

9 General agricultural development in the research area has been strongly influenced by the massive migration, which has led to a lack of labour. This has increased the relative importance of irrigation in farming. One effect of the lack of labour is the cultivation of less staple food and rye which in the past were commercialized but now only serve household consumption needs. An extensification in land use was the result; much land which was cultivated in a rye/potatoes rotation was abandoned, became uncultivated land or unimproved natural meadows. Within many farms a shift took place from non-irrigated to irrigated land: the balance between the cultivation of non-irrigated and irrigated lands changed. Extensification of some parts (with the worst soils and more distant from the villages) went parallel with a relative intensification of other parts (good quality land with irrigation facilities near the villages). In these favorable parts there has been a shift from staple food to the cultivation of cattle feed.

10 Farmers in the mountain areas say: "Agua limpa é só para limpar a cara" (clean water serves only to wash your face).

11 However, various contradictory statements and facts about the nature of the 'rega de lima' exist, e.g.:

- It is difficult to understand why in mountain areas this irrigation practice is more important than in the high valleys. In some parts of the high valleys there occur more frost days than in mountain areas. Like manuring practice, there is apparently no reason for it to be more important in the mountains than in the high valleys.
- Some farmers say that for 'rega de lima' you need relatively warm water from springs which give small discharges as compared to rivers. In contradiction to this statement is the opinion that you need large water quantities, and that without them it is better not to irrigate at all.

This suggests that the underlying ecological and local factors which explain the nature and importance of the 'rega de lima' are not well understood. The research on this irrigation practice is important for defining the nature of interventions and e.g. determining technical design criteria for calculating irrigation canals. This research can also explore an interesting hypothesis, namely, whether this irrigation practice constitutes a water-spreading technique that stores water in the soil profile which in the dry summer period will gradually be released to feed water sources such as springs and wells. The slow melting of snow has the same effect, as reflected in the proverb 'Ano de nevão, ano de pão' (Year of much snow, year of good harvest). Such applied research undertaken by a team of researchers of different disciplines will, in our opinion, constitute an outstanding example of institutional support to regional agricultural development.

12 However, in quite a lot of villages with specific farming systems and scarce labour resources, this is changing because of a recent tendency to transform irrigated arable plots into permanent meadows.

13 An ingenious labour saving artefact is used generally in Trás-os-Montes, called *pedra de engenha*. This is a self-starting syphon built in a reservoir. When the reservoir is full and the incoming streamflow is relatively large (in the winter period) the syphon will be activated and will empty the whole reservoir in a limited time. It is a type of automatic irrigation fully adapted to the winter irrigation of meadows (large streamflows). In the summer, the syphon does not function because the incoming streamflow is too low. In this period, the reservoir needs to be opened by hand and the outgoing streamflow will be carefully regulated to use the small quantities of available water in the best way.

14 Allocation means the assignment of rights of access to the water among users, while distribution refers to the physical distribution of water among users (Martin et al. 1987).

15 This classification, obviously, cannot catch the whole diversity of water allocation in traditional schemes. Although hybrid variants and combinations of elements exist, this classification in broad categories serves well to show the diversity found.

16 Water allocation in FMIS has also clear temporal and spatial dimensions, as will be elaborated next in this section.

17 From the table, it seems clear that time-share systems are in the absolute majority. However, later empirical evidence shows that in this sample, time-share systems are over-represented in relation to systems with other water allocation principles.

18 A very interesting and relevant question is how these different water allocation principles emerged and developed, what are the underlying reasons for their existence and which relations/ linkages now exist between them. The emergence of the time share type can be clearly traced back historically to the proportional relation between users resource contributions to the construction of the theme (labour, land for canal and reservoir construction, property of water source, rights of passage etc.) and the initial users access to water. For type 3 (plot based) we will formulate the hypothesis that this type developed out of an irrigation scheme controlled by one farmer. The heirs divided the land but did not fragment irrigation time accordingly. For the 2-level allocation time-plot a similar hypothesis can be formulated considering an original time-based distribution of water between various farmer households (*casais*). Distribution groups are often indicated by the name of a family (*casal*). Type 5 (*a vez*) seems to be related to the regularity and reliability of the water source flow.

19 Irrigation in these schemes also implies a certain synchronization and coordination of farm activities because of the shared use of irrigation channels, and the access of draught cattle, tractors and equipment to the plots. In the village 'Galegos de Serra' the farmers use expressions like *Caminhos sabidos* (known paths) to indicate that farmers have in summer about eight days right of way over other farmers plots to reach their own plots in order to prepare and plant them. Also water is not allowed to flow in the channels during certain periods in order to drain, to plough and manure the plots (*aguas sabidas* or *known waters*).

20 A survey, in 1986, among the 125 farmer households of the village of Cimo de Vila de Castanheira, revealed the existence of 20 relations between farming households in which water was exchanged for other resources, principally labor. In the farmer strategies of Trás-os-Montes exchange of resources is a crucial social relation of production. Through these relationships, farmers mobilize resources which are missing and exchange them for others which they possess in sufficient measure. Even old people who are not able to work any more, by means of this social mechanism, can survive.

21 A case study of the village of Sezelhe (Morgado 1992) in the mountain zone of Barroso reveals that of a total irrigated area (winter and summer areas) of 125 ha, water users irrigate 17 ha of land (or 14 percent of the total) that is the property of migrants.

22 Agronomic practices to make the most adequate use of scarce water resources, include:
- Use of balanced cropping patterns: a proportion between irrigated and non-irrigated (e.g rye) crops on a farm globally adapted to existing water availability.
- Irrigation of different crops in distinct periods, e.g. potatoes (irrigation in May-June) and maize (July-August).
- Earlier seeding and planting of crops to escape water scarcity. There are differences in

planting dates between different zones and also between the farmers of the same area reflecting different behaviour to risks of frosts and heavy rains with earlier seeding.
- Use of different plant varieties depending on their water needs, drought resistance, planting dates and crop uses. For example, hybrid maize has a higher water need, is less drought resistent and needs to be planted earlier (because of a longer growth period) than the regional, rustic varieties. The longer growth period of hybrid maize is related also to the use of silage when the regional varieties can be used as green fodder or harvested as corn.
- Stimulating of good rooting of crops (e.g. maize) by not irrigating in the first growth period. This has also the advantage that in subsequent irrigation turns, deep losses outside the root zone of the crop are minimalized.
- Timing of irrigation in the critical growth period of the crop, e.g. the flowering/tasseling stage of the maize crop.
- Relay planting of other crops (e.g. beans in potatoes, annual grasses in maize) which can use the soil humidity that is left after the main crop is harvested.
- Frequent weeding in order to prevent losses of nutrients and water taken up by weeds, and hoeing to disturb the upper soil layer preventing water losses by capillarity rise to the soil surface.
- High sowing density of maize. Then, dependent on irrigation water availability and rainfall, farmers assess the possibilities of crop yield and survival. Normally they thin out the crop 2 or 3 times. The plants with most hydric stress serve as green cattle feed.
- Irrigation of alternate furrows to give small water gifts to a plot in specific conditions, e.g. when it has rained or rain is expected.

23 Additional irrigation facilities at plot/farm level are used to e.g.:
- permit a more flexible and improved timing of water application not prescribed by the rigidities of the system (e.g. long lengths of irrigation intervals). By means of temporary water storage in reservoirs (poços, tanques) it is possible to irrigate in between turns which is necessary principally in horticulture.
- irrigate plots which otherwise cannot be irrigated. By means of pumps and flexible tubes water can be transported to plots which are higher and farther away.
- irrigate plots with a convenient discharge that is neither too low nor too high, dependent on crop and irrigation method (water storage by tanks/reservoirs and regulation of discharge from reservoirs and by using pumps and *pedras de engenho*).
- irrigate plots more efficiently/with less water and uniformly, mainly pastures, by means of sprinkler irrigation. EC funds are available for some groups of farmers.
- irrigate with less labour input (*pedra de engenho*, sprinkler).
- permit more flexibility in labor input by use of tanks (important in the combination of farm and off-farm activities). Tanks are frequently found in schemes near cities with off-farm employment opportunities.

24 The village of Roriz is another interesting example. The old system, in which water distribution was based on (very) unequal time shares, have been abandoned and not used for years. When rehabilitation recently took place, all households in the village had the opportunity to obtain equal shares by means of equal (money) contributions to the rehabilitation works. The new type of water allocation can be considered a hybrid type. On the one hand it has type 2 features, but water rights are not temporary and village bound; they are attributed to specific persons who can freely dispose of and transact these water rights. These are typically type 1 features.

25 Also change of external conditions may constitute an opportunity. In Vilar de Lombo, a type 1 water allocation existed with very unequal access to water among water users but with equal obligations to maintain the system. This was experienced by a lot of farmers

as unjust. The Cravo Revolution in 1974 was used by the group of water users who had little access to water to impose a change. Water rights were equally distributed among all households in the village, in spite of big water users protests and attempts to re-establish the status quo by means of juridical procedures.

26 The rationale is obvious: individual water sources imply more control over individual water use. It will be interesting to test the hypothesis that development of individual water resources is positively related to the different degrees of rigidity of water use found in the communal systems and the emergence/development of specific farming systems.

27 Striking examples can be found in villages with collective milking parlours in the high valleys, where during the last 10 years farming has become principally oriented to milk production. That required more water for more and better cattle feed. Some farmers have made enormous investments to explore small quantities of water.

28 The difference in contributions appears to be related to the two different kinds of finance sources of the programme (World Bank and EC).

29 E.g. comparing two cases:

Irrigation scheme:	High Valleys	Mountains
Source flow:	1 l/s	20 l/s
Before improvement		
losses:	70%	50%
Available water:	0.3 l/s	10 l/s
After improvement (canal lining)		
losses:	10 %	10 %
Available water:	0.9 l/s	18 l/s
Incremental available water	0.6 l/s	8 l/s

The differential productive effects of lining in these two cases are very clear.

30 A whole series of examples can be given. Irrigation systems are improved where necessity is less felt than in other hamlets where for instance conditions are created for milk production by the building of a collective milking parlour (SCOM). The same happens with the improvement of rural roads. Synergic effects of development efforts are seldom explored. In a broader scope actions could have contradictory effects, e.g. forest developments which dry up water sources on which improved irrigation systems depend (when a forest burned down, as happened in Soutelo and Sta. Marta do Alvão, sources flowed again). Local needs and priorities might be different even related to water supply (Example: Mourilho where people in the first place were interested in a reservoir to combat forest fires and not to improve their irrigation scheme).

31 There is evidence to doubt whether in some cases (e.g. Santiago) the most important communal system was really improved. In many villages, principally of the high valleys, there are a great number of individual and small group water sources whose importance could be more important than the communal system. For instance, some measurements in the village of Sesmil show in the case of one user that she receives from the communal system some 2.1 m^3/day (July 1992) and her shallow well yields approximately 3.7 m^3/day which corresponds with 65 percent of her total water supply (Schultink 1992). In this village, at a rough estimate the contribution of scattered individual water sources is about 80 percent of the total water supply in the summer. On the basis of other empirical research we can expect that similar situations are general in the high valley zone.

32 The only rigidity in type 1 and 2 is the fixed irrigation interval, which if a long period, is already or can become an obstacle to improved water use and increased production.

33 Irrigation is crucial for all farming households to secure production for household consumption needs. Moreover, the development of specific farming systems is conditioned by the availability and increase of water supply (See the four farming styles identified by Christóvão et al. in the mountain area of Barroso). In the high valleys a great variety of farming systems can also be distinguished, based on the forage system that farmers use (Baptista *et al.* 1990). Irrigation potential and practice appear crucial variables in the identification of these forage and farming systems.

34 In spite of the limited character of these criteria, much evidence exists to question the reliability of the data on water flows and irrigated areas which have been used for design purposes. Irrigated areas and water flows are not measured and are frequently overestimated.

35 The balance between local initiatives and institutional intervention need to be specific for every local situation. It is obvious that the relation will be different in traditional FMIS intervention than it would be in the creation of new small-scale irrigation perimeters.

36 A salient example is the village of *Cidadelhe de Aguiar*. The local commons management commission invested 40,000 US$ in irrigation works (9 km channel) (Brouwer 1992).

37 This approach seems not entirely new in Trás-os-Montes. People in some villages informed us about the former existence of an *Instituto de Reforma Agraria* created after the Cravo Revolution of 1974 which supported local water supply projects with e.g. construction materials complementing the labour of the village habitants. Another example is the village Gallegos de Serra, in which the local habitants in 1974 substituted 500 meters of earth canal by a canal constituted by half-circular concrete elements (*meia manilhas*). These elements were supplied and transported to the village by order of the then *governador civil* of the Vila Real district.

38 The practicality of this intervention strategy is dependent on the local situation and specific for the type of intervention. It is obvious that the implementation of new small-scale irrigation perimeters requires other methods than improvement of traditional FMIS.

7 Ecological Wine-making in a Depressed Mountainous Region in Southern Spain

Gaston Remmers

The Alpujarra, a mountainous region in the south of Granada (Figure 1), has been classified by the Spanish Ministry of Agriculture Fisheries and Food as one of the ten most socio-economically depressed regions in Spain (MAPA 1983).

Farming in the region is generally based on animal traction, and farms, while diversified, are partly subsistence-oriented family enterprises. Since the fifties, a rapid depopulation has taken place, resulting in a highly ageing population. Income per capita, in 1975, was less than half the national average (Calatrava and Molero 1983). On the lower mountain slopes some relief was offered by almond growing, but when prices dropped due to the importing of U.S. almonds some eight years ago, this source of income became unreliable. Recently, the autonomous government of Andalusia has promoted tourism to generate employment.

The region can roughly be divided into the High Alpujarra, comprising almost all of the southern slope of the Sierra Nevada, whose summits range from 2500-3500 metres, descending to the rivers Guadalfeo and Andarax, that lie at 350 metres in Orgiva and 921 meters in Laujar de Andarax, and the Low Alpujarra, (extending from the Guadalfeo almost to the sea, enclosing a mountainous ridge that runs east-west, parallel to the Sierra Nevada, reaching 1500 meters). The distance between the Sierra Nevada and the Mediterranean Sea is about 35-40 kilometres. The Guadalfeo is located some 15-20 km from the sea. The Contraviesa mountains, where this study was carried out, lie in the Low Alpujarra region.

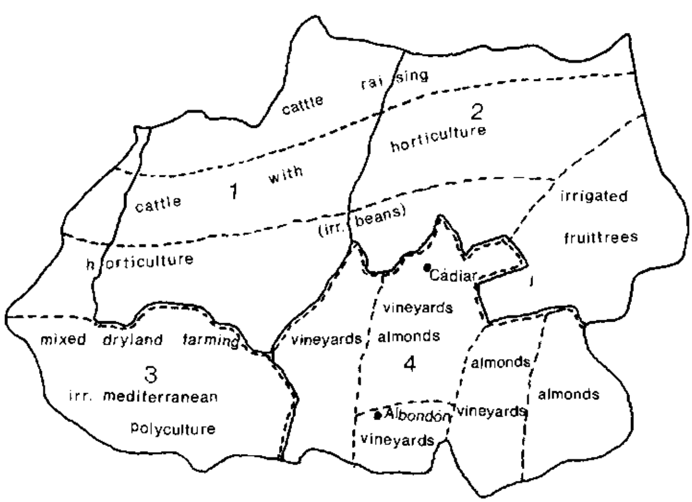
More than half of the Alpujarra and almost all of the Contraviesa has been classified by the Andalusian Agency of Environment (AMA) as unproductive or marginal land (Junta de Andalucia 1991). This is due to its combination of steep slopes and poor soils. Only 5.65 percent of the land in the Alpujarra has slopes of less than 20 percent, usually considered to be the limit for mechanized agriculture (Calatrava and Molero 1983). The orographical conditions generate a zoned rainfall pattern, and with it, a wide variety of agro-ecological zones. Despite the adverse biophysical conditions, in the last century the region sustained a population density that surpassed the national Spanish average.

From the early 1970s, many of the Alpujarra farmers travelled as day-labourers to the Campo de Dalías, a coastal plain and highly productive vegetable area in the Province of Almería that borders the Alpujarra to the southeast. The centres of the two regions are approximately 50 km apart. Many of these workers eventually decided to abandon their land and homesteads and they moved to the Campo de Dalías to start their own agricultural enterprises. Campo de Dalías has become a very profitable centre (Europe's largest) for the year-round production of vegetables in plastic greenhouses, exploiting the high insulation but avoiding the high costs of construction and maintenance that characterize greenhouse horticulture in northern Europe. Although the development of this 'protected agriculture' originated from local farmers who discovered that plants grew well on a layer of sea-sand over the soil, it now heavily depends on imported knowledge. The production system is in many cases computer guided and makes intensive use of chemical fertilizers and pesticides, and the debt level of the farmers is high. Through the years, such agriculture has led to a contamination of the environment that endangers its own production potential, as it renders salty the aquifers used for irrigation (Calatrava 1982, 1985).

Figure 1 Localization of the Alpujarra

Thus the two regions contrast heavily in biotic and abiotic conditions as well as in their agricultural production systems. Thus, in Campo de Dalías, farming has become 'artificial' and independent of its physical and biotic environment (Gastó 1980). By increasingly leaning on imported technology, instead of local farmer knowledge (van der Ploeg 1987), surpassing in this way the 'barriers' to agricultural production have been surpassed. In contrast, the Alpujarra farmers have had to farm within the limits and possibilities dictated by the natural environment, using their own 'traditional' knowledge. However, the price for the bulk production and high incomes of Campo de Dalías has been a low food quality and a contaminated environment. In contrast, the Alpujarra still produces quality food, though it has never been remunerated for this. There are, at present, several farmers' initiatives aimed at increasing income levels. Central to at least some of these initiatives, is an improvement of the use of local resources, and a fight for higher prices. Cooperativization has emerged as a specific mechanism for attaining these goals. In this chapter, one such cooperative – an ecological wine cooperative founded in the Contraviesa mountains in the mid-eighties – will be explored. But first I will discuss some particular aspects of local styles of farming in the Contravies. It is through the cooperative that farmers are attempting to revitalize aspects of local farming practice.

Figure 2 *Farming Systems in the Contraviesa*



___ Limits to zone ....
----- Limits to farming system

1 Western High Alpujarra	3 Lujar - Lanjaron - Orgiva
2 Eastern High Alpujarra	4 Contraviesa

Agriculture in the Alpujarra

The Alpujarra region can be divided into various subregions that currently sustain different systems of land use (see Fig. 2). With the resettlement of the Alpujarra with people from other regions of Spain (after the expulsion of the Arabs in 1572), the region underwent a transformation – from the production of silk from the *moral* tree (Morus sp.) to a cereal based agriculture, which occupies up to 30-40 percent of the cultivated land (Navarro 1981: 44-47). Wheat was predominant on the irrigated southern slopes of the Sierra Nevada, and in the dry-land farming zones, barley was important. Many of the former forest-covered areas (with various species of oaks) were cleared for cultivation. The literature mentions the dominance of complex farming patterns, where in both horticulture and wheat farming, intercropping was important. Where agro-ecological conditions allowed it, almonds, figs and numerous other fruit trees (olives, oranges, nut-trees etc.) were cultivated though these never reached the importance of almonds in present day agriculture, especially in the central valley of the Guadalfeo and in Andarax rivers and in the Contraviesa. Green beans (*habichuelas*), potatoes and wheat were the main sources of income on the southern slopes of the Sierra Nevada and wine-growing was important in the Contraviesa, where the soil was more suited to grapes than cereals (Garcia Manrique 1973). This will be dealt with later. Transhumance systems of livestock (cows) were important in the High Alpujarra and even included the Campo de Dalías as pasture land until the boom of intensive horticulture there (Calatrava 1985). Goat and sheep raising abounded in the Contraviesa mountains.

Family farming in this region has always been mixed. Navarro (1981: 60) mentions the animals of an independent (*saneado*) farmer as being one cow, one sow, ten to twenty lambs and goats (offspring of which are sold), one working mule, two pigs, eight to ten chickens, ten to twelve rabbits and sometimes one or two beehives, all of which were almost exclusively for home consumption. In the Contraviesa, where agriculture is more extensive than in the High-Alpujarra, the number of mules, used in ploughing and as pack-animals, was probably higher. In addition, animals were and are important because of the manure produced. Traditionally forage was raised by the farming family, and until very recently bread was baked at home from family-grown wheat. Family food consumption was and is complemented by small-scale subsistence horticulture, although in the southern parts of the Contraviesa, on a very reduced scale, since water is a scarce resource there. One of the food transforming industries in the Alpujarra that has gained nation-wide fame is the curing of hams.

Land Tenure and the Socio-Economic Structure of the Alpujarra

The most comprehensive study of agriculture in the Alpujarra is that of the Instituto Nacional de Investigaciones Agrarias (project No. 2051), summarized by Calatrava and Molero (1983). At the beginning of the eighties, 79.4 percent of the active population were working in agriculture with 62.5 percent of the farmers exercising some kind of off-farm activity, a figure that stresses the importance of pluri-activity. The population has dropped from approximately 59,000 in 1950 to 32,000 in 1980, which is lower than at the turn of the century. In 1972, 47.6 percent of the farmers were over fifty-five, with only 5.8 percent younger than thirty-five. In general, about 35 percent of the land is cultivated, although locally, above all in the Contraviesa, it may be much more. However, due to migration, land is being progressively abandoned. Minifundism is characteristic of the Alpujarra. In 1972, 59.3 percent of the farms had less than 3 ha (49.9 percent less than 2), 30.1 percent between 3-10 ha and 10 percent more than 10 ha. The Contraviesa, however, had a slightly different structure: 40 percent had less than 3 ha (34 percent less than two), 46.4 percent between 3-10 ha and 13.6 percent more than 10 ha.

The region has not yet been sufficiently studied to characterize it in depth socio-economically. Nonetheless, enough is known to be able to claim that the region still maintains traditional power structures, exhibiting traits of '*caciquismo*', a system in which a few powerful persons control many others by providing them with work and services (Navarro 1979: 297-320). Navarro (1981) characterizes the region as submerged in a process of depopulation that keeps very few of the entrepreneurial people in the area, leaving behind the older farmers who are less responsive to change. When asked to characterize the agricultural potential of the region the word 'miserable' was frequently used, suggesting a degree of local pessimism.

Since the beginning of the eighties, tourism has grown in importance. But to date this has affected only the western half of the Alpujarra, hardly as reaching the Contraviesa.

Agriculture in the Contraviesa

The Contraviesa is a fairly homogeneous region agronomically, orographically and culturally, though with different local emphases. It is an undulating area with heavily sloping gullies (40-50 percent is very common) called *barrancos* or *ramblas*, with widely dispersed farming hamlets and where altitudes range from 900-1400 metres. Climatic data on the area are scarce, since there were no weather stations in the centre of the Contraviesa until recently. Estimates of annual precipitation for the area range from 400-500 mm and humidity is low. Temperatures may reach a summer maximum of 35 degrees. Winters are heavy, with snow covering the ground for a period of time, sometimes leaving hamlets isolated. The regime of sea and mountain winds that led to the former name of the region, *Sol y Aire* (sun and wind), plays a decisive role in grape growing.

The settlement pattern, the orographic and agronomic conditions, the poorly developed transport infrastructure and, according to some authors (e.g. Navarro 1981), the individualistic and distrusting nature of the habitants, have led to a diverse, partly subsistence-oriented family-based agriculture. Currently, agriculture in the Contraviesa is structured around three crops: almonds, grapes and figs. For the past 20-25 years the commercial cultivation of almonds has become widespread and has generated a surplus income, that, as one farmer said, 'serves to clothe one's family and do nice things'. In turn, vineyards and wine-making serve 'to feed one's family'. It is considered a stable, albeit small source of income, whereas the almonds, although they permit a larger profit, are subject to unstable prices and many zero-harvests due to frosts in spring. Figs are economically less important. They grow on nearly all kinds of soils, allowing the farmer to make use also of marginal land.

A large quantity of the almonds, figs and grapes produced in the Contraviesa are intercropped, if not all three together than in any combination of two, with almonds and figs predominant. According to the almond co-operative in Durcal (Granada), more than thirty varieties of almonds are traditionally grown. Cereals are now cultivated under the almond and fig trees, in rotation: wheat, barley, *moruna* or *prensules* (*Pisum sativum*), and then fallow. I assume that this rotation can be traced back to the cereal growing period.

According to the farmers, it is no longer cost-effective (*no costea*) to grow forage (wheat, grains of moruna and prensules) since it is so time-consuming.[1] This has led to a decline in the number of livestock and to abandoning cereal rotation. In their discourse, farmers talk firstly of animal stock being reduced to animals for home consumption because the newly founded intensive farms now make home production for the market uncompetitive and they cannot comply with veterinary sanitary regulations, and secondly they mention giving up raising animals even for home consumption.

Instead of feeding what animals remain on home-grown forage, more and more mixed feed is bought, processes which are likely have a serious impact on the maintenance of soil fertility and soil structure. In the first place, the manure available from animals is no longer sufficient to fertilize the land, and in the second, abandoning cereal-leguminous rotation implies that no nitrogen is added to the soil, and, what certainly is important, the soil is no longer aerated by the roots of these annual crops. The soil becomes, in the words of the farmers, 'hard as cement' (*duro como hormigón*). Farmers believe this to be the more negative effect. The fertility of the soil could partly be restored with chemical fertilizers, particularly in almond growing. Chemical fertilizers have been in use since the early seventies, although in very low doses compared to other regions. Nonetheless, fertilizers, especially nitrogen fertilizers, raise problems in years of drought. When applied in these years, almonds produce branches with dried out leaves (a phenomenon called *puntiseco*), since the uptake of nutrients is not accompanied by a corresponding volume of water, or, as explained by one farmer: 'If you eat a huge meal with a lot of salt and do not drink water with it, you will feel bad. And the same occurs with the plants'.

The abandoning of family livestock is reflected in the yearly *feria del ganado* (livestock fair) in Cadiar, which used to be the most important animal market of the Alpujarra, where all kinds of animals were traded. Now, business is limited to a few mules, goats and sheep. The prices of the mules are illustrative of the changes in agriculture. As late as 1990, a price of 300,000 pts was normal for a 3-5 year old mule. In 1991, the highest prices oscillated between 125,000 and 150,000 pts. Farmers and cattle merchants put this drop down to the conversion from animal labour to tractor, to the lack of rain and consequent water shortage, (which makes ploughing difficult) and to the low price of almonds. The low prices probably induce farmers to limit costs as far as possible, or to seek other work.

When asked what they considered to be the main problems in agriculture, farmers first pointed to the shortage of water, which they claimed to have felt strongly the last few years. An important aspect of water availability in the area is the role played by snow. Farmers place a high value on snow cover. Since it melts slowly, it can infiltrate the soil before it is lost by run-off, as is usually the case with rainwater. This slow process of absorption of water makes the soil spongy (*esponja*) and provides many natural springs in spring and summer time that can be used for irrigation. According to one informant, the number and flow of natural springs have notably reduced since his youth. He also considered the rainfall pattern to have changed, with rains now falling in short and heavy showers. These observations merit investigation. It might be interesting to examine the relation between the greenhouse horticulture of the coastal plains and this supposed change of climate. Of second concern was the low price of almonds. Whereas ten years ago they would fetch up to 150 pts/kg of *pipa* (nut), now the price is less than half that amount owing to the scale of importation from the USA.

Erosion was hardly perceived as a problem, although it is recognized that 'some earth' goes down hill. Garcia Manrique (1973: 508) is much more pessimistic about this, but affirms that due to the depth of the soil and its continuous disturbance by ploughing, for the time being erosion does not necessarily pose a serious problem. Pests and diseases are present, but again they are not perceived as posing a serious problem since levels are low, probably below any level that justifies treatments. Although the high altitude, low humidity, diversified and small-scale nature of agriculture, and the regime of sea and mountain winds could also have something to do with the relative absence of pests and diseases, farmers only put forward the winter snow and frost as a reason with any conviction. They commented that descending the Contraviesa, where snow cover is less usual and temperatures are a bit higher, pests and diseases appear more frequently. However, some farmers did suggest that their non-use of chemical pesticides may have had something to do with it. One farmer referred to his own experience in his vegetable garden; the year after applying pesticide to his beans, he had much bigger problems, not only in his beans but also in the neighbouring crops.

The consequences of the fallow vegetation that has taken over abandoned farmland have not yet been analyzed. There are some indications that forest fires have resulted.

Grape-Growing and Wine-making in the Contraviesa

Grape-growing has a long history in the region and can be traced back to Roman and Arab times. In 1887, however, as in many other areas of Europe, grape-growing came to an end with the introduction of the Phyloxera louse from the United States.

Before the Phyloxera, the lucrative and export wine industry was in the hands of a limited number of rich farmers who maintained innumerable day-labourers. Grape-growing was the almost exclusive form of land use in the Contraviesa. The crisis, that led to a reduction of the population by 25 percent in thirteen years, ruined many landlords and led to a drastic drop in the price of land to levels within the economic reach of the former day-labourers. According to Garcia Manrique (1973), this led to the widespread minifundism found today.

The rootstock that has generally been used in the region since the Phyloxera is an American rootstock, Rupestri du Lot, locally known as *albarcoquillo*. This has been grafted onto numerous local grape varieties. The traditional vineyard has a plant spacing of about 2 to 2.5 metres and is called *marco de cuadro*, leading to approximately 3,000 plants per hectare. A plot usually abounds in varieties of grapes, red and white all mixed, in proportions and orders that vary enormously between farmers and that until now they have explained only by referring to 'tradition'. Garcia Manrique nonetheless attributes it implicitly (*op. cit*: 517) to the fact that the former day-labourers were unfamiliar with the technique of grafting and with grape-growing. It is possible to find in one plot up to 15 of the 25 or so varieties that exist in the region. Predominant varieties are (estimates of the Asociación 1987): Jaen blanco (30 percent), Jaen negro (25 percent), Pedro Ximenez (20 percent), Garnacha (10 percent), Montuo (10 percent) and others (5 percent).

The Contraviesa has deep slate soils (*pizarra*) with layers of lime in between low in organic matter and unique in the whole complex of the Alpujarra. They are considered particularly suited to grape growing (Garcia Manrique 1973: 507). The last wave of vineyard plantations came in the 1940s and 1950s, together with the last surge in demographic growth. Since then, due to better prices, almonds have grown in importance, and the vines and vineyards have hardly been renewed (Asociación 1987).

Figure 2 shows the current spatial differentiation within the Contraviesa of almonds and vineyards. About 18 percent of the unirrigated land in the Contraviesa is covered by vineyards (Asociación 1987), part of which is also associated with almonds and/or figs – in 1979 more than 60 percent of the area (MAPA 1979: 44-45). Taking the twelve most important municipalities that lie partially or wholly in the Contraviesa (Albondón, Albuñol, Almegijar, Cadiar, Cástaras, Lobras, Murtas, Polopos, Rubite, Sorvilan, Torvizcón, Turón), the total area occupied by vineyards changed from 5,704 ha in the early seventies (Garcia Manrique 1973: 509), to 7,062 ha in 1978-9 (MAPA 1979), to 5,199 ha in 1987 (estimates of Asociación 1987) and 4,175 ha in 1991 (unpublished provisional data provided by ARVE, Asociación Registro Vitícola España).

In 1973, production per hectare varied from 1,000 to 5,000 kg/ha (Garcia 1973: 534), with an estimated mean of 2,500 kg/ha, which is low. According to Garcia Manrique, production could have reached a maximum of 10-12,000 kg/ha. He attributed the meagre production to the lack of labour because of the massive migration, particularly of young people, and to land tenure. Many vineyards were farmed *a medias*, which implies that part of the grape harvest must be handed over to the absent owner of the land. This inhibited farmers from investing in this land, and motivated them to grow crops that were not part of the *medias* deal, such as cereals to feed the beasts of burden (*op. cit*: 531). On private land production was probably higher, as the technique of green manuring discussed below may indicate. It is not known yet how land tenure has evolved since 1973.

Currently, there are an estimated 2,000 grape-growing and wine-making families in the region (personal communication first president of co-operative). A remarkable aspect of grape cultivation met with during field research is the use of the leguminous plant, *moruna* (*Vicia articulata*), as green manure. It is sown in between the rows of vines every third or fourth year, and then ploughed under. Chemical fertilizers were used only rarely, and since pests and diseases are relatively absent in the region, no pesticides are used. Traditionally only sulphur is applied as a preventive measure to control *Uncinula necato*, a fungus locally called *ceniza*. *Plasmopara vitícola*, another fungus that has a very bad reputation in viticulture and in Spain is called *mildiu*, is virtually absent. The *yesca*, referring to two fungi, *Stereum hirsutum* and *Phellinus igniarius*, sometimes causes damage on a more serious scale, but no treatment is used other than perhaps burning the plant or opening the trunk to kill the fungi, that can only live in anaerobic conditions.

Wine-making

Wine is traditionally produced by the grape growing farmers or *cortijeros* as they are locally called, in their own *bodegas* (the place where the wine is made and stored). The typical capacity of such a *bodega* is about 5,000 litres (300 *arrobas*; an 'arroba' refers to a locally used glass recipient of 16 liters), though there are about thirty *cortijeros* with *bodegas* of over 50,000 litres (3,000 *arrobas*) (Asociación 1987). An unknown number of farmers produce no wine themselves but sell their grapes to others.

Traditionally, grapes are picked in late October or even early November, late compared to usual picking dates, leading to a high sugar content and a wine with 14-15 degrees of alcohol. According to one farmer, the grapes are picked when there is no more sapstream and the leaves turn yellow and are almost falling from the plant, in order to 'extract all the good from the leaves and bring it to the grapes'. No effort is taken to separate the grape varieties when making wine. The result is a reddish wine known locally as *costa*. The grapes are pressed in the family *bodega*, and the *must* is then stored for fermentation in wooden barrels. Grape-growing and wine-making depend completely on the farmer's judgement. The palate (*paladar*) is the main instrument used to determine the moment for processing after picking. According to the first president of the co-operative, the processing can vary a lot. Some farmers may add substances they call *fermentores*, among them gypsum and ham or metabisulfate. Fire is the only temperature control measure used and decantation is manual.

It is not clear why the traditional wine in the region is allowed to become so alcoholic. It may have to do with the fact that harvesting has to wait until the latest-maturing grape variety has ripened. It may also have to do with poor *bodega* conditions, which pose problems in controlling the fermentation process. Alcohol may have functioned as a safety net for failures in farmer control turning the wine sour, as the presence of alcohol above a certain degree inhibits bacteria from functioning. Garcia Manrique comments that wine frequently turned sour in the higher parts of the Contraviesa, where temperature did not allow the fermentation process to reach the alcohol content that could be obtained in the lower, warmer parts (1973: 520). So growing grapes with a high sugar content could be understood as a strategy to raise the alcohol level, and thus to lower risk.

The wine that is produced is highly appreciated in the region. Nonetheless, as one farmer said, 'if there are fifty wine-makers, then there will be fifty different tastes and qualities of wine'. Such diversity is obviously due to the variety of grapes grown and to the variety of bodega conditions and levels of craftsmanship.

Grapes suited to wine production can be grown with great ease in the area, as explained by the first president of the co-operative: 'Look', he said,

> *'in the south we have the sea and in the north the Sierra Nevada. Between 900 and 1,400 meters a special phenomenon occurs. The air is renewed every day, because during the day the warm air rises from the sea and at night a cold wind descends from the mountains. The cold wind does not descend below 900 meters and the warm air can't rise over 1,400 meters. This implies that the warm days favour the production of sugars and the cold nights paralyse the process of reducing acidity. In this way a high degree of alcohol (up to 15) is reached with a degree of acidity of six, which is exceptional. The sugar-acidity ratio tends to be much more stable than could be expected in a hot environment (with warm nights), where a lot of sugar and a low degree of acidity would be normal. Here we do not need to add tartaric acid as in many other regions, such as Campiña (a region in the province of Córdoba).'*

The key to the difference in grape production with other Andalusian regions is probably the relatively cold nights. Whereas photosynthetic conditions for sugar production, favoured by daylight and the elevated temperature are not very different from other Andalusian grape producing regions, the conditions for the decomposition of acids are. The latter takes place during the process of plant respiration, a continuous (day and night) process that proceeds faster at elevated temperatures. According to EC regulations, wine must have a degree of acidity of at least 4.5. In Andalucia the acidity reached naturally usually does not exceed 3.5 and there is almost always a need to add tartaric acid. The specific agro-ecological conditions of production need further study.

Commercialization

Wine has traditionally been marketed by the growers themselves to a fairly fixed set of clients and to bars and restaurants in the Alpujarra and surrounding provinces, either directly or through a middleman, and to occasional visitors. Wine is sold by *arroba*. The village of Albondón has the most intensive tradition in wine-making.

There used to be a dense network of smaller and middle-sized *cortijero bodegas* throughout the region that absorbed its grape production. Those farmers without a *bodega* sold their grapes to one of the others. Prices paid for grapes in the Contraviesa-Alpujarra are said to be higher than those in the large-scale wine-growing regions in Spain but this has not yet been verified. Various informants remembered prices per kilo in the years preceding the co-operative, oscillating between 15 and 25 pts (in 1991, 128 pts = 1 ECU and 100 pts = about one US dollar). This structure was profoundly changed by the emergence of various bigger, private *bodegas* in Albondón in the 1960s and 1970s. One of these is said to have bought grapes from local farmers at prices high enough to discourage some growers from producing their own wine and for others to stop selling their grapes to former buyers. This has reduced the number of small farmer-based *bodegas* significantly from approximately 600 to an estimated 200 today.

The big *bodegas* have long been involved in what is widely referred to as the 'wine-fraud'. Merchants buy cheap surplus wine from other regions in Spain (La Mancha, Jumilla), mix it with locally produced wine and then sell it as *Alpujarra wine* at a much lower price than wine produced in the *cortijos.* Garcia Manrique comments that the trade in 'extra-local' wine stems from the enormous demand for Alpujarra wine that cannot be supplied by local production (1973: 535).

The big *bodegas* in Albondón have all failed but one. The failure of one of them seems especially relevant. Although the reasons for its collapse have not yet been fully explored, they appear to be related to a drop in the price the *bodega* was willing to pay for local grapes, motivated by the much cheaper wine that was available from outside the region, and with problems with the organization of labour in the *bodega.* When this *bodega* ceased to function in the early 1080s, an important buyer of local grapes disappeared. This left the sector 'without spirit' and a decline set in, which can also be interpreted from the data on the area under vineyards.

This depressed situation was a reason for an attempt to resurrect the vitivinicultural sector in the mid-1980s. The Secretary of Commerce of the Department of Agriculture of the Andalusian Administration in the province of Granada mentions another reason, that is, the increasing demand for the local wine over the last ten to fifteen years, by the growing number of inhabitants on the coastal plains. These people, in great part migrants from the Alpujarra, who have sought a new life in the nearby coastal greenhouse agriculture, return as 'Sunday tourists' to the area, visit the local *cortijos* and demand the local wine. But this demand also induced the small *bodegueros* to buy cheap 'extra-local' surplus wine to mix with the local product. It is believed that wine-fraud has penetrated, to a larger or lesser degree, to virtually all *cortijos.*

In short, until the mid-1980s almost all wine was sold without any legal qualification, i.e. there was no registration. Hardly any bodega had a license to sell wine, and there was no control on quality. This was the situation in which the co-operative studied here emerged.

Genesis of the Contralp Co-operative

A Case Study

Contralp is an ecological co-operative based in Cadiar. It was legally founded on the 23rd of June 1987 and produces and commercializes wine based on the grapes grown by members. The formation of Contralp was preceded one year earlier by the establishment of the *Asociación.* (*'Asociación Comarcal de Cosecheros y Productores de Vino de la Tierra de la comarca Contraviesa-Alpujarra*). Both types of organizations were completely new to the region, and at a time when the vitivinicultural sector was in decline, they provided a real stimulus.

The Role of the First President and Institutional Support

In the formation of both Contralp and the Association, two persons played a fundamental role: Enrique, the first president, a man who settled in the region in 1980; and the Secretary of Commerce (*Negociado de Comercialización*) of the Department of Agriculture of the Andalusian Administration in the Province of Granada.

Interested in ecological agriculture, Enrique and his family started restructuring the land they had bought on a *cortijo* in the municipality of Cadiar and he began experimenting with grapes and wine. He and his wife can be considered as exponents of the 1960s movement. They had been living and studying in Barcelona and had lived and worked in France for a while, for political reasons, during the Franco regime. Enrique is the son of an Andalusian agricultural day-labourer. In the first six years after his arrival he made his living as a tractor driver, ploughing 'almost all the land' in the Contraviesa. In so doing he gained a profound knowledge of the region. His knowledge of viticulture and ecology is based on his experiences as a worker in French vineyards, contacts with agricultural family friends, personal study and experimentation and the local knowledge of the Contraviesa farmers. Although initially he based his practice on this knowledge, he eventually came to the conclusion that the farmers possessed neither certainty about the subject nor any sense of experimentation. Through his own efforts he is now considered an authority in the field. Although he and his wife were initially viewed as 'hippies', they have gained the respect and absolute confidence of the farmers who value their honesty and Enrique's advice on viticulture.

The confidence he enjoys has made him the binding force among co-operative members and because of his authority on wines and grapes he is able to impose his way of thinking. All changes in the cultivation of the grapes and kinds of wine produced in the *bodega* are the fruit of his experimentation. He re-discovered a local grape variety called *Vigiriega* which had been almost forgotten by the farmers but is producing promising results.

Initially Enrique was not especially dedicated to the development of the region and if he had continued to develop his own farm instead of investing his time and energy in founding the Association and the Co-operative, he would now undoubtedly be making a good living from his own classified wines. However, the Secretary of Commerce persuaded him, instead of constructing the small experimental *bodega* for which he sought government subsidies, to invest his efforts in founding first the Association and later the Co-operative.

Initially it was an inspector of the National Institute of Certification, who, in the mid-1980s asked the Contraviesa wine sector to organize itself to bring an end to the illegal wine-making and commercialization situation. The Secretary of Commerce, likewise, came with the same message, worried that the wine-fraud would eventually destroy the sector. This, and the Administration's offer of a subsidy to start restructuring the vineyards, were the main motives for founding the Association. The Secretary of Commerce and Enrique were the most active in its establishment, searching for possibilities within the Administration. It was finally founded in the second half of 1986 with 300 members and Enrique as president, a post he still holds. Its objectives were: 1) to acquire official recognition and legalization of the wine-growing sector in the Contraviesa-Alpujarra; 2) to restructure and improve local vineyards; 3) to define the quality of Contraviesa wine and identify marketing options. The most important activity was to establish a plan to restructure the vineyards using collective action, which was known as the *Plan de Reestructuración*. The plan, funded by the Andalusian government, the EC and 40 percent by the farmers, aimed to raise farmer profits by reducing the costs of production and by augmenting the value obtained without raising levels of production (Asociación 1987). A central point of action was to convert old vineyards into young plantations with new root-stock and a limited number of new grafts (Garnacha, Pedro Ximenez, Vigiriega). New plantations were and continue to be established, spacing the plants where possible (depending on slope) in such a way that tractors can be used for ploughing. To meet the first objective, it was considered important to acquire local certification for the wine, the *denominación de vino de la tierra*. It would help to eradicate wine-fraud. So far, this recognition has not been achieved. The National Institute of Certification claim that the numerous registered letters of application from the Association have never been received. Fifty-nine of the 300 members participated in the plan.

As president, Enrique invited a young agronomist to prepare and present to the Association assembly a proposal for a co-operative *bodega*. The proposal outlined a *bodega* of approximately thirty members, some 200 ha of vineyards, and a production volume of about 250,000 litres of wine. This plan, according to the agronomist, was very badly received by the assembly. The members wanted a much bigger *bodega* in which all members could participate, with a reduced amount of social capital. The agronomist had opted for a smaller one, since in a big one the vintage would be difficult to organize. Moreover, both Enrique and he suspected that a large number of members with a small contribution in social capital would not generate the commitment necessary for a quality product. They had a pilot *bodega* in mind, that could serve as a test model for five or six other *bodegas* that could be established throughout the region and would include the other farmers.

The cooperative was promised funding from the Andalusian Development Institute (IFA), a government institution, to be determined by the amount of social capital raised by the co-operative, which meant a contribution of 500,000 pts from each member. A fund of 27 millions pesetas was given, only 10 of which needed to be repaid. A smaller subsidy of 3.7 million pesetas was provided by another body within the Andalusian Administration.

A condition of the IFA-funding was that five jobs should be created, a condition disapproved of by the co-operative who felt there was not enough work for five people, and that the money could have been better spent elsewhere.

Establishment of the Members and Their Characterization

Despite initial enthusiasm from a potential 300 members, the cooperative found it difficult to recruit. The ideal members for Enrique were those who were 'real' (i.e. full-time) farmers, who had a strong interest in grape cultivation. He initially put a lot of effort into convincing individual farmers to join the cooperative, helped by a young, non-farmer member. Due to financial problems, some members were sought solely because of their ability to raise the social capital that was so urgently needed. This is why of the twenty-nine current members, one is a solidarity member contributing only social capital and ten have a primary profession outside of agriculture (six of whom have no agricultural background, merchants in construction materials, furniture, a smith, a teacher, an electrician etc.), who usually pay day labourers to do their agricultural work. Only fifteen can be considered full-time, traditional farmers (one of whom also raises goats). Three members combine agriculture with off-farm work. Except for Enrique, none of the farmers have training beyond their own experience. The age of most members ranges around forty-eight years.

All members interviewed possess vineyards, but in general, about two-thirds of their land is dedicated to almonds. Three have planted vines only recently and do not yet deliver grapes. The members possess around 115 ha of vineyards (approximately 3 percent of the present total in the Contraviesa). Since statistical data on land tenure are not at present available and a new 'Catastro Vitivinicola' (register of growers that includes property and size of vineyards, varieties grown and wine produced) is under way, information on land tenure and the relative social-economic class of the members is based on the interviews carried out and the data provided by Enrique. The full-time farmer members and the three with off-farm work belong, according to him, to the local middle-class and upwards. Certainly all the farmer members but one, interviewed possessed more than 10 ha. The other members are economically better-off, and accept more easily the fact that their investment has not yet shown a profit. No new members are at present being admitted because of the limited *bodega* capacity.

Several motives were put forward by the farmers for enrolling in the cooperative. Full-time farmers believe it will be more profitable than individual wine-making. Furthermore, they can avoid the uncertainties involved in home wine-making (the wine can turn out bad) and free themselves from the work involved. Many lack the equipment to process wine. Some, mainly those who do not depend economically on agriculture, value the social aims of the co-operative, and its ecological philosophy. Almost all members interviewed explicitly stated that they finally opted for the co-operative 'because of Enrique' i.e. they trusted his management capacity and honesty.[2]

Ideological Orientation of the Co-operative; Organization and Control over the Production Process

The first president, Enrique, is without doubt the ideologue of the co-operative. Because of his authority on wines and grapes and because of his charisma he has a very important say if not ability to impose his ideas on the cooperative assembly.

The co-operative in the first place wants to consolidate the income of the farmers of the area and so offer an alternative to migration and depopulation. The ecological option has been chosen from the desire to produce a quality wine, that would generate a higher surplus market value as well as easier access to the market. Added arguments were to avoid environmental degradation and to avoid absorption by agro-industry. As part of the ecological ideology the co-operative aims to revive an autochthonous grape variety called Vigiriega, presumably better adapted to local conditions than the others, but little cultivated by the farmers. The arguments for the production of an ecological wine were Enrique's.

An equal share of social capital was preferred to shares according to the size of one's land or its financial carrying capacity, to make, in the words of the first president, everybody feel equal and burdened with the same responsibility. This he considered necessary to break with the region's historical mutual distrust and individualism.

The agronomist who presented the 'bodega plan' was contracted to design and supervise the construction of the bodega and (together with the first president) the wine-making process. He was also to take care of the administration while the first president was to occupy himself with sales. He worked for the co-operative during its first two and a half years and was officially called *gerente* (director) but was also referred to as the book-keeper/technical adviser.

The co-operative has a 'Daily Board' consisting of eight members who meet monthly and make most of the decisions. Although he did not wish to be so, Enrique was made its first president. Furthermore, at present (formerly with the *gerente*) he is the only member of the Technical Committee, whose instructions on the growth of grapes and the wine-making, according to the internal regulations (Contralp 1987), should be followed, although the *gerente* continues to monitor the harvest and wine-making process by regular visits. Assemblies are officially held twice a year, although between February 1991 and February 1992 there were five.

In January 1991 a new book-keeper, academically schooled in law and accountancy, was appointed, who is also in charge of sales. He is a very ideologically motivated immigrant from the north of Spain who settled in the area about seven years ago. In January 1992, the Daily Board decided to give him 'carte blanche' over the commercialization of wine, and all measures he considered necessary to drag the co-operative out of its bad economic situation. In the February 1992 Daily Board elections, Enrique resigned from his post as president and is now an ordinary member of the Daily Board. In his own words, he felt himself 'charged by the members with all the responsibility and executive tasks'. According to him, they do not understand what a co-operative means and that instead of viewing the co-operative as the result of collective action, they basically view it as something to which 'I deliver grapes and it should pay me henceforth'. He senses that the co-operative is working as a form of 'neo-caciquismo', in which he is the cacique-against-his-will, and the members are the new dependents. Neither has he felt at ease with the Andalusian Administration in Granada, who want him to be some kind of 'field employee'. The farmer members, on the other hand, argue, as one farmer phrased it, 'the land is *our* craft' (*la tierra es nuestro oficio*), but that *others* need to help in the process of making wine and its commercialization, since they don't know about that, which is one of the reasons they joined the cooperative.

During the past few months relations seem to have changed. Enrique is no longer the man whose ideas are accepted with almost automatic trust in his prudence. The members supported by the dramatic financial situation have been able to persuade Enrique to abandon the commercial strategy he laid out in the initial years of the co-operative.

Financial and Commercial Strategy

The analysis of accounts by the new book-keeper at the beginning of 1991, which until then had been very neglected, showed that the co-operative was in a deplorable and highly indebted financial state. This was due to several reasons: The funding promised by the Andalusian government arrived more than half a year later than agreed, and the commercialization of wine had not proceeded as well as expected due to the loosely founded financial and commercial strategy. This urged the co-operative to seek alternative sources of financing for the construction of the *bodega* and the production of wine in the interim. In the first place, payment to members for the first grape harvest was delayed, and the 1990 harvest was to be converted into a contribution to social capital. Second, members decided to augment social capital by contributing an amount in line with the solvency of each member (up to 300,000 pts). Part of their contribution was in days worked on the construction of the *bodega*. Third, two loans were contracted with local banks. As a fourth means to overcome financial problems, it was recently decided (March 1992) that the grapes delivered by members would not be bought at nearly double to triple the market price (depending on the variety), as had been the case during the first two harvests. They would be bought at only slightly above market price. About 5 pts were added to the market price for being a member of the co-operative; ecologically produced grapes brought an additional 10 pts on top of that.

The lack of financial administration in the first two years inhibited the co-operative from having a clear view of the economic possibilities and risks and has made its financial situation more difficult to grasp. To overcome the present financial problems a new commercial strategy has been designed, which will be commented upon later.

The first president wanted to produce a quality wine with characteristics not found in other areas. However, he did not opt for the traditional *costa* wine, since he considered it impossible to commercialize outside the Contraviesa-Alpujarra, because of its high alcohol content. He thought it necessary to advance the harvest by a month to reduce the alcohol level and bring out a young wine (*vino joven*) of about 12 degrees. He also wanted to use selected grapes instead of mixing different varieties, in order to better control the fermentation process and produce a constant quality. In its first two vintages, the co-operative produced six classes of red, white and rosé wine, in both ecological and non-ecological series, to initially address the production of farmers who were still in the process of obtaining the certification of the Spanish Ecological Agriculture Regulatory Board (CRAE). The wine was sold in the first two years in bottles only, to obtain the highest surplus value, and at a price considered very high (375-600 pts/bottle) but according to the first president also reasonable, because of the labour involved and the quality produced, for which the consumer should pay a premium. In several wine-tastings, various wines of the co-operative have been classified as 'good', with 'very special, unknown characteristics'.

Marketing was started by selling to the former clients of Enrique, the first president. Since then, the wine has been promoted at village fairs, contacts have been made with alternative food shops, and last year some big national warehouse chains were the focus of attention. At the time of the first visit, commercialization was considered to be the main problem, since a great deal of the stock had not been sold. Since then a lot of discussion has taken place within the co-operative that has resulted in a new commercial strategy. Analysis of the marketing strategy by the new book-keeper, shared by the former *gerente*, shared only partially by the first president and to an unknown extent by the members, touches upon five items: volume of production; types of wine produced; types of markets to which the wine is sold; and packaging and price. He argued that the initial strategy lacked a step-wise production scheme for ecological wine and for introducing it to the market. The co-operative wanted to produce and sell as much ecological wine as possible from the beginning, and only in bottles, to be able to obtain the most surplus value. But this resulted in a large quantity of unsold stock. No serious market research on the demand for such wine had been carried out, and even less on consumer willingness to pay a high price. The experience so far has shown that the demand is very limited. The book-keeper concluded that it should therefore be created. The volume produced could only partially be covered by the circle of former clients of Enrique. Markets were sought in Granada and Almería and among the Contraviesa-Alpujarra bars and restaurants, but they could not absorb the remaining wine. No attention was paid to the former clients of the members.

As a first step in creating this demand and increasing sales, the price per bottle was significantly reduced, to less than 200 pts. In addition, an attempt was made to recuperate the local market, lost when the farmers stopped producing wine in their own *cortijos*. Wine will no longer be sold exclusively in bottles; on the contrary, most of the wine will now be sold 'bag-in-box', a volume that approximates the traditional packaging of the area and that better suits the local restaurants, bars and even home consumption. And it has been decided that members should again get involved themselves in selling the wine, by becoming new points of distribution, and sell, as they used to do, on their *cortijos*. Although the first president strongly objected to the reduction of the price and sale by 'bag-in-box', fearing the loss of the exclusivity of the wine, he had to give in to pressure from the members. A *costa* wine has been produced this year based on pressing a mixed variety of grapes harvested at a moment closer to the traditional one (half October). This *costa* wine was to differ from the local *costa* by improved control and a standard quality: it is slightly less alcoholic. Two *costas* will be produced: one with 1991 grapes to be sold by the bottle to local bars and restaurants that will bear an individualized or customized label (*'edición especial de la bodega Contraviesa-Alpujarra para el restaurante...'*), and another based on a blend of the red, rosé and white wine produced in the first two years to be sold 'bag-in-box'.

In 1991, no white wine was produced, since experiences in the first two years showed that local white grape varieties do not provide sufficient quality to make a good white wine. In a third measure to improve sales, only a small percentage of the wine produced will be sold as ecological wine. To date, organically-produced grapes have been separated from conventional grapes to produce different classes of wine. However, the classification criteria has changed. The need for economic survival is now so urgent that the establishment of the co-operative in the market prevails over ecological concerns. So ecologically and conventionally grown grapes will be mixed to obtain wines that can be more easily marketed. Meanwhile, organically produced grapes will gradually increase through continued conversion of members' farms to ecological agriculture. Within a few years, it is expected that all production will be ecological. It is hoped that by that time the circle of clients will have stabilized sufficiently to allow the ecological label to be added to the wine now sold as conventional, and to sell it at a premium price. Finally, it was agreed that members should be free to reserve part of the harvest for home production. This had not previously been allowed because it was considered to be against the 'competitive' interests of the co-operative. This decision also aims to provide the *cortijeros* with a ready income and to prevent an overproduction of wine, since grape production in 1991 was very high.

Since the implementation of the new commercial strategy, sales have risen significantly and prospects are good, according to the book-keeper. In the future, the co-operative hopes to produce a wine based exclusively on the promising Vigiriega variety. The grape gives a wine of outstanding quality, and a champagne might even be produced from it. No plant diseases have so far been noticed in connection with it.

Technological Transition

The transition from traditional to ecological grape-growing has been a smooth one, since the *cortijeros* have never used pesticides and the application of sulphur, a natural mineral, is permitted in ecological agriculture. Only in the maintenance of soil fertility has there been a change. Some form of organic fertilization is required every two or three years, be this in theory animal manure, green manure by moruna cultivation or worm-humus. Since moruna demands a lot of work, worm humus is preferred as it can be incorporated into the soil more easily than animal manure. The application of worm humus, which is slightly more expensive than chemical fertilizers is possible by buying the humus in great quantities and then selling it to the co-operative where members could buy it. In this way its application is controlled. Two of the farmer members interviewed, who also worked land *a medias*, applied only organic fertilizer to the land they owned. They saw ecological farming, and more precisely the contribution to soil improvement through organic fertilization, as an investment that would yield fruits in the long term, but they feared they might not profit from their effort, as the tenure relation of *a medias* does not give them long-term security over usufruct rights. According to Enrique, no conditions have been set regarding erosion control, plant spacing or which varieties to grow.

The organization of agricultural labour through the year has been changed only by the earlier picking of the vintage. According to one of the farmers this does not pose any problems. On the contrary, picking in September relieves the work-load at the end of October, when the almonds and figs are picked. Delivering the whole harvest to the cooperative also takes away the burden of making wine at home. According to Enrique, it is this relief of labour that was the most important argument in getting farmers to accept the advanced picking date, despite their dislike of the type of wine produced.

Processing takes place according to criteria laid down by the first president and the former *gerente*, using technology based on scientific research. The wooden barrels of the *cortijeros* have been replaced by modern, fully equipped *bodega* installation with a pneumatic press and a system to control the temperature, and decisions on the wine-making process are based on chemical analysis of wine samples. This equipment allows a conversion rate from grapes into must of about 75 percent. The conversion rate for traditionally made wine was estimated by the gerente at 65 percent, but if losses such as transpiration through the wooden barrels and wine turning sour was counted, then this rate could come close to 50 percent. However, it has not yet been possible to verify these figures.

All wine-making, whether from ecologically or conventionally-grown grapes, respects the standards established by the Spanish Ecological Agriculture Regulatory Board (CRAE 1990: 72-75) on the concentration of total sulphur dioxide (SO_2) in the end product. This is added to conserve the wine and should not exceed 70 mg/l for white wines and 80 mg/l for dry red and rosé wines.

Perception and Acceptance of the Ecological Initiative Among Farmers

According to the full-time farmer members, many of their colleagues sit on the fence and are waiting to see which way the cat jumps. There is a lot of interest among farmers, but they fear to get their fingers burnt. The agricultural extensionist confirmed that all farmers in the region have at least considered joining. The members interviewed claimed that they would have joined even if it had not had the ecological dress. Most of them regard a co-operative as the only way to defend their interests. Most of them view the ecological strategy as something that may turn out well, but their behaviour is basically guided by profitability. The concept of 'ecological farming' is too abstract for most of the farmer-members who consider it 'what we have always done'. The non-farmer members can more easily agree with Enrique's conceptualization.

Caciquismo (power resting in the hands of the few); rural unemployment benefit (*el paro*); wine-fraud and the antiquated data of the Land Registration System (*el catastro*) are, according to the comments of one farmer, interrelated in a way that has negative repercussions on the cooperative. The *paro* system provides a year's unemployment subsidy to agricultural day-labourers who can prove they work at least for sixty days a year in agriculture. They have to show a paper signed by the person who has employed them. This has led many farming families to go in search of the signatures in order to apply for the *paro*. The farmers cannot sign for each other because this implies that they own land, which, if above a certain level, makes them ineligible. They thus resort to the bigger and richer farmers who have their land legally registered, who charge for each '*firma*' (an amount of 500 pesetas was mentioned). However, these bigger farmers, according to the informant, are those involved in wine-fraud, selling wine at half the price of the real *costa* wine. For obvious reasons, they are not interested in the *vino de la tierra* the Association is trying to obtain. This obviously also prejudices whether the *cortijeros* can apply for the *paro* or not. Even so, according to the informant, no collective action against wine-fraud can be taken by the growers since they have different interests; there is no *unión* (unity) between them. Another farmer argued that if the land registration was to be actualized the situation would change. If this situation comes close to the truth, then the work of the cooperative is politically loaded, and touches on vital points of the agricultural production structures.

Prospects for Ecological Agriculture and Rural Development in the Contraviesa

The first cooperatives in the region were organized for the almond-growers. The ecological wine cooperative, however, is without doubt the farmers' most radical experience in collective action.

More or less at the same time as the birth of Contralp, four other cooperative *bodega* initiatives arose in the Contraviesa. Although a thorough study has not yet been made of them, it is relevant to discuss them. Two of them, in Torvizcón and Murtas, failed from the beginning. Another, in the Polopos-Sorvilan-Alfornon region, was proposed by two non-farmers concerned for the well-being of their fellow citizens, both now members of Contralp. The initiative failed, according to one of them, because farmers could not raise the money needed as social capital. It did not contemplate the production of *ecological* wine.

According to some of those interviewed, the fourth initiative, in Albondón, was born out of jealousy. Albondón farmers would not have approved the founding of a cooperative *bodega* in the municipality of Cadiar when Albondón has a much larger tradition of wine-making. This initiative, most probably led by those representing local power, was planned as a mass cooperative of about on one hundred members, to produce and commercialize wine, and also market almonds and figs. The cooperative was preceded by an extensive feasibility study in 1988 and founded shortly after that, although only the almond and fig section's have been established. It was difficult to find out why the wine section failed to materialize. Those interviewed were not very willing to speak about the subject. There is a lot of distrust among the farmers, more than elsewhere in the region, and this may have been the reason. Another reason, deduced from the words of the president of the cooperative, had to do with the amount of social capital each member was to contribute. They agreed after a long period of discussions to contribute according to what each member expected to be the volume of his contribution in grapes, based on the mean of the last three harvests. However, at the moment of paying, some of the bigger wine-growers withdrew, thus blocking its development.

Comparing these experiences, the key to the relative success of Contralp can be summarized as follows: The cooperative was proposed and encouraged by relative outsiders and led by an immigrant who now makes his living from farming. The confidence and charisma the leader enjoyed among the local farmers was very important. The fact that an equal share of social capital was chosen may have also been an important factor.

Continuity of Agriculture in the Contraviesa: Impact of the Ecological Initiative

Most farmer-members interviewed said that their children were either too young to express any wish to succeed their parents on the farm, or had no interest in doing so. Most of them hoped, nevertheless, that their farms would in some way be continued and therefore were restructuring their vineyards to make tractor ploughing possible, since they considered animal traction to be a major obstacle. The data are insufficient to give a full perspective on the continuity of agriculture based on demography and farm succession. Notwithstanding, such perspectives must not be disregarded. Not all farmers in the regions are old. One young married farmer interviewed (aged 29) had returned from his job as a driver in Almería to take over his parents' farm, and he might join the cooperative when his young vineyards are producing sufficiently. A young unmarried member of the cooperative (aged 36) is also considering taking up agriculture seriously in addition to his job as an electrician. However, another young member (aged 28), who combines his farm with his job in the *bodega*, is much more pessimistic and believes that the final destiny of the Contraviesa will be 'to plant pines', and his decision to continue in agriculture will depend on the economic rewards.

The impact of the cooperative is difficult to measure at this moment in quantitative terms, such as the number of jobs created, income generated or influence on migration to the coastal plains. Probably the most important effect is a psychological one. As mentioned before, there are a lot of farmers observing the moves of the cooperative with great interest. Two of the members said that they had canceled their move to the coast because of the cooperative. It is not known whether other farmers have postponed their departure. According to most interviewed, the vitivinicultural sector certainly has received a revitalizing jolt from the cooperative. Most assured me that the cooperative had been of more benefit to those who did not become members than to the members themselves. This is due to two reasons: the price per kilo of grapes paid out by the cooperative, and the gap in the market created when twenty-six producers withdrew from the local grape and wine market in order to deliver to the cooperative. As part of the objective to stabilize farmer income, a 'decent' price per kg was considered important to 'dignify' the production of grapes. So the first two harvests were rewarded at a level two or three times the market price. Because of optimism about sales, grape prices per kilo reached values of 60-90 pts, depending on variety and class; ecologically sound grapes, for example, were rewarded an extra 25-30 pts/kg. This probably lifted the general standard for local grape prices, since in 1989 these reached 30-35 (a year with very low production) and in 1990 40-45 pts/kg. In 1988 the price had been 16 pts, according to the agricultural extensionist.

This cooperative appears to be a test case in two ways. The farmer-members attribute much importance to its success or failure (that is, level of profit), since it will awaken or definitively 'kill off' the possibilities that exist for collective action. It may even determine the survival of any hope of an agricultural future for wine-growing in the Contraviesa, let alone the claims for ecologically sound agriculture. According to Enrique and the agronomist, its success or failure will also be decisive for the willingness of the provincial authorities to sponsor any other development initiatives that have some 'left-wing' (read ecological) connotations.

Other Possibilities for Eco-farming: Figs, Almonds and EC Policy

Fig-growing may well be another interesting item in ecological development. Figs of the Contraviesa are widely recognized for their superior quality. The tree is easy to grow, adapts to all kinds of soils, is drought resistant and has, as a marginal tree, never received any 'investment' in the form of chemical fertilizers. However, according to Enrique, people do have, in contrast to grape-growing, a profound knowledge of its cultivation and processing.

Almond-growing might be another possibility for eco-farming. Actually, some farmers already have certification from the CRAE for ecological almond- and fig-growing and there are merchants looking specifically for such products. However, any options for this for the future are presently being ruined by a plan to improve almonds (*Plan de Mejora de la Almendra*) which is the result, and an example, of the inadequacy of European Agricultural Policy. This plan aims to improve the 'quality' of almond production through replanting or regrafting varieties that have a retarded flowering period (to avoid spring frost) and that receive better prices in the market alongside measures to maintain soil fertility and to control pests and diseases. Farmers can receive 45,000 pts/ha if they join the plan and comply with conditions. But this is where the plan fails. First of all, almond plots are only admitted if they contain less than 10 percent of other trees (figs, grapes). Secondly they are required to apply a fixed dose of chemical fertilizers and pesticides. Their application has to be proved by producing receipts for the purchase of the chemicals (Almendras Alhambra 1991), something considered absolutely impossible and inappropriate. To quote one farmer:

> *'They say they will give money for the almonds, a subsidy to work them better. But this is a deception. If a plant does not need to be treated, why should I spend money treating it? And if these almonds have enough with one kilo of fertilizer, why do I have to give them five? And they require exaggerated receipts. I can't present those receipts (...), because if I gave the plants all the fertilizer they demand, my plants would dry out. It doesn't rain here enough to justify so much fertilizer. And it's the same story with the 'poisons' (venenos; he is referring to the pesticides). Hombre, I don't want to say that treating the plants is bad, but not as much as they say. They demand something impossible. And that goes for all of us. We won't present any receipts. And then they will keep what they were going to give us.'*

Farmers also believe it as very laborious to go up and down the steep hills with a pesticide container on their back.

This plan was designed by Crisol Frutos Secos, and approved of and financed by the EC. The plan shows how the breakdown of a traditional, diversified, ecologically sound although not very productive, farming system can be induced into structures of production beyond the farmers' control. Clearly, this plan will put an end to any relative advantage that ecological almond-growing might have had in this area, and will most probably, in any case, never be able to stimulate the increase in production that would allow Alpujarra farmers to compete with their North-American colleagues. This plan merits a study of its own, since it deals with the inadequacies of (inter)national agricultural policy that disregards local reality, the technological transformation of agriculture and peasant resistance to such transformation.

Concluding Remarks

Outsiders, both with respect to their knowledge (technical and commercial), ideological convictions and different backgrounds, have an interesting contribution to make in a society that has little history of collective action. Endogenously induced development might foster local power structures and stimulate individual profit-making, but it can also be the case that it takes an 'outsider' to recognize the privileged position of agriculture in an area with low levels of input-contamination and this can be put to advantage. The population of the area is a greying one, and this together with the low esteem for the agricultural potential of the area, is a bad starting point for revitalizing agriculture, and maybe the lack of long-term perspectives will induce people to seek short-term ways out, including chemical agriculture.

However, the experience of Contralp provides some reason to hope that endogenous development will not be abandoned. Development is a multi-facetted phenomenon: all facets have their endogenous and exogenous sides. If endogenous is understood as arising from or in articulation with local resources of whatever kind, the Contralp experiment is of a mixed kind.

This is reflected as a paradox in the ideology of the cooperative: it has based its production strategy on traditional, low-input farming but its commercialization strategy on the purchasing power of non-local elites. There is, as frequently occurs in ecological agriculture, a disarticulation between the social and economic values directing production and sale and those directing consumption (Remmers 1992). Thus, the new commercial strategy can be interpreted as a step 'forward' on the endogenous path.

It must be stressed, however, that endogenous development should also be understood as a process over which the local people have control. Although much has depended upon outsiders and the cooperative is partly tied to banks and the Granadian Administration through financial debts, Contralp is functioning in a way that breaks with the Administration-centred and local personalized traditional forms of organization.

Notes

1 Tentatively the following trends can be seen in Contraviesa agriculture: diminished livestock; diminished cereal-leguminous rotation under almonds; increased purchase of mixed feed; increased use of fertilizers; decreased use of green manure; conversion of traction power from mules to tractor; land abandonment. Such changes, of course, have their effect on all interrelated aspects of agricultural practice, as suggested in the text.

2 Among the reasons given for not enrolling in the co-operative were problems raising the money needed to pay the contribution to social capital; being able to market one's own wine; distrust of collective action; very small vineyards; vineyards too young (recently restructured) to produce enough to make up for the investment; too old; because all grapes had to be delivered to the co-operative, if it fail, and the wine-making equipment at home would become useless because of drying out. It seems clear also that status has a role to play, although no direct comments from members were recorded. The agricultural extensionist stated that, giving up wine-making at home reduces one's status from a wine-maker (vitivinicultor) to a mere producer of grapes (viticultor). This is particularly so for full-time farmers. Some of them have continued processing grapes from old vineyards or from vineyards they worked *a medias*. One farmer said that he had continued to make wine, buying grapes from other growers at a price lower than that paid by the co-operative. On the other hand, those who did not depend economically on agriculture felt they had raised their status by producing wine. Although the social capital required from each member seems a lot, only one member needed to contract a loan with the bank. According to another member, 'everybody can raise the money, if necessary, with the help of family members' and in his view the level of the contribution did not pose problems for people to enrol. No motivational differentiation between farmers (both members and non-members) according to the motives in relation to the style of farming they pursue and the socio-economic characteristics of their farm household can yet be made. However, it can be advanced that the size of vineyard and the success with their own elaboration of wine seem to have been two of the decisive forces.

8 Transformation and Consumption of High-Quality Meat: the Case of Chianina Meat in Umbria, Italy

Flaminia Ventura and Hielke van der Meulen

The production of high-quality foodstuffs[1] is the single most important objective pursued in Umbrian agriculture, since geographical conditions and institutional limitations ensure that any farm strategy or agricultural policy aimed at bulk-production is doomed to fail. At the same time natural conditions favour the production of genuine, tasty and typical products. Umbria has a strong tradition in high-quality food production and the importance Italians attach to delicacies enhances perspectives for increased local value-adding in agriculture, against a general trend towards industrialization and standardization.

The research on which this contribution is based analyzes the specific possibilities for the valorization of the commonly acknowledged high quality and typicality of Umbrian beef. The scope of the research entails the entire beef sector in order to obtain a clear understanding of its endogenous development potential. The results serve as a point of departure for discussions with regional authorities and the local groups of farmers with whom we collaborate to define actions to safeguard and develop their precious patrimony. The research started with the assumption that the concept of quality should be seen as a social definition. It focuses on the way in which people talk about quality, exchange and articulate their ideas about quality and how they structure their actions. Simultaneously, it is through this particular focus that we can analyze how everyday practice shapes and reproduces people's concepts of quality. We have therefore studied all relevant 'actors' involved in the production, distribution, transformation and final consumption of beef produced or sold within Umbria.

The dominant trend in research on meat quality in different countries is characterized by the typical marketing view, that atomizes consumers as merely individuals who finds themselves in front of counters. This standard approach usually involves surveys on consumer preference and consumer panels under standardized conditions. The purpose generally is to establish the preferences of consumers as well as to identify the criteria applied for their choice, mostly concentrating on the 'first-look variables' such as price, colour, visible fat content etc. (Steenkamp *et al.* 1986). We certainly share their view that quality is a subjective item. But there is much more than just individual preference. The desegregated demand-side as the decisive criterium is too narrow a focus on what a market really is. Paramount is the *social interaction* between consumers, butchers and farmers: it is from this highly differentiated interaction that different market segments or 'social circuits' for the communication of specific quality notions result. Hence consumer preference and market segments do not exist as just static phenomena, but are constantly being created and altered.

Of course, it makes all the difference whether we talk about the Dutch situation, for instance, or about central Italy. In the first case, butchers, and therefore their clients, generally do not know where and how the meat is produced. Ironically, at least in the Netherlands, it is the supermarkets that increasingly impose definitions of the origin and quality of meat. In Umbria, however, 80 percent of the regional turnover of beef is channelled through small butcher's shops. Most butchers select their merchandise directly from farms in the neighbourhood, applying very explicit, though differing criteria. Umbrian consumers often explicitly ask for certain meat, i.e. tender, genuine, tasty, easy to prepare, originating from the local Chianina breed or being just *nostrana* (local).

It is our view that any definition of quality is determined by the many-facetted interaction of all those involved in the realization and appreciation of the final product. Personal contacts and the exchange of information and ideas among the various actors are conceived as central to the development and social reproduction of different and mutually competing definitions that can be identified within a particular socio-economic context. This point of view implies a so-called along-the-chain investigation of the definition, articulation and negotiation of particular quality-definitions, as linked to particular social circuits of interlinked producers, distributors, transformers, and consumers. Within these circuits the butchers are considered to be the central pivots around which consumers and farmers position and articulate themselves, that is, the butchers are the crucial *interface* between supply- and demand-side actors.

As far as we know, this approach to the beef sector is rather unique; first because it refers to specific socio-economic circuits instead of referring to rather abstract categories such as market segments or consumers, and second, because it identifies specific origins and particular processes of production as valid quality criteria. The typical zootechnic and/or agro-economic research on beef production is almost exclusively concerned with *quantitative* indicators, such as daily weight increment, precocity, feed conversion factor, slaughter rate and fat percentage. These parameters are then related to the kind of breed kept, the feed system and the type of stable used (see Giorgetti 1990 for central Italy). Other research concerns physio-chemical characteristics of beef fibres during slaughtering, conservation and preparation (pH, redness, brightness, sarcomere length, drip loss, water loss etc.), mainly related to tenderness and taste. Such a limited research focus masks the reality of the Umbrian beef sector. The persistence of the famous local *Chianina* breed with its tasty and typical meat (Poli 1991), and the widely diffused use of particular kinds of fodder produced on the farm, both highlight a largely quality-oriented market.

Unfortunately the impact of breed and feed on the quality of meat, (taste, fibre, tenderness, water content, genuineness, etc.) has never seriously been studied. This paper tries to pay due attention to these particular aspects of the notion of quality. An implicit purpose of our research work is indeed to revitalize criteria that have been marginalized, if not omitted from current research, acknowledging therefore the recent trend towards more genuine, tasty and recognizable food. Umbria, known as 'the green heart of Italy', and already famous for some of its agricultural quality products[2], constitutes a promising base for this type of development.

Many people would identify at first sight the traditional production and commercialization of beef in Umbria to be 'backward'. Exploring further, they would be surprised to find out that in many respects it is far ahead of the half-hearted campaigns and efforts elsewhere to combat the negative image of meat, to de-industrialize certain aspects of farming, and to establish direct relations between consumers and producers, etc.

This chapter presents first a description of the research methods and techniques used, elaborating the concepts of 'actor-oriented approach' and 'styles of farming'. A schematic summary of the principal results is then presented, highlighting the three main social circuits that have been identified as far as the 'passage' of meat from producers to consumers is concerned. After this global introduction the different styles of cattle farming to be found in Umbria are discussed. This analysis is followed by a description of the different types of butchers who are characterized, among other things, by the origin of their merchandise. The butcher's knowledge of the on-farm production process appears to be essential to their quality definitions and economic strategies. Finally, the results of a survey among 150 Umbrian consumers are presented. The final section summarizes the potential for endogenous development in the beef sector of Umbria.

Theoretical Notions and Research Methodologies

Umbria is an interesting region with regard to the beef sector. It contains an enormous diversity of cattle farms, varying from the traditional summer ranches in the hills and mountains to the large modern farms with French cattle for fattening in the low plains. In addition, the *Chianina* breed occupies a prominent place in the regional market. There is also a considerable variety of chains through which the beef finds its way to the consumer.

As mentioned, current research on the meat-sector is quite biased. Our research assumed that considering the persistence of various farm types, the supply-side would strongly co-determine the distribution sector, the final consumption, and the ample range of quality definitions. As far as the latter are concerned we assumed that, apart from a prestructured marketing survey, a profound *qualitative* study of each element of the concerned chains was indispensable. The methods and techniques used in our empirical research closely relate to some of the theoretical notions we had in mind. One of them is the actor-oriented approach (Long 1977: 187-92; 1984), which sees social phenomena, such as the definition of meat quality within a group of interlinked persons, as the result of the actions of those persons. Actions constantly reinforce, and eventually redefine, the implied rules for behaviour. A second theoretical concept, still closely related to the actor-oriented approach, concerns the diversity in *styles of farming* that can be identified within a given agricultural context. Crucial to this concept is the assumption that farmers (or farmers' families), as social actors, structure the labour process and consequently the process of production and commercialization according to their own strategic insights. Within the agro-technical and administrative[3] space available to them, farmers develop an ample repertoire, that is a set of different 'logics of farming' (van der Ploeg 1985). Consequently, one might assume that farmers play an equally active role in the definition of the quality of meat – a notion that surely will be linked to their opinions of how the meat ought to be produced.

Given the above mentioned contextual implications and theoretical guidelines, the research, conducted among Umbrian butchers and farmers (being the 'full-time actors' in the chain), was directed towards an understanding of their concepts of quality and related entrepreneurial strategies. A number of in-depth interviews were held, while observing the actors at work and discussing the way in which they exercised their profession, thus trying to unveil the practical consequences of their definitions of meat quality (and vice versa). Special attention was paid to the so-called 'domaine de l'indiscutable', the domain of ideas and practices people take for granted or do not formulate explicitly. Each interview lasted for several hours and was conducted at the work site. All interviewers (rural sociologists) had experience with this kind of work. These semi-structured qualitative interviews were followed by surveys of a larger scale,[4] providing the statistical backing for the hypotheses that had emerged from the first inquiries. The in-depth interviews turned out to be of great help in the design of the structured survey questionnaires, and they were indispensable for a meaningful interpretation of the statistical output derived from the surveys.

For the research among Umbrian consumers we resorted to structured questionnaires. This was done for two reasons: First because consumers were not expected to be able to digress on meat quality in the way farmers and butchers do, second, the interviews with the butchers had already satisfied a great number of our questions about consumer behaviour. This 'shortcut' then was also facilitated by the fact that all three questionnaires (on farmers, butchers and consumers) were scrupulously co-ordinated, so as to match the same topics; sometimes they even contained exactly the same questions. The comparative value of the material was further enhanced by asking every interviewed person what the quality criteria of their suppliers or clients were. In this way the research developed into a real 'along-the-chain' investigation.

The collection of empirical data started by interviewing the butchers. A practical reason for this was the fact that the butchers could provide us with useful information on both production and consumption. This enabled us in a second phase to model farmer and consumer interviews and questionnaires on the results obtained from the butcher interviews. This approach also provided us with the names of the supplying beef-cattle farmers, so that we could follow, once again, the empirical structures of the 'chains' themselves. The samples for the in-depth interviews included some 30 farmers and 30 butchers. The interviews involved 150 butchers, farmers and consumers and were stratified in Umbrian territory on the basis of community membership. Afterwards these samples were checked for their skewedness on certain phenomena (such as frequency of hallmark adherence or farm type) and eventually adjusted.[5] Our research did not include the supermarkets, schools and restaurants, which are the large distributors of beef. One reason for this is that 80 percent of all sales in Umbria are handled by the butchers' shops; restaurants and schools also order from there. Another reason is that it is more or less known where the supermarkets acquire their produce: from the wholesale dealers or directly from a number of very large farms that are able to provide a uniform and cheap product which looks good. On the other hand, some supermarkets give concessions to 'independent' butchers, some of whom are present in our sample. A third reason is a practical one: the beef farmers in the region supply almost exclusively to local butchers and not to supermarkets[6] etc. Taking the butchers as the only distributors/transformers, made it easier to match them later with certain types of farmers. Consumers were contacted and interviewed in the street. The number of 150 was arrived at by means of cumulative stratification: as the interviews progressed, care was taken that every age category, every professional category and every community type (qua dimension and geographical position) was finally represented according to its relative regional importance.[7]

The main statistical procedure was the identification of a limited number of typical subgroups within each sample. This was done by means of factor analysis in the case of the farmers and multivariable frequency analysis in the case of the butchers. The calculations were not made at random, but were inspired by the general understanding obtained from the first series of interviews. The second step was to compare the average scores of these subgroups on the various variables. The most interesting results are presented here in the form of plot-like images. This method leads to a comprehensive simplification of the at times very complex material. The elaboration of the consumer data was organized mainly in the form of cross tables, confronting the answers of the most interesting categories (for example townsmen versus countrymen). In a final stage the subgroups identified among farmers, butchers and consumers were related (matched) and put into a flow scheme (see Table 1), showing thus the principal social circuits for the production, transformation, distribution and consumption of beef in Umbria. This flow-scheme takes account of the different quality definitions.

The interpretation of the comparison of the frequencies and average scores of the subgroups (notably those among farmers and butchers) was not always easy. Sometimes it looked as if the answers of those interviewed did not correspond to the criteria on which these groups were formed, i.e. with their supposed entrepreneurial strategy. We suspect that some responses were only meant to make a good impression on the interviewer. But mostly more complicated phenomena were at stake. The most important one being that of the 'implicitness' of some quality criteria. For example, within one of the circuits identified, the criterion 'genuineness' was regarded as implicit to the feed used and to the 'style' of these (small-scale) beef farmers. But the interviewed persons mentioned other criteria as being of prime importance, such as tenderness, i.e, characteristics that, unlike the indisputed genuineness, involved individual judgements. We were able to reveal these kinds of hidden results with help of the information provided in the preliminary in-depth interviews, as above.

For reasons of space we will not elaborate here on how the statistical significance of the difference between two average scores was determined, but in brief, Chi-square scores of cross-tables were compared with (two-tailed) Pearson correlations, taking account of the size of the subgroups concerned.

Three Social Circuits for the Definition of Quality

This section summarizes the main research results, describing first the three most typical along-the-chain social circuits through which production, transformation, distribution and consumption of beef are co-ordinated and structured. In each of the particular circuits, the artisanal, the industrialized and the anonymous, one encounters a specific definition of quality. The circuits should not be seen just as market segments through which the meat flows, but rather as institutionalized patterns of interaction between certain social actors (albeit loosely organized) who actively define their own notions of quality.

Table 1 gives the most typical circuits identified. Of course not every farmer, butcher or consumer falls into one of these three social circuits.[8] That is, the scheme is a simplification of reality. However, that does not alter the fact that the presented 'extremes' are relevant and recognizable as such within Umbria. Especially the first circuit is very clearly present; it comprises 35 percent of regional production and 30 percent of all butchers. Butchers in the 'industrial' and 'anonymous' meat circuits total another estimated 30 plus 30 percent. The next sections will show how, within every category of actors along-the-chain, we came to the subdivisions on which the scheme presented below is based.

Table 1 Summary of the Characteristics of the Three Along-the-Chain Circuits Identified

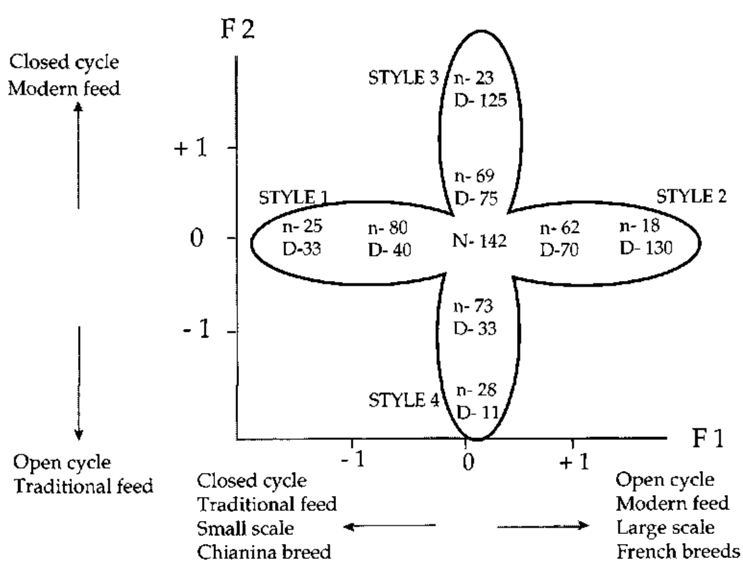
ARTISANAL CIRCUIT	INDUSTRIALIZED CIRCUIT	ANONYMOUS CIRCUIT
	FARMERS	
Small-scale farmers in hills Chianina livestock Closed cycle of reproduction Use of traditional fodders Animal has 'its time to grow' Self-sufficiency in fodder Quality=dark colour + use of self-produced feed	Large-scale farmers in valley French fattening-calves Modern, industrial feed High livestock burden on land Speeding up growth cycle Quality=tenderness + tastiness by infiltrated fat	Import
	Wholesale dealers with cheap meat, also sold in pieces	
Farmers know their butchers appreciate use of certain feed Close personal relations with butchers Butchers said to accept high final weight	Farmers know butchers want lean, tender and bright coloured meat and official guarantee Butchers would not care too much about content and feed used Farmers aware of importance high rate meat/bone and low final weight (French breeds)	
	BUTCHERS	
Butchers convinced that small farmers produce better, natural meat Prepared to pay 10% more for right quality	Butchers require standardized feed and 'scientific' approach as found on large farms	Butchers want young animals (tender, white meat) Not very prepared to pay for quality
Quality for butchers=tasty, genuine Strategy butchers production-oriented Some butchers prefer Chianina meat	Quality=tenderness and bright colour Strategy butchers oriented towards transformation and presentation	Quality='white' meat Strategy butchers merely directed by demand for easy meat and low price
Butchers presume clients search genuine product, eventually Chianina Clients presumed to be rather prepared to pay more for quality	Butchers presume clients want tender and tasty meat, who therefor pay less attention to fat	Butchers presume clients want 'white' and very lean meat Clients presumed to be unwilling to pay for quality
	CONSUMERS	
Personal trust important for consumers Consumers from the country: connoisseurs Want tasty meat	Yuppies among consumers mind hallmark Consumers 'buy with their mouths'	Townsmen Consumers 'buy with their eyes'

Styles of Cattle-farming

From the thirty in-depth interviews that preceded the survey, some farm characteristics appeared to be of particular importance for explaining the differences in the definitions of beef quality given by the farmers themselves. These were: number of livestock kept; the type of feed used (traditional or modern);[9] the kind of breed kept (Chianina or French); and reproduction cycle (open or closed). In other words, the way in which farmers organize their farm, that is their 'style of farming' (expressed here in terms of these four parameters), influences the criteria used[10] in qualifying their product. But also the reverse holds true: farmers have explicit and implicit ideas of what constitutes a good product and they shape their farms accordingly.[11]

The above mentioned farm characteristics combine in all possible ways in Umbria, giving rise to an enormous diversity in beef-cattle farming. Some specific combinations, however, turned out to be particularly relevant in the analysis of our 150 farmer sample. A factorial analysis, run on the basis of the four variables mentioned above, resulted in two main factors (principal components), explaining 67 percent of the original variance. The two factors provide us with four typical groups or 'styles', represented by the four arms of the two axes in the plotted image below. The result is presented in Figure 1.

Figure 1 Number of Farms Falling into the Groups Defined by Factor 1 and 2 (n) and their Average Livestock Dimension (D)



Here, each extreme group is a subgroup of the larger one towards the centre. The extremes have factor scores greater than +1 or lower than -1 on one factor, and are neutral on the other.

The reader must note that both the horizontal and the vertical axes comprise the whole interviewed population and as a result, the larger groups at the centre have an overlap going from F1 and F2. The extremes, however, exclude each other and are therefore to be considered as different groups. We will refer to these extreme groups as 'styles of farming'.[12] The horizontal axis will appear to be of particular relevance, since it has a greater explanatory value in statistical terms.

The sample of 150 farmers was stratified according to the different farm types to be found in Umbria, and their relative weight, as derived from the regional government census data. Table 2 shows the outcome. Farmers with more than fifty animals are over-represented in our sample and as a consequence the numerous small farmers are under-represented. This was done in order not to end up with subgroups in the large farmer category that were too small.

Table 2 Stratification of the Sample According to Farm-Type

	CLOSED CYCLE OR CLOSED + OPEN				
SCALE	Chianina only	also Chianina	without Chianina	FEEDLOT	TOTAL
5-10	24 (16%)	17 (11%)	11 (7%)	12 (8%)	64 (43%)
11-50	10 (7%)	16 (11%)	10 (7%)	10 (7%)	46 (31%)
> 50	10 (7%)	10 (7%)	10 (7%)	10 (7%)	40 (27%)
TOTAL	44 (29%)	43 (29%)	31 (21%)	32 (21%)	150=100%

Figure 1 shows the average number of livestock per farm (D). Taking into account the different reproduction cycles,[13] we see that style 2, qualified as the *industrial* type of farming, produces by far the most animals a year. It is these large farms that account for a good part (35 percent) of total beef production in the region.

Looking at the basic characteristics of the groups created by factor analysis, it is precisely the large farms that make use of modern feed (silomaize and industrial compound feed) while the small ones stick to traditional feed. In fact the expansion of some farms, essentially during the last twenty years, was made possible by the intensification of land-use (irrigated maize crops) and the acquisition of industrial compound feed.

Hence, a larger stock often implies a higher animal burden on the land (see Table 3). Since small-scale farming is usually associated with self-sufficiency in feed and fodder, the relatively high percentage of feed bought by the category of small farmers with an open cycle (style 4) might be at first sight surprising. The explanation is that for this category, beef cattle are not a fixed activity; many of them fatten calves in winter only (when they have more time) or during years in which they can fill gaps in the local market. Hence, fodder crops may not be of first interest to them. Normally they have some grassland available to produce the basic feed. But the most important fact is that the feed they buy is always in the form of hay and cereals, acquired from nearby farms. This highlights their preference for the traditional kind of feed; indeed, nothing would be easier for them than to buy ready compound feed (note also their strong conviction that 'small farmers feed better', as shown in Table 4).

Farmers of style 1, qualified as *artisanal,* remain by far the most self sufficient in feed among the four styles. This might have to do with their often isolated position in the hills (see average altitude), on the other hand it corresponds to the strategy of the closed cycle. Alongside a certain restructuring of *space* (scale, commercial relations, high percentage of feed bought) the rapidly expanding farms (notably styles 2 and 3) also contain a certain restructuring of *time perspectives.* The use of industrial compound feed (and perhaps other substances) in order to accelerate growth, is just one example. Another is the shortening of the reproduction cycle by reducing the time between subsequent births of calves. This strategy is particularly relevant for farms with a predominantly closed cycle, styles 1 and 3, so we will limit ourselves to them for a moment. Artisanal farmers (style 1) made it clear in the in-depth interviews that they often have difficulties with the calving of their (delicate) Chianina cows. This explains the bad performance on the reduction of the inter-calf period. A second factor may be that the very small breeders do not have enough space and money to afford a bull of their own. This would largely solve the problem; as the Umbrian proverb says, 'the bull never fails'.

The qualities of small farmers, i.e. those of style 1 and 4, are to be encountered mainly in the domain of feeding. It might perhaps cause surprise that there is a broad consensus among *all* types of farmers about the superiority of small cattle-breeders in this field. Table 4 reaffirms this (the incidence of farmers answering 'I don't know' or 'No difference' only reinforces the significance of the percentages).

The thirty farmers involved in the preliminary in-depth interviews were asked to comment on a scheme involving a small farm with a closed cycle using traditional feed (A) and a scheme involving a large feedlot (B). They were asked which farm was better and why. Typical responses were: 'Farm A is better because it breeds its own animals and is more secure about the meat (...) there is care and 'pasione'. And, 'On farm B they stress feed more, those breeders calculate more in terms of chemicals and economics.'

Table 3 Average Scores of the Four Styles on Structural Variables

	ARTISANAL	INTERMEDIATE		INDUSTRIAL
Style number	1	4	3	2
Number of farms *	25 (80)	28 (73)	23 (69)	18 (62)
Type of feed	traditional	traditional	modern	modern
Scale	small	small	large	large
Dominant breed	Chianina	(mixed)	(mixed)	French
Reproduction cycle	closed	open	closed	open
Altitude	470	320	350	330
Animals/ha fodder	1.1	1.4	1.9	2.8
% of feed bought	20	48	39	37
Lucerne yield/ha	83	93	72	70
Intercalf period	458	422	407	405
Feed conversion **	9.4	9.5	10.5	11.5
'Costs too high'	28%	39%	26%	50%
'Lowering possible'	36%	21%	39%	28%
> 20% sold to wholesale dealer	4%	0%	13%	11%
> 20% to consumers	12%	25%	4%	0%

* Number in brackets refers to the number of farms in the larger, composite group.

** The feed conversion factor is expressed in number of fodder units used per kg weight increment (1 unit equals 1 kg of barley).

Apart from the obvious difference in final meat *quality* caused by the choice of feed and breed, the greater care these farmers devote to their livestock is also translated into *quantitative* terms. Contrary to the general belief that large farms of the industrial type, with a rigid 'scientific' feeding system (style 2) have better technical results, conversion of feed into meat turns out to be more efficient in the case of the small breeders with their traditional feeding system and better animal care. The good score on feed conversion corresponds to these farmers' definition of good farming, in which it is important not to waste inputs, not to 'throw away money'. This is also reflected in the way they cultivate their crops: they seldom use herbicides and pesticides or heavy fertilizing. Nonetheless they arrive at fairly good yields, especially in grass/lucerne hay, the basic fodder crop.

While large farmers agree in general terms about the merits of their smaller colleagues, they do not consider making any changes in their feeding system. This clearly emerges from their answers on more explicit questions. A large farmer: 'All right, one gets always a better quality without silomaize and with as little fertilizer as possible, but it would take too much time. Having four or five animals you can do that, but on this farm silomaize is necessary to make a shorter cycle.' Clients of small farms with traditional feeding, however, care very much, as is shown in the butchers' survey. They select their supply farms mainly on the basis of the feed they use.

Table 4 Average Scores of the Four Styles on Quality Issues

	ARTISANAL	INTERMEDIATE		INDUSTRIAL
Style number	1	4	3	2
Small farmers feed better	76%	96%	61%	72%
Small farmers care better	72%	68%	57%	56%
Own fodder better	52%	50%	44%	28%
Buyers' opinion	32%	25%	22%	22%
Silo-maize and industrial compound feed worse	32%	25%	4%	0%
Buyers' opinion	20%	25%	9%	0%
Meat of the mountains better	80%	82%	70%	72%
Chianina superior *	20%	28%	22%	16%
Buyers' opinion	24%	32%	0%	-5%
Low weight better **	-8%	7%	4%	6%
Buyers' opinion	-4%	10%	20%	11%
Fat infiltration desirable	24%	25%	44%	44%
Buyers' opinion	16%	14%	26%	22%
Higher price possible	16%	39%	35%	44%
Selling price/kg	L.4440	L.4-320	L.4470	L.4230
Problems in selling	28%	45%	39%	67%

* This index is obtained by subtracting the percentage of farmers and buyers preferring another breed from the percentage of those prefering the Chianina, for quality reasons. This procedure serves to summarize the differences between the groups.

** Percentage of farmers opting for a final weight of more than 650 kg minus percentage of farmers opting for a lower final weight.

As for the positive role of the Chianina breed in determining beef quality, farmers are again rather univocal (Table 4). This might again seem contradictory, but in fact all farmer families now situated in styles 2, 3 or 4, once produced and consumed Chianina meat themselves: they know what they are talking about. To quote an interviewed farmer: 'On the slice, one notes the quality of Chianina: it remains more *rosa* and doesn't get dark like the other breeds. The taste is better and it has less fat. Above all it is the good conservability that matters. The *Charolaise* may yield more beefsteaks, but it's fatter and shrinks when cooking, because it contains water.'

Significant differences also emerge when the opinions, as attributed by farmers to their buyers, are analyzed that relate to a particular differentiation within butchers' strategies: many butchers who get their supplies from farms of style 1 and 4 are explicitly looking for Chianina cattle, because of its excellent meat quality. The clients of the large farms, instead, are looking for well-formed, high-yielding animals (yield in terms of percentage meat on total weight), preferably under 600 kg and younger than sixteen months. This is in order to get tender meat of a bright colour. A high slaughter rate and a limited growth period imply a 'pushy' kind of feeding and the use of French breeds, and these buyers seem to accept this necessary evil.

For lack of space we leave out, at this point, the precise results of the farmers opinions on the organoleptic aspects of beef such as tenderness, colour, taste and leanness. We limit ourselves here to pointing out that the opinions correspond rather well with the styles of farming and with the kind of clients each style attracts, even if there are some inconsistencies in the material.[14]

There are important differences in economic and marketing strategies between the interviewed farmers. These differences coincide, to a large degree, with farm characteristics and quality considerations. Big farmers evidently aim at economies of scale. Their gain lies in the sheer number of animals kept, even when they perform worse technically (less growth, lower feed conversion). Having more animals than land, they intensify fodder production by increasing inputs and they buy industrial compound feed. They try to reduce the growth cycle in order to accelerate the turnover of capital. The industrial style, number 2, is the most conspicuous exponent of this strategy. Marketing is directed at the delivery of a uniform product, attractive enough for the bulk of consumers. Their crucial problem is to get rid of the animals in time to start up a new cycle and avoid low prices (when the animals grow fat and old). This is precisely where things went wrong in the last two years (1990, 1991). Since the large, industrial breeders are stuck in a production structure with high constant costs, they cannot permit themselves to end up with unsold animals. Small farmers, on the other hand, often explicitly do not take the risk of going big, of being forced to depreciate on heavy loans and buy feed and cattle. Table 3 further shows that farmers who buy cattle for fattening (open cycle, feedlots), especially the industrial farmers, consider production costs too high at the moment. Breeders with a closed production cycle (style 1 and 3), vice versa, not only have less problems in this respect, but also more often see possibilities in lowering production costs even further. They apparently have more room for adjustment on the farm. One should also note the fact that these two styles are among the most self-sufficient in fodder, which corresponds again with their strategy to achieve 'autonomy'.

As to the selling price, we see that cattle farmers of the artisanal style (style 1) manage to get a 5 to 10 percent higher price (per weight unit) than farmers of the industrial style. This fact is mainly explained by the higher value of the Chianina cattle and the better quality of the feed they use. The surplus, however, is not enough to compensate for the higher production costs involved, since the Chianina demands better fodder quality and traditional fodders cost more. Table 4 shows that it is mainly the breeders with French cattle (style 4) who think they could get a better price than they actually do, who put up Chianina calves for sale. The large farmers will not do this because it goes against the internal logic of farm structure (pushing), and the small farmers will not do it because of the scarcity of such animals and the lower margin between costs and selling price. Regional prices closely follow national and international markets, determined by the overproduction of beef at EC level. In this situation of overproduction, manifest also in Umbria,[15] what matters is a *secure selling network*. Small farmers practising traditional feeding methods appear to be better off, because they have close relations with local butchers who are looking for quality. Large farmers are left to the mercy of wholesale dealers. This was shown clearly from the in-depth interviews and from the survey. Sixty-seven percent of industrial breeders admit to having problems in selling off their animals, whereas only 28 percent of the artisanal farmers say so.

At the end of 1991 the crisis in the beef sector deepened, and we noted that indeed it was the small breeders who were surviving. Bigger enterprises were closing down. As well as their stronger selling network, the very logic of the small family farm (giving their own labour, a flexible farm structure, off-farm activities, a high degree of auto-consumption, the availability of pensions) permits these small Umbrian breeders to carry on while waiting for better times. An interesting observation is the high incidence of direct selling to consumers among some breeders (style 4). Some are even opening butcher's shops on the farm. Others slaughter an animal every now and then and sell it to interested neighbours and friends. It goes without saying that this strategy is inconceivable for the large 'professional' farmers. Widespread auto-consumption in the countryside should also be mentioned in this regard. Both on-farm commercialization and auto-consumption are expanding. This is partly due to low market prices, but it also evidently relates to the growing awareness among consumers about the quality and origin of their food.

Some final remarks in this section will be dedicated to the question of certification of hallmarks. One of the institutional efforts to secure marketing of relatively expensive regional beef has been the establishment of quality hallmarks. The '5R' hallmark of the five Italian breeds is the best-known; in Umbria it promotes the Chianina. More recently *Carni Umbre di Qualità* (CU) was founded. It has a stronger regional position than the 5R, because it has a larger number of selling points, being essentially a hallmark to combat the poor image of beef. Both consortia, regrettably, are characterized by malfunctioning inspection at the production and distribution level. They make excessive use of slogans appealing to the merits of 'traditional farming' (5R) and the genuineness of regional produce (CU). As such they are mere marketing hallmarks instead of product guarantees; for example, no guarantees are given as to the feed used. People have thus little faith in these initiatives, and confidence is also lacking among the participants themselves. Let us cite two proponents: 'I am an associate of the 5R. I know that in my butcher's shop only Chianina beef is sold, unlike the other so-called 5R butcheries where they slaughter one bull a week but sell three. Better control is needed, because I hear what people around say: the hallmark is there but not the beef. Another informant: 'I don't understand anything about the Carni Umbre hallmark. The only thing I understand is that it brought me an extra client and that I signed a contract saying that the butcher would pay me 500 lire (10 percent) above the market-price.'

Many butchers see the hallmark as just an extra gesture towards their clients. For the conscious client, in fact, the personal *fiducia* (faith) in the single farmer or butcher and being able to trace the origin of the beef is what matters most. In Umbria there still exist a substantial number of breeders producing the typical Umbrian beef or at least offering a tasty and completely genuine product. Some consumers, mostly country people, find their way to them by buying directly from the farm. Others are awaiting the moment when these engaged producers will succeed in organizing themselves, prescribing strict and rigorous production procedures, as the farmers in north Italy did for the famous parmiggiano-reggiano cheese. Only then can they hope to realize prices which really correspond to their remarkable production efforts and sacrifices.

Circuits of Beef Transformation and Distribution: the Butchers

Butchers in Umbria play a key role in the definition of beef quality, since they keep in close contact with both producers and consumers. They manage 80 percent of all regional sales and the majority of them select their animals directly at nearby farms. Besides having the function of service hatch between supply and demand, butchers actively co-determine the definition of beef quality and add a lot to the final quality itself (through storage and transformation). We refer to the categories of butchers below as 'circuits', the same circuits as appear in Table 1. This is justified by the fact that the butchers could be distinguished accurately on the basis of where they got there beef, thus integrating the different categories of breeders.

A first analysis of the survey data (correlations, factor analysis) confirmed the hypothesis obtained from the in-depth interviews, namely that butcher definitions of quality depend much on *where* they get their beef. These quality definitions correspond again to butcher's business organization strategies and to the approach of their client, as we will see below. The *size* of the farm where butchers buy turned out to be one of the criteria for the qualitative distinction between butchers. The preceding section showed how the factor 'scale of breeding' is correlated to the feeding system and thus to meat quality (small being superior). Butchers are very well aware of this. But not all meat is directly obtained from regional breeders. Butchers buy also from intermediaries, butchers' associations, and wholesale dealers (see Table 5). The last two also provide the so-called *carne da latte,* the white calf meat imported from the Netherlands and Denmark. This meat is sought after in Italy for its tenderness, although it has little taste and people have serious doubts about the way it is produced.[16] This leads us to the second relevant criterion: *anonymity* or, its antithesis, the *verifiability* of the distributed meat. Verifiability of origin is expected to guarantee genuineness, a major current concern of consumers of beef. Anonymity is considered highest (according to the butchers interviewed) by the wholesale dealer. Wholesale dealers tend to buy from very large farms in north Italy and abroad, though some meat also originates from small and large farms in Umbria. After the wholesale dealer are those sticking to the butcher's association and the intermediary; the last two cases still know more or less where the product comes from. The most verifiable meat is from butchers who buy directly from the farm, those buying from small local farmers doing best, because they demonstrated during the in-depth interviews the most profound knowledge of the production process. Thus butchers buying 60 percent or more of their turnover from a wholesale dealer (circuit 3) are to be found in the upper-right angle of Figure 2 and butchers taking 60 percent or more from large breeders (circuit 2) are located at lower-right. Finally, butchers who depend for 90 percent or more on small cattle farmers (circuit 1) are placed in the lower left corner.[17]

As we can see from Figure 2 and even better from Table 5 a lot of intermediary positions are occupied; 30 percent of the butchers interviewed do not obtain their beef from predominantly one type of supplier. *Grosso modo,* however, a certain concentration is to be observed at the angles; further analysis is based on these three groups. The high number of butchers operating in the artisanal circuit (group 1) (and in general the relative weight of the basis of the triangle) might surprise the reader and many an Umbrian alike. It highlights the strong regional-based character of the Umbrian beef market.

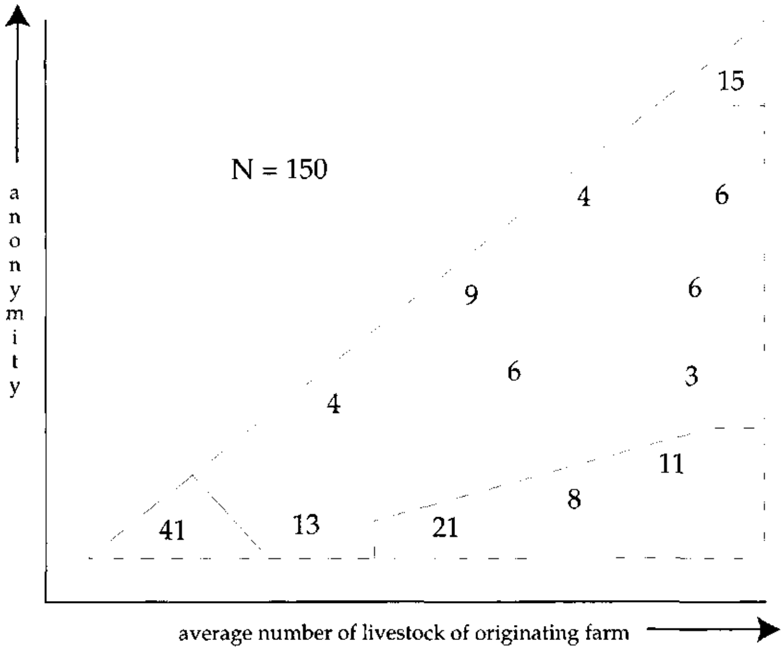
Table 5 Frequency Distribution of Butchers on the Basis of the Percentage of Beef Bought from the Various Types of Suppliers

Supplier	Code Subgroup	Frequency N=150
Buyers' association	—	
	0	2
Intermediary	4	4
	2 2	1
Wholeseale dealer	4 0	5
	2 2 0	1
Big meat-cattle farmer	4 0 0	15
(> 50 cattle for fattening)	2 2 0 0	1
Medium meat-cattle farmer	4 0 0 0	11
(10-50 cattle for fattening)	2 0 0 0 2	1
	2 0 0 2 0	1
	2 0 2 0 0	2
	2 2 0 0 0	1
	2 2 0 0 1	1
	3 0 1 0 0	1
Small meat-cattle farmer	4 0 0 0 0	14
(< 10 cattle for fattening)	1 0 0 0 0 3	1
	1 0 0 3 0 0	4
	1 0 3 0 0 0	3
	1 0 4 0 0 1	1
	1 1 0 2 0 0	1
	1 1 3 0 0 0	3
	1 3 0 0 0 0	2
	2 0 0 0 0 2	1
	2 0 0 2 0 0	6
	2 0 1 1 0 0	1
	2 0 2 0 0 0	5
	2 2 0 0 0 0	10
	3 0 0 0 0 1	1
	3 0 0 1 0 0	2
	3 0 1 0 0 0	3
	3 1 0 0 0 0	1
	4 0 0 0 0 0	41
	4 0 0 1 0 0	3

definition codes:

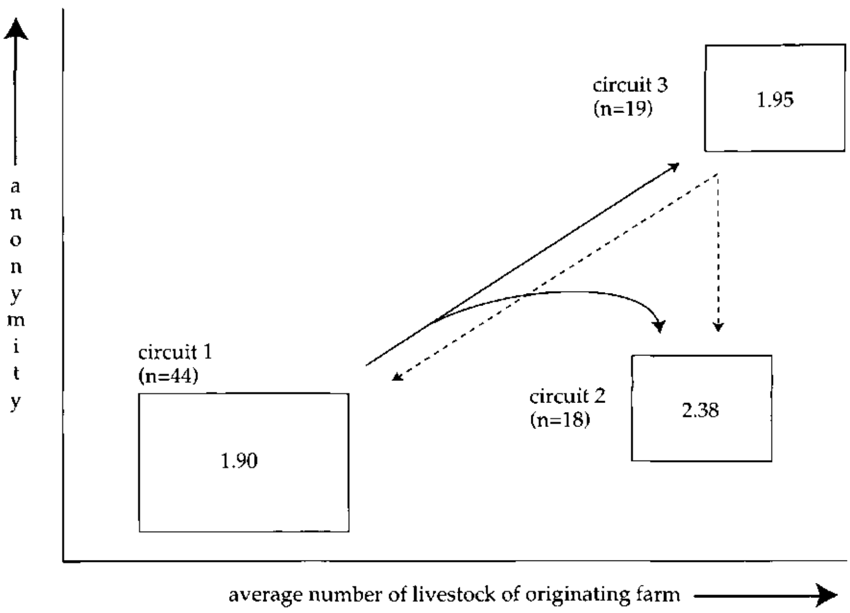
0 - buys nothing from this type of supplier
1 - buys between 5% and 35% of supplier
2 - buys between 40% and 60% of supplier
3 - buys between 65% and 85% of supplier
4 - buys between 90% and 100% of supplier

Figure 2 Plotted Frequencies of Butchers Grouped on the Basis of the Main Types of Suppliers and Arranged along the Dimensions 1) Size of the Farm of Origin and 2) Degree of Anonymity of the Meat Acquired



Some general data are presented in Figure 3, which is a schematization of Figure 2. For statistical reasons all three groups were somewhat enlarged compared to the original number of farms at the extremes. In order not to suggest a purely static image of the circuits, we have indicated the direction in which butchers' shops have developed in the last ten years (information from survey). The main direction, perhaps surprisingly, leads from circuit 1 towards 2, in other words from one 'extreme' to the other. These mainly involve small butchers' shops that have been eaten up by urban peripheries where consumers have become 'detached' from the country. They say they still admire the small breeder, but they now buy from wholesale dealers (Table 7). Butchers in circuit 2 have gained a quite stable position by offering more sophisticated products and by promoting 'quality' (exposing dubious hallmarks). They fear competition from supermarkets the least. Operating generally on a larger scale than their colleagues, they enjoy some scale advantages, for example in the conservation of their product (larger refrigerating cells, with more constant temperature and humidity, permitting longer conservation, i.e. greater flexibility). The arrows with dotted lines from circuit 3 downwards represent the wave of butchers who, in the 1980s, turned away from wholesale dealers and large cattle farmers in north Italy (anonymous meat) and went back to local farmers, because of a growing concern among consumers about the presence of toxic residuals in imported beef (calf meat from abroad and adult meat from northern Italy). Indeed the use of chemical growth-enhancers seems less practised in Umbria, especially on small farms, where it is more easy for butchers to check. Official surveillance is not very efficient. Butchers in 'artisanal' circuit 1 can be found everywhere in Umbria, but most frequently in the villages. Butchers of 'industrial' circuit 2 are typical of the booming areas in the central plain of northern Umbria. Those who sell 'anonymous' meat mostly have their shops in the large towns.

Figure 3 Schematic Presentation of the Three Circuits of Beef Distribution; Average Scores on the Variable 'Number of Persons Employed'; Dotted Arrows Indicate Recent Evolutions

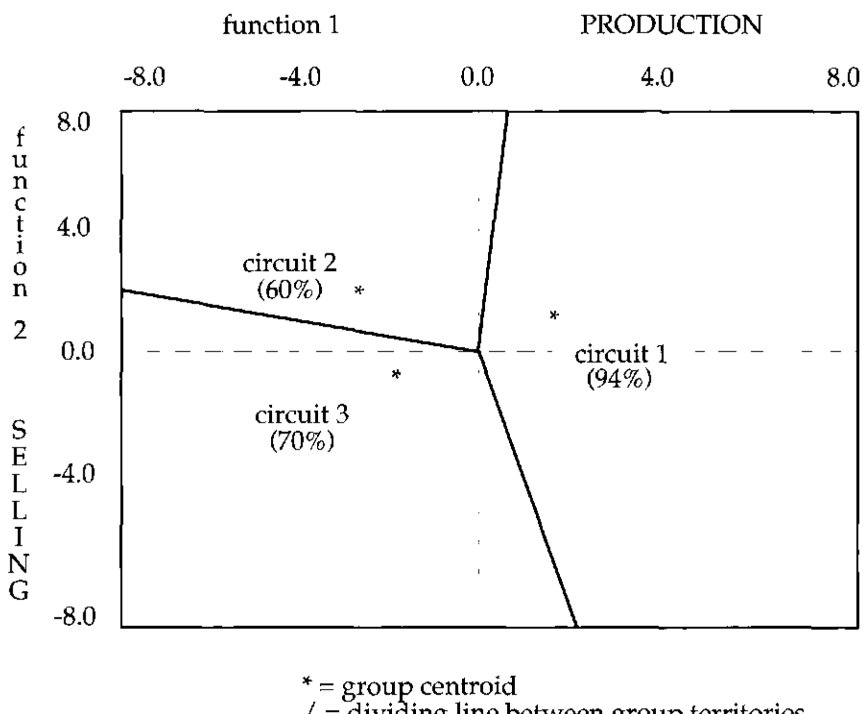


Before discussing the average scores of the above three circuits on the other items of the interviews, a more synthesized result is presented (Figure 4). This concerns a canonical discriminant analysis which provides us with two functions that are linear combinations of some preselected variables (Table 6).

Table 6 Intergroup Correlations Between the Selected Variables and the Canonical Discriminant Functions

	F1	F2
importance of feed used	.62	.26
small farmers better	.40	.28
Chianina has future	.35	.08
increase sale-ready products	.18	.57
number of persons employed	.04	.53
exposing hallmark	.17	.36
willingness to pay for quality	-.02	.35
externality of information resources	.12	.30

Figure 4 'Territorial Map', Plotting the Three Circuits on Two Functions Obtained by Discriminant Analysis; Percentages in Brackets Indicate Adequacy of Grouping by Functions



The functions are computed in such a way that the exponents of the three circuits acquire positions as different as possible on the two factors. Strikingly the first function 'brings together' all the variables to do with the way in which farmers produce, whilst the second one collects the variables concerning the way in which butchers organize their business. This organization refers to the display of a hallmark, good presentation and in particular to the degree of transformation of beef into a variety of ready products (value-adding). Transformation is the butcher's answer to the growing demand for luxury meat (beef etc.) and easily prepared products. Figure 4 shows that butchers who buy mainly from large breeders (circuit 2) pay most attention to the 'selling' factor and that those who buy exclusively from small breeders (circuit 1) concentrate on production characteristics, especially on feed and breed. The third circuit, dominated by the wholesale dealers, cares neither for the production process nor for value-adding; it sells, as it were, whatever is the easiest and cheapest product.

To conclude, we will comment on the average scores of the different circuits on items such as tenderness, colour, taste and fat content (see Table 7). Every butcher interviewed was asked to choose from a large list of items the three items that best defined beef quality. They were also asked to do the same for the criteria they thought their clients would use. The items selected here are the ones mentioned most frequently. The results may sometimes seem inconsistent, but this is mainly due to the fact that the personal opinion of the butcher, the business strategy he follows and the (supposed) opinion of his/her clients are three different things, and they do not always coincide.

The interpretation of the answers required a good background knowledge of the different types of butchers, especially of their complex quality definitions. The preliminary in-depth interviews were helpful here, for example, in understanding the link between fat content and taste/tenderness that some butchers make. Because we are dealing here with opinions, the relative differences between the percentages of the various circuits are more important than their absolute values. A second point of statistical concern is the significance of the differences. Without going into the calculation procedure used here, we indicate that a difference of 12 percent or greater can be considered significant.

Table 7, then, shows a clear preference for tender meat in the second circuit, not so much among the butchers themselves as among their clients. The same kind of discrepancy is observed in the farmers survey: here butchers, in the role of clients, were considered to be more interested in tenderness than the farmers themselves. This is, of course, a quite logical outcome when opposing personal opinions to the assumed opinions of clients, since tenderness has a negative connotation, as it is associated with imported meat with little taste.

Table 7 Average Scores of the Main Circuits on Some Items

Type of circuit	ARTISANAL	INDUSTRIAL	ANONYMOUS
Circuit number	1	2	3
Number of butchers	44	21	23
Type of supplier	small farm in Umbria	big farm in Umbria	wholesale dealer
Small farms better	83%	46%	67%
Feed criteria decisive in choice of supplier	93%	78%	37%
Believe in future Chianina breed	76%	55%	33%
Tenderness factor meat quality	23%	39%	42%
Opinion of clients	53%	100%	47%
Brightness factor meat quality	41%	56%	68%
Opinion of clients	34%	33%	58%
Tastiness factor meat quality	41%	17%	37%
Opinion of clients	23%	39%	16%
Leanness factor meat quality	28%	22%	10%
Opinion of clients	28%	16%	47%
Willingness to pay for extra quality (in lire/kg)	530	440	290
Willingness clients (in lire/kg)	510	490	430
Increase sales ready products	45%	61%	37%
Competition from supermarket	53%	36%	69%
Externality index of professional info	1.83	2.27	2.42

Colour predominates in circuit 3, the anonymous meat circuit. Clients in this circuit are said to 'buy with the eyes'. In the circuit of modern butchers (2) clients buy 'with their mouth'. In the artisanal circuit the focus of the 'actors' (butchers and consumers alike) is directed essentially to the production-side (feed and breed). So the scores on the organoleptic characteristics of meat reveal rather those qualities that leave much to be desired. This explains for instance the high percentage of clients asking for tender meat, who complain about toughness (as compared to the butchers). More mature meat will surely be tougher, but they would not buy another kind of meat for that reason!

The fat content of beef, finally, appears to have the least negative connotation in the second circuit. This is to be explained by the effect fat has on taste and tenderness, as both butcher and farmer explained to us. In fact, without fat, beef in this circuit would have little taste, especially since it is not mature. Incidentally, in forcing production with compound feed and silomaize it would be hard to completely avoid fat infiltration. The wholesale dealer circuit (3), is explicitly looking for leanness, which is a clear characteristic of the imported *carne da latte* (calf-meat). Fat is associated with old, tough meat and with cholesterol. This holds true at least for the consumers. The butchers find themselves in trouble (expressed during interviews) coping with the consequent dryness and toughness of the meat; clients 'do not understand that leanness and tenderness can't go together'. In the artisanal circuit (1) the fat content follows from the process of production itself and is consequently seen as a natural phenomenon. Beyond that the meat is relatively lean since these farmers often keep Chianina cattle, which has the valuable characteristic of retarded maturing. This means that it remains less fat, even after two years, so it can be given 'its time to grow'.

A last point to be discussed concerns the quality/price relationship. We already mentioned the limited extent to which better beef (unanimously recognized) is paid a better price. Chianina meat makes on average 5-10 percent more for a farmer, but on the butcher's counter it costs the same as all other adult beef. Butchers tend to stick to market prices as far as buying is concerned, and selling prices are set by agreement with local colleagues. As a consequence, butchers try to maintain stable relations with their clients by offering a good product, instead of competing on the price. This, however, does not exclude price differences. In the countryside meat prices were registered as much lower than in town. This is a remarkable paradox, because the meat commercialized in the countryside (circuit 1: small farms, traditional feed, Chianina breed) is unanimously considered of better quality and incurs higher production costs.

From the consumer survey we obtained a similar result. In the urban areas a kind of inflation seems to take place, caused by high-income consumers in combination with a lack of knowledge of beef production and origin. The data from the butchers' survey show that in the artisanal circuit there is a willingness to pay (still) more for a (still) better quality, unlike circuit 3 butchers, who buy from wholesale dealers. The unwillingness to pay extra corresponds with that of their butchers.

In synthesis, the different attitudes towards price and quality nevertheless offer some opportunity for a bigger price margin on the basis of intrinsic meat quality. The significant return of Umbrian butchers back to local cattle-farmers in the last decennium emerges as a significant detail. Apparently consumers were prepared to pay the higher price that resulted once they were informed better about the production process. Crucial of course, is whether producers and butchers manage to offer a typical product of which production, conservation and transformation procedures are strictly prescribed and preferably controlled (albeit indirectly) by consumers. Especially the question of feed quality will become increasingly important. High-quality circuits will necessarily function on a limited scale, characterized by as close a contact as possible between producer and consumer. We have no doubts about the market success such a product would have. The results of the consumer survey also justify such optimism.

The End of the Chain: Consumers

The consumer survey comprised 148 Umbrian consumers (see Table 8). The study was a type of market research; the question of quality was not discussed at length. As most of the contacts were made in the street, it was not possible to identify precisely certain types of consumers as we did for the farmers and butchers. But some subdivisions could be made; that between country and townsfolk being especially interesting. Some general results are presented first.

The majority of consumers in Umbria buy so-called *tagli pregiati*, i.e. the prime cuts of beef. They also prefer freshly cut to prepacked meat because it is thought to be tastier and more genuine. More than 90 percent of those interviewed said that they bought at the butcher's shop. Only a minority bought beef from the supermarket. This confirms the official estimate of 80 percent of sales within Umbria attributed to butchers. Eighty four percent of the population consumed beef more than once a week. Non-consumers hardly existed. Consumption per head was stable at 24 kg a year, somewhat below the national average because of higher swine and poultry consumption. The two main defects registered were loss of water during cooking and toughness. Technically the first can be due to excessive use of silomaize or compound industrial feed or to the use of chemical growth-enhancers; the second defect may result from age, bad health or lack of fat. Conservation and preparation can also have an important effect on tenderness, but we assume these items to be dealt with similarly by the various butchers and consumers. The most important quality concern expressed was that the meat be natural or genuine; people want nutritious and digestive meat which can be given safely to children. 'Taste' also appears to be very important. The overwhelming majority of consumers claimed that 'sound' beef *cannot* be secured from big farms. This corresponds exactly with the positive attitude of many butchers in Umbria towards small farms. Consumers were not very knowledgeable about the characteristics of meat; many of them were unaware that a higher fat content makes meat more tender and tasty, though people from the countryside and the elderly were an exception to this. Their lack of knowledge is also evident in the wide range of positive characteristics attributed to what the questionnaire called 'guaranteed beef': besides being nutritive, conservable and coming from small farms, such meat was also said to be tender, tasty, fit for slimming, contained little water etc. One thing consumers unanimously agreed on was that guaranteed beef was not for those who want to save money. When asked why it has to cost more, people pointed first to the higher production costs and then to the costs of the inspection system and the fact that 'quality just costs'. All answers were chosen from a prepared list.

Table 8 Distribution of the Consumer Sample (N=148) per Community, per Age Category and per Occupational Activity

COMMUNITY TYPE	N				%
Urban	83				56
Semi-urban	41				28
Rural	23				16
Total	147				100
	ACTIVITY				
AGE CATEGORY	outside home		domestic		TOTAL
	N	%	N	%	%
20-35 years	25	17	25	17	34
36-50 years	25	17	17	11	28
31-69 years	25	17	31	21	38
Total	75	51	73	49	100
OCCUPATION HEAD OF FAMILY	N				%
Professional	22				15
Trade	27				18
Employee	36				24
Manual labourer	25				17
Farmer					
Shop assistant					
Housekeeping	2				1
Retired	18				12
Other	18				12
Total	148				100

Seventy-one percent of the consumers said they were prepared to buy qualitatively guaranteed beef and to spend more money on it on average L.2,500 extra per kg (that is 15 percent beyond the actual price levels). Eleven percent of all Umbrian consumers buy beef guaranteed by an official hallmark. Some of them also frequent other selling points, so the partial market will involve an estimated 5 percent. The turnover of beef for auto-consumption and direct selling is difficult to assess, but according to sector experts it amounts to another 5 percent. In Umbria auto-consumption and direct selling seems to counterbalance the penetration of a commercial 'quality market' of the kind we find in Northern Europe.

Hallmark displaying butchers in the cities make clients pay fully the extra L.2,500, if not L.5,000. Breeders who sell directly, on the other hand, might even underscore the official market price; for them it is a lucrative business anyway, since they do not have to pay Value Added Tax and have no middleman to pay. In this way they force the butchers into paying prices at dumping level, even for excellent meat. There are noticeable differences between urban and rural areas. Urban consumers are more prepared to pay extra for guaranteed beef, even though town prices are already about 10 percent above those in the villages, where meat appears to be of superior quality. Townsmen complain about 'loss of water' during preparation of the meat (an indication of forced fattening), whereas countrymen complain about toughness (a consequence of longer maturing and lower fat infiltration). Townsmen also show concern about the use of toxic substances and would like to see a more natural way of cattle-rearing. Rural consumers recommend maintaining the quality they already have. A third indication for a better quality of beef in the rural areas can be assumed from the fact that discerning village butchers buy from small farmers, whereas town butchers buy mainly from wholesale dealers. Customers who want quality would prefer to buy directly from producers since they show no faith in the hallmarks displayed and the trend is for consumers to do this. It is now possible to do this as more and more producers are selling direct.

Table 9 Shortcomings of Beef Bought; Percentage of Consumers per Type of Community

Residence	urban	semi-urban	rural	average
not as good as once was	5	0	0	3
no good taste	11	0	4	7
costs too much	1	0	13	3
is often not genuine	7	2	8	6
contains hormones	2	0	4	2
animals are kept in a natural way	2	0	4	2
loss of water in cooking	77	34	33	58
tough	53	59	67	57
of poor quality	4	2	4	3
too bright in colour	1	0	13	3
too dark in colour	1	5	8	3

The paradox of a higher quality related to a yet lower price shows at least one thing clearly: that is quite possible, within Umbria, to obtain a natural piece of beef at a reasonable price. But one has to be prepared to search for it and inform oneself on the matter of beef production. The most logical thing for consumers to do would be to enter into direct contact with producers, because hallmarks do not succeed in convincing people. In Umbria it is not difficult to find examples of farmers who open butchers' shops, or who slaughter an animal every now and then to distribute among family members and interested friends and neighbours. In fact, more and more consumers are finding their way to the place of production.

Table 10 Consumers' Advise to Beef Producers: Percentages per Type of Community

residence	urban	semi-urban	rural	average
be honest	8	0	4	5
make it better	12	7	4	10
make it more genuine	25	20	17	22
inform about production	4	2	8	4
do not use hormones	36	32	17	32
make it less tough	4	2	21	6
maintain quality	7	2	42	12
produce more naturally	55	46	58	53

The Endogenous Development Potential

Given the persistent trend towards high-quality food, there is scope for development for Umbrian cattle-breeders, mainly for the relatively small farmers who have the 'breed' and who produce the required 'feed' to match new consumer trends. Increased outlets for the meat produced, as well as an increase in price, would contribute not only to the 'survival' of these farms whose families are involved in may other activities and who have relative autonomy *vis-à-vis* the markets, but would lead also to the revitalization of their styles of farming, and make them attractive for the younger generation. Such a revitalization is important since it is closely associated with other concerns, such as the conservation of typical landscapes, natural resources and a reduction of pollution. It is through a higher price for high-quality produce that the work involved in such concerns are indirectly, but nonetheless substantively remunerated through the market. This provides perhaps a better alternative to the plea for direct payments to farmers for 'landscape preservation'.

Evidently, the reproduction over time of this Chianina-farming system and the related artisanal circuit is, in no way, guaranteed. There are several threats, amongst them the competing industrial chain, which is increasingly appropriating the image of 'high quality produce'. The main problem for any strengthening of the existing artisanal circuit (and therefore strengthening Chianina production and the potential it entails) resides in the required co-ordination of actions embracing production, transformation, distribution and consumption (as exemplified by the actions of certain consortia). The specific co-ordination and articulation existing in the different chains described earlier, could be taken as a central design principle for strengthening the structures that can link production to consumption on terms more favourable for both sides of the equation. If such action is lacking or fails, Chianina-breeders have still one ultimate 'line of defence' at their disposal, that is the on-farm commercialization of their products. Needless to say, such an alternative also requires socially defined (and possibly also institutionally controlled) rules for production, transformation and distribution. Our research programme will focus, in the years to come, especially on these questions and problems.

Conclusions and Recommendations

A central conclusion of the research is that the organoleptic characteristics of beef and the specific requirements of consumers are effectively guaranteed by the production process and distribution channels. Another aspect usually ignored, if not denied by 'opinion makers', is that in a market where demand for quality is crystallizing, the so-called 'artisanal circuit' is a promising option.

There exists an enormous variety in modes of production, distribution and consumption of beef in Umbria. Different socio-economic circuits can be distinguished, characterized by specific relations between farmers, butchers and consumers and by specific notions of quality. One circuit that emerged from the research is the artisanal circuit. It is based on numerous small and medium-sized beef farms with a closed reproduction cycle, keeping the local Chianina breed and, last but not least, using traditional fodder produced on the farm. The beef produced on these farms finds its way directly to local butchers. Small farms (one to ten animals) constitute the bulk of the total (40 percent) and provide a substantial part (30 percent) of the beef commercialized by Umbrian butchers.

Artisanal farmers, against all expectations, turned out to be superior at the technical level (feed conversion factor etc.), whereas farms of the industrial type make profit through the sheer numbers of livestock. Related to numbers is an intensification of land use and a higher use of chemical inputs. In fact, large farms tend to economize on feed quality. Silomaize and industrial compound feed are used to force growth under condition of minimal care for the cattle.

Umbrian consumers almost unanimously consider beef from small farms to be produced more naturally and to be of high quality, even those who do not consume it. There is a lot of confusion on what quality criteria to apply, and how to ensure they are applied. Townsmen are sceptical about finding genuine beef. There is a growing interest from consumers for higher quality meat stimulated by negative experiences with respect to the so-called 'industrialized circuit' and with imported meat. The main defect, loss of water, points to forced fattening. The main concern is for genuineness.

So far the efforts of cattle farmers and butchers to offer a guaranteed product have not succeeded; the existing hallmarks in Umbria create more confusion than quality. Official aspects and image building receive more attention than accurate information about the production process, which is never specifically prescribed or taken as the starting point for information campaigns. The new consumer's interest for healthy meat of local origin (*carne nostrale*) could revitalize sizeable rural areas. The major part of the 'quality' market has been cornered by farms of the industrial type who just create the required image, not the meat. This will ultimately disappoint consumers and do damage to an emerging market. Encouragement of this emerging market could help to keep the 'green heart' of Umbria and to maintain employment and incomes in these areas. The industrial type of beef farming is a risky business and is at present in crisis because of negative market tendencies. It thus constitutes an unstable base for the regional economy. In addition, it has a negative impact on environment and landscape.

With Umbria's strong tourist attractions, products such as Chianina beef, and the pureness of its nature and landscape is an economically valuable long-term investment. Although the (small) artisanal farmers find themselves in a precarious income position at the moment, their earning capacity can be strengthened in several ways: They can reduce the distance to consumers by direct selling, thus realizing higher value-added; the large differences in income among artisanal farmers, which implies that with some adjustments (augmenting scale, augmenting the fertility of cows, diminishing labour input), income could be improved; within the artisanal circuit there exists – all along the chain – relatively good prospects for augmenting the price of the final product.

At the level of research centres, of agricultural extension and planning, a certain fatalism exists with regard to the artisanal circuit. The decline of production in this circuit is taken for granted or even thought desirable. The danger of a self-fulfilling prophecy is evident. Its strong points and its internal logic are not paid due attention. Many of the very small beef-producing farms will fold, no matter what, but on the other hand this could provide more opportunity for 'industrializing' farms to return to traditional feeding and to the local quality breed. We noticed an almost total absence of research on the relationship between type of feed, the system for keeping cattle, and type of breed, and the organoleptic characteristics of beef. More research is needed on the precise impact of various types of feed (barley, corn, beans, silomaize, compound feed etc.) on meat quality. Farmers and butchers leave no doubt about the relevance of this impact.

In the light of consumer ignorance on the impact of the production process on the quality of beef and on the merits of Chianina meat, an information campaign is needed, preferably managed by the (neutral) regional administration for rural development. In combination with this a regional law is needed, obliging butchers to inform consumers about the precise origin of their meat. The name of the farm and production characteristics, especially feed, breed and stabling should be specified.

The most far-reaching recommendation concerns the creation of a consortium for the production, transformation and distribution of beef produced in an 'artisanal' way. The consortium must seek rigorous control of fodder production (no herbicides or pesticides), on the types of feed allowed (cereals, grass, hey, corn, fodder beans), on the allowed breeds (Chianina and its F1 interbreeds), on slaughtering, conservation (minimum period to cool and harden) and on presentation (information to clients). The control of production will automatically stimulate production in the hilly and mountainous areas where for geographical reasons 'natural' cropping is feasible. The present regional policy aimed at concentration and uniformity of slaughter, must make way for local, specialized abattoirs. Associated butchers must limit their acquisition to a few fixed local farmers.

Consortium activities should start on a small scale so as not to make the same failure as its predecessors, with dependence on government help limited to initial assistance and to inspection of the associated farms, abattoirs and butchers' shops. The actual inspection of genuineness should be left to a consumer panel aided by private or university laboratories. Negotiations with the existing consortia, in particular the 5R, will be necessary to investigate the possibilities of integration.

The ultimate condition for the development of a market for high quality beef concerns agricultural policy, in particular at the level of the European Community. In our view, present price-oriented measures, based on the fiction of a free market, have to make way for a contingency approach. Only under the circumstances of fixed production quotas will it become profitable for farmers to point to the quality and particularity of their produce (price increase). A positive side-effect of such a policy will be a lower input of chemicals and energy (cost reduction). Both effects favour precisely those styles of farming which according to present standards appear as invalid. It will mean a rehabilitation of the endogenous knowledge of farming still widely diffused in Umbria. In the end the region can only benefit from such a development, both economically and culturally.

Notes

1 High-quality of course is a subjective term. Here it refers to those food products generally considered by the local population to be high-quality or typical.

2 The level of food self-sufficiency among the rural population is still very high. This guarantees the maintainance of food quality. Moreover, people in Umbria cherish their typical local products, which gain ever wider reputation. Examples are plenty: Castelluccio lentils, Colfiorito potatoes, Spoleto olive oil, Trevi celery, the white truffels of Gubbio, Bettona peas, Monteleone di Spoleto farro, the Sagrantino wine of Montefalco, etc.

3 Benvenuti uses the concept of TATE, Technological and Administrative Task Environment, to analyze the effects of external factors on agriculture and the consequent reactions of farmers to these limitations, and to the externalization of certain production processes and decisions.

4 We were assisted in the surveys by a research bureau managed by former students of the agricultural faculty of the Università degli Studi di Perugia, one of the few bureaus with the required experience in the field.

5 For the in-depth interviews with butchers, only those with a strong commitment to quality were sought, most of them adhering to a hallmark. This was done in order to guarantee a substantial discussion on the theme, not to obtain a representative picture of the average Umbrian butcher. Additional information on the commercialization of beef was gathered from informal discussions with regional wholesale dealers and from some sector experts. The addresses of the butchers selected for the representative 150 sample were obtained with the help of the regional Camera di Commercio. The thirty farmers participating in the in-depth interviews were contacted through agricultural extension agents of the Coldiretti (farmers union) and from the names provided by interviewed butchers. Here the main criteria for the selection of farmers was to cover as great as possible a range of different types of beef-cattle farmers. The addresses for the representative 150 sample were provided by the two provincial cattle farmer associations (APA: Associazione Provinciale Allevatori) and by the Regional Administration for Agricultural Development (ESAU: Ente di Sviluppo Agricolo Umbro). The stratified sample was based on the registered requests for the most common subsidies, being the most reliable and exhaustive source offering information on farm size, the reproduction cycle and on the breeds kept (i.e the stratification criteria).

6 The Coop supermarket chain acquires a proportion of its adult beef from cooperative stables in the region for political reasons.

7 The quota for the various categories were calculated using data from the general population census of 1981 (ISTAT 1982).

8 In the analysis of the 'styles of beef-cattle farming' in Umbria, for example, we distinguished four instead of two categories. As to the butchers, we can mention the existence of a small sub-category of about ten butchers who acquire all their beef from those small farmers typical of the first circuit, but who at the same time point to labour-intensive transformation of the meat into ready products, and for colpo d'occhio (good looks). They often also adhere to an official quality certification. For this shop-orientedness they would fall into the second circuit. On the consumer side the point is quite evident: people

sometimes buy beef at the supermarket along with their other shopping, but otherwise go to the local butcher.

9 Modern feeding is defined as the use of silomaize and industrial compound feed, whereas traditional feeding is defined as the exclusive use of lucerne, grass, barley, wheat, oats, corn, fodder beans, soya and mineral salts.

10 Farmer are often referred to as male; a small number of farms are managed by women. This should not obscure the fact that farmers' wives often do a substantial part of farm work and have their vote on deciding the organization of the farm, though they seldom manage external contacts.

11 In our view, farming is not the inevitable outcome of a set of prevailing geographical, political and economic circumstances. There is room for manoeuvre; that is, farmer choices shape different forms of farming, sometimes in unexpected ways.

12 The more so since Umbrian farmers are very aware of the indicated differences and quite often 'classify' the neighbouring farms in terms more or less congruent with the dimensions expressed in Figure 1.

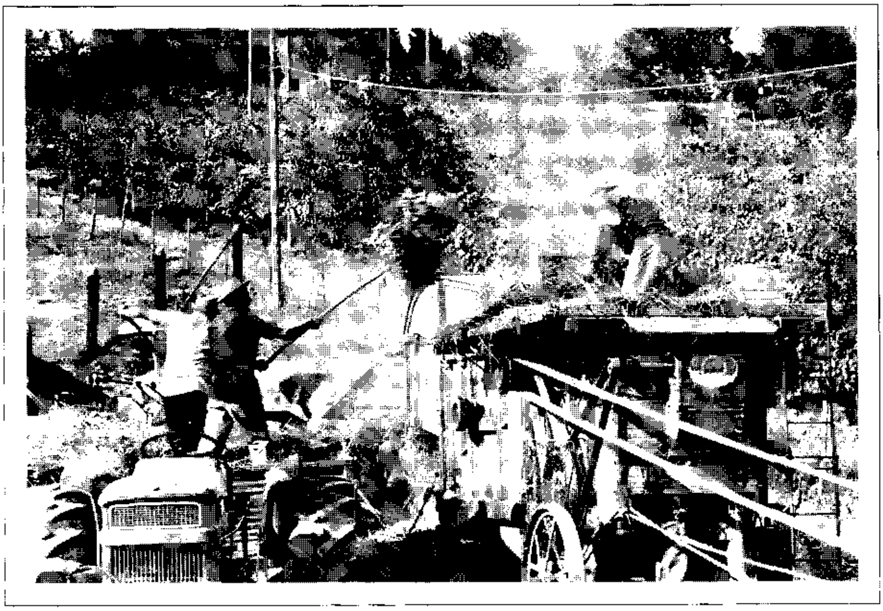
13 Since the number in the case of style 1 and 3 includes calves for fattening as well as cows, their meat-producing capacity is much lower than that of farms of style 2 or 4 with the same number of animals.

14 These 'inconsistencies' are in some measure due to the fact that opinions are always subject to many intricate considerations on the part of those interviewed, in deciding what answer to give. They are also due to the phenomenon of so-called 'implicit reasoning': some farmers may just not mention certain desirable quality aspects, such as taste and conservability, because for them they are implied in the production process or in the breed and are thus taken for granted. Farmers may mention instead those characteristics that leave much to be desired. To give just one example: large farmers (style 2 and 3) often mentioned 'fat infiltration' and 'good taste' as important quality parameters. A certain group of interviewed farmers and butchers showed themselves very aware of the fact that fat augments the (perceived) tastiness of food and that, at the same time, the consumer does not want visible fat.

15 Breeder's small and large farmers alike put extra animals up for sale in 1988 and 1989, when prices were good.

16 In the Netherlands veal is produced with the use of powdered milk. The calves are kept in small boxes where they cannot move, increasing their daily weight. Scandals about the use of clenbuterol, beta-blockers and anti-biotics regularly occur.

17 Small breeders are defined as those with fewer than ten animals, large breeders as those with fifty or more.



9 On the Relationship Between Central Regulation and the Potential for Local Initiatives: Some Reflections on the Growing Scope for More and Better Research

Bruno Benvenuti[1]

Invited to deliver a contribution on the relationship between central regulation and the potential for local initiatives, I commented to the organizers that this topic had been a focus for discussion under different guises in the social sciences throughout the post-war period. In fact, discussions about such themes as broad as centre-periphery relations; authoritarian versus democratic planning; dependency; cooperation amongst farmers as well as nations; social organizations as well as state organization, and a good many more fields of interest for a whole plurality of social disciplines seem to form a perennial hobby of our scientific fora.

As far as one can oversee the state of the art, it seems still far from having produced an uncontradictory body of knowledge. In fact, it is still one of the most elusive and ambiguous themes for current theories of democracy. I can hardly hope, therefore, to deliver here a clear-cut vision on the matter. Nevertheless, there is ample scope for drawing the attention of research workers to certain dimensions or aspects of the topic that have seemingly acquired a renewed relevance within the development trends of the last years.

Talking of Central Regulation, Free Market, Participation, Rationalization, the Economic System, Tailor-made Technology, 'Professional' Agriculture and Similar Jack-of-all-trades Concepts

Let me start by recalling three vicariously related facts. First, on top of existing theoretical insights, the very macroscopic historical experience of these last years of former 'Eastern Bloc' European countries shows concretely that, notwithstanding the amount of allegedly available power, central planning becomes increasingly difficult, counterproductive, and in the end utterly impossible because of the rapidly growing scale and complexity of the systems or processes in question. And hence (so the dominant story goes), at the theoretical level, even less than at a practical level, valid alternatives to the market economy system are still far from conceivable at present. And, to make the simplification even more incisive and easy-going, this said system is handily labelled as 'free market'.

Second, it is a sad acquisition that, in spite of a lot of good intentions, wishful thinking, and generous personal efforts on the side of whole squadrons of social scientists, technicians and animators in the field, so far most attempts at furthering autochthonous/endogenous/bottom-up local development have generally had a hard time surviving even for a while – let alone having the time to consolidate or further prosper as such. And because of this tendentiously steady negative outcome, scientists who uphold the current deterministic view that the legitimacy of any scientific concept, theory, world-view or procedure depends on its assessed capacity to function (to 'work'), tend to deny the legitimacy of socio-economic and socio-political theories based on concepts of the above sort. In the opinion of such scientists, it is far better to put the whole idea of autochthonous development out of one's head. But a second notion – that proves very hard to get into the heads of the addicts of positivism – is the tautological character of many feed-back mechanisms of the social construction of reality. And positivism fares quite well amongst the present technosciences (I will come back later to the social sciences).

Third, it takes little to conclude that the generalized failures to launch locally-based, self-sustaining development, are neither a random effect nor the result of unavoidable natural laws like gravitation or general relativity. However, the dominant socio-economic and socio-political paradigm shows, contemporarily, a truly curious and remarkable lack of interest in gaining a well underpinned knowledge of the cause of such near-to-systematic failure. In this regard, one can actually speak of the existence of a kind of 'black hole' of 'respectable' (canonical) scientific knowledge. One is then tempted to wonder whether this void of theory is in turn purely casual or whether it can be seen as some kind of selective affinity with the major practical developmental tendencies of western society (or as a theoretical co-variation thereof).

I will summarise my basic feelings regarding the above set of questions using three different considerations.

First, the three facts recounted above have so far manifested a clear functionality to the views presently dominant, at the politico-economic and technological level, in diffusing and imposing one market economy model, as well as one pattern of development. That is, even when the principle of the primacy of 'economic-expansion-at-all-costs' is mitigated in the public ideology by one or another smoke screen, at present the public legitimacy of an absolute priority assigned to economic expansion is still far from being successfully challenged by any opposing conception or theory of similar following (irrespective of the level of complexity or danger that this primacy might entail for present or future generations).

This implies that a teleology of 'the economic system' has come into being and is being actively supported by those who expect to reap the most comparative rewards from this expansionism (its 'high priests' speaking now of 'the need' to consolidate an 'advanced industrial system'). This system teleology can be distinguished by two basic traits: the image or notion of 'economic system' which inspires it is defined more effectively by those who favour the teleology than by its possible opponents; other, its nature has something of a new God-Moloch to which all must be sacrificed – just as the biblical Jehova could ask Abraham to kill his own son Isaac even against his deepest tribal ethics, so the 'high 'priests of this teleology also ask for legitimate independence from ethics.[2]

Second, as currently stamped into the public's head by an uninterrupted multimedia barrage, economic expansion 'needs' wide and constantly expanding economic spaces and divisions of labour, which, in turn, increasingly 'demand' coordination processes and structures, displacement of labour force, destruction of capital, of know-how and of nature, increasing R.&D. to the sacrifice of other investment goals – and still more. Consequently, the economic system, together with this expansionist view, 'requires' growing and increasingly specialised (read: fragmented) institutional and individual inputs. By the same token, such an economic system is forced to rely more and more on the formal dimensions of social relations, on formal institutions, formal definitions of roles, formal agreements and channels, formally defined economic spaces and – last but not least – whole arrays of ad-hoc, deliberately formalised scientific and professional knowledge. Of course, this is not to say that in such an economic system informal relations, informal arrangements and in general the informal dimensions of life have disappeared. But it is a fact that the increased role of science adds preponderantly to its formal dimensions and processes. And while most modern scientists seem to assume that this fact is a natural and necessary (in the sense of natural science) outcome of the situation, the imperative nature of the correlation in question is still far from being proved or even seriously examined. Yet such a kind of development is more and more consciously planned – a planning activity forming, directly or indirectly, the basis for the existence of growing armies of scientifically-trained personnel in widening numbers of disciplinary fields.

Third, while being theoretically incompatible with the practice of a centrally-planned, monolithic, economic order, this aggregate of formal systems and subsystems (system of systems) has actually replaced that practice in an official sense by a praxis of extensive social regulation of a softer form, with a concomitant blossoming of vertical flows of orders on a widening front of interactions and relations. More specifically, as far as the economic sphere of action is concerned, the free market of our textbooks has pervasively gone over into 'managed trade' within so-called Free Trade Areas, in which the techniques of large-scale enterprise planning emerge as a most effective form of coordination and structuration of inter-industrial relations.[3]

As far as farming is concerned, this organizational trend means that in the present development model the interests and goals of the firms and companies constituting the industrial pole of the agro-industrial system (a fast growing subsystem of the 'economic system) lie not only in the establishment of new sales markets and large distribution networks setting out explicitly their norms of functioning,[4] but also, in the parallel creation and diffusion of a so-called integrated agriculture[5] whereby industrial inputs and especially the newest technologies dictate the manner of farming. In fact, as such, the growing complexity of scientifically produced technological packages reveals an increasing 'definitory potential' (Benvenuti 1992) upon their adopters; also, in general, a new relationship in the agricultural sector is being developed which can be called increasingly prescriptive (Ruivenkamp 1992) both directly and indirectly. That is, in the development model represented predominantly by agro-industry, the former dialectic between central regulation and local potentialities or 'space for manoeuvre' has been transformed into a double-edged structuring principle: prevailing top-versus-down relations on the relational dimension, coupled with prevailing prescriptive-versus-servicing functions on the functional one. Hence, normatively speaking, a 'top-dog' perspective is gradually prevailing as the overarching logic in/of the 'agro-industrial system, which, again, seems to be considered as a kind of necessary condition for a 'professional' agriculture by growing numbers of agencies, opinion leaders, and even scientists of the sector. And, by a sleight of hand, a concept of professionalism is thereby imposed on farmers, which is the opposite of its orthodox meaning.

Where Do We Go From Here?

Thus we are back at the beginning of our story. The situation described so far is probably becoming increasingly familiar to most of us. But if we want to improve upon it, how concrete for the moment can the necessary indications be? And I wonder whether such indications can be found at all, if the quest for immediacy should make us bypass a series of important side-tracks, all of which eventually synerge, in my opinion, in the central theme.

To ease a discussion that threatens to become too burdensome it might be useful to take the cow by the horns and refer to an ideal situation:

> *'If political democracy means the right to participate in political decisions that affect us, economic democracy means the right to participate in economic decisions that affect us. And by economic democracy I mean.....not just veto power over technologies that someone else has already developed, but the right*

to participate in shaping the directions that science and technology take.' (Kloppenburg 1991: 482).

Not only is it obvious that such a situation does not exist at present, but if these conditions were reasonably met, there would not be much scope for discussing further our present topic. In fact, central regulation and potential for local initiative would have automatically reached some kind of 'optimal' equilibrium in a smoothly self-governed social aggregate.

In the meantime, the increasingly decisive role of R.& D. and of science at large in this lack of people's control upon the directions taken by the evolution of the socio-economic order, becomes every day more visible and documentable.[6] And since the impact of science on society keeps unquestionably growing, one may infer that the same also holds true for the relation between science and central regulation and the potential for local initiatives. Certainly there are also other factors in that play, but quite probably science will soon influence them too. Hence, the question 'which science?' is doomed to acquire an increasingly focal place in this discussion. That is to say, why it is that all scientific attempts to work out anything but vaguely in the line of a 'project' or 'proposal' for possibly attaining a more balanced relationship between central regulation and potential for local initiatives, cannot avoid paying growing systematic attention to what is conventionally called science. A step in that direction will be undertaken in the next section of this paper. Yet, let me deal immediately, by way of introduction, with a kind of 'perceptual trap' (disciplinary? paradigmatic? emotional? 'mass product'?, call it what you will) that is not uncommon these days in the social sciences at large.

Among those who object to the present techno- and power-centric view of social development, the principles of doing research 'with the people' and, later, 'by the people', are becoming popular – particularly amongst 'progressive', left-wing research workers, as if this were, beyond a necessary, also a sufficient condition to counter the development tendencies to which they object. For some 'schools of thought' it seems already almost a tenet for shunning or accepting colleagues; but I am afraid it is largely insufficient and most probably also dangerously illusory to think that this is all that there is to say and to do 'within' (I stress within) science for altering – not to speak of reversing – the present trend. Why illusory and why insufficient? Of course I am not saying that research 'with' and 'by' the people is not necessary and should not be done – quite the contrary! Only, if left at that, the expression simply becomes a slogan, a stereotype implying a superficial re-edition of a worn out old phobia: 'on the other side of the barrier' there exists the Big Powers' Plot; and all one needs do is...undo the damn thing. Unfortunately, things are somewhat more complicated than that.

Why then insufficient? On the one hand it is true that, for example, the present non-conventional, non-sustainable, non-regenerative, high-inputs and homogeneous agriculture is in fact the product of the diffusion and generalization, at both individual and collective level, of standard organizational models, standard technology, standard procedures for action, and standard know-hows allegedly 'required' by the Fordist view inherent in the dominant 'system 'teleology. And it is also true that the 'malleability' of society is inversely proportional to its scale – which means that, particularly at the local level, the number of negative results originated elsewhere is, on the contrary, directly proportional to this scale. And could, by any chance, our predominant research style be one of the factors contributing somehow to this state of affairs? Scientists who object to the latter should ask themselves – to begin with – how come that the majority (there is no doubt about that) of their research colleagues not only collaborate in good faith with this massive and multi-level standardization effect but, beyond that, quite often do not even perceive the potential for development inherent, in principle, in heterogeneity as such. Or, even worse, do not perceive heterogeneity at all, are in fact annoyed when they happen to discover its existence, and do not see much that is worthwhile in specificity. Here there is probably something not well 'digested' in their scientific nutrition: for striving to increase the 'general' validity of knowledge is one thing, and seeking to impose 'universality in the ontological construction of society is a completely different matter.

For, in fact, how many well-intentioned, self-perceived and self-labelled liberal, left-wing, or even 'progressive' scientists practice, knowingly or not, a reductionist science? I am afraid that the answer would be deceptively high. And, under such conditions, even doing research 'with' or 'by' the people at best will remain a rearguard fight. Or else the result ends in another kind of system teleology - with its 'high 'priests and its watchdogs. But then, if we suspect that this would be the outcome, the discussion needs to make a qualitative leap. From the level of good intentions and social labelling, it must be lifted to that of the scientific conception consciously or unconsciously *de facto* adhered to. For it is clear that, if the global outcome of the present standard scientific exercise is the strangling of local potentialities, then in order to avoid it we must begin to have at our disposal a better, fuller and less unilateral science.

Yet I am convinced that, even then, we would not have reached the necessary and sufficient conditions. It must be stressed that there are certainly at least two more dimensions that play a decisive role for the present topic: two dimensions that in the short run might even emerge as more difficult to correct than a scientific personal conception and a scientific paradigm – and these must be reckoned with. The first of these pertains to the moral order, and therefore it concerns primarily the people themselves to whom we ought to relate our research endeavours. In fact, in order to be reproduced and give the expected results on a significant scale, the present spread of standardization and homogenization processes must be accepted in the end by the involved actors/producers at large.

And the hypothesis does not seem too far-fetched that the bulk of our farmers, rural artisans, and other actors performing the gamut of specialised professional roles that constitute the TATE, or Technological-Administrative Task Environment of the farm enterprise (Benvenuti: 1984; 1987; 1989; Benvenuti and Mommaas 1981; Benvenuti *et al.* 1992), generally speaking, perceive the ongoing multi-level standardization and homogenization of their internal-farm reality as an effective, visible and rational means to maximise the economic utility of their own professional activity – whereby this utility is intended 'uniquely' or predominantly in a strictly monetary, short-term sense. And while this hypothesis can easily be falsified in individual empirical cases, there still can be little doubt that at the public, 'cultural' level of the economic sector, this multi-level standardization and homogenization process (of the use of technology, organizational patterns, calculation procedures and professional know-how) is currently proposed as a matter of fact; and that – whenever emerging as 'necessary' – its imposition on the agricultural producer is legitimated as a convenient recipe for obtaining a higher 'day after' output of monetary utility. Such a structural-functional mechanism is presently at work in every technological sector of 'professionalised' farm management - from animal feeding to fruit sorting; from automated management to insurance practices.

Therefore, I am afraid that until the concept of utility broadens enough to include also other dimensions of our global reality, the fact of standardization and homogenization as such will substantially maintain its present rationale and its tendentiously expansionist and totalitarian character.[7] Here lies therefore a second field of action for any moral movement supporting the cause of locally-based forms of development and well-being.

The other, and third strategic dimension, in my opinion, has an explicitly political (politico-economic; politico-institutional) character. For, even should the two former dimensions be sufficiently attained in principle, they could scarcely be expected to yield sufficient help to the a-priori increase of potential for local initiative if their politico-economic context is still that of the 'free' (read: vertically managed) trade areas we know presently throughout the world.

What are the potentialities for local development? On paper the answer appears decisively easy: Since we presently live in these Free Trade Areas and in 'free' markets strongly regulated by the planning activities of (coalitions of) commercial companies, the expression 'potentialities for local development' can abstractly indicate two opposed ideal typical situations (let us not consider in-between cases for charity's sake). First, you may have enough local availability of products and/or of factors of production exactly 'fitting' the plans of the companies qualitatively and quantitatively, which is, in fact, the meaning attached to the idea of 'local potentialities' by the system's top-dogs. But, in a turbulent world, company plans can change almost overnight; or they can imply extreme subordination for local decision making; or extremely low remuneration for local labour and other production factors; or, such plans can imply that the companies concerned are interested only in a minimal fraction of the local potentiality, so that – at best – the result would be a strongly unilateral growth. I need not dwell on this example. And I would not even mention it were it not that it serves to clarify how also the expression 'potential for local initiatives' can be – and currently is – transformed into a jack-of-all-trades concept. Once again, this presupposes an alertness for taken-for-granted definitional and epistemological questions by those who try, practically, to tackle our type of problems.

Then you have the second, opposite situation: i.e. there exists locally a given aggregate of products and/or production factors that must be utilized to their best for the present and future local population. What really needs developing in this case, is first of all sufficient, sufficiently skilled, and sufficiently non-canonical research about the way(s) to do so. For, if science today is capable of shipping people into and around the cosmos; of filtering cosmic rays and splitting or fusing atoms deep under mountains in giant laboratories; of grafting animal organs into humans and even creating so far non-existant living nature, it can surely find the way to utilise rationally, and to its best, almost any chance aggregate of productive factors. However, it takes little reflection to conclude that if this first condition were satisfactorily met, one would also have to build and guarantee a purposeful institutional apparatus in order to ensure sufficiently the practical realization, locally or regionally, of what the research programmes might have indicated as feasible. In other words, one would have to conceive and pursue an outspoken institutional policy to let the new local productive arrangements – 'misfitting' in the pre-existing politico-economic order – consolidate and gain enough economic space, even if this might imply running counter to the common official policy of the day.

The possible applications at the different levels and sectors of local well-being are doubtless all but negligible. Within the agricultural sector one of the simplest possible provisions could, for example, consist of renting out land in selected areas to farm tenants at reduced rents, with clauses in their agreements for 'well-crafted land', thereby formally acknowledging that well-crafted land can be obtained differently in different localities and regions of the same country;[8] and that the art of 'well--crafting' the land, together with the variations therein, constitute one of the political options on which to base the development of local potential. However, this simple recognition implies having an eye for 'well-crafting' the land, acquiring or developing the knowledge, insights and technology specific to the case, being ready to honour it and operate in such a way as to prevent it from being torn apart and 'homogenized' by the steam-roller effect of the dominant technological-organizational model.

Many of us agree on the need to develop 'ad hoc' research programmes for this specific aspect of the problem. Where I am less convinced, is that this simple recognition is no guarantee against ritualized 'fact finding', paradigmatic blinkers, and methodological sterilization; against the specific or, on the contrary, the hypostatization of an atomistic view on social life, all of which can rely on a solid tradition within the canonical subdisciplines applied to rural life.

And What About Science?

The preceding pages have already touched upon some of the real or possible roles of science-based technology, R.&D., and of science in general. Meanwhile the discussion has reached a sensible tempo elsewhere. The Science Studies Unit of the University of Edinborough, U.K., and the related Social Studies of Science Journal, are focused systematically on it. Also professional rural sociologists are, of late, getting into motion with essays (e.g. Marglin 1991) and lively debates in Rural Sociology, such as the one between Jack Kloppenburg Jr. and Molnar *et al.* and Flora (Rural Sociology, Spring, 1992). Á propos the new biotechnologies, Kloppenburg wonders whether:

> '*the companies and the Universities and the scientists and the technocrats who have given us a conventional agriculture that is non-sustainable, non-regenerative, high input and homogeneous now use biotechnology to give us an agriculture that is alternative, sustainable, regenerative, low input and diversified?*' (Kloppenburg 1991).

Having answered negatively his own question (because the companies cannot subsist without wanting to expand their sales of pesticides, fertilizers, licensed technological innovations etc., to farmers) that author embraces wholeheartedly the idea of finding the remedy in doing research 'with the people'. And when Molnar *et al.* cry out outraged that 'there is only one science' (Molnar *et al.* 1992), he answers with equilibrium that (synthesizing the basic features of his position): a) his stance does not imply that existing science does not produce useful and workable knowledge; b) the problem is not that scientific and technical truths are relative, but that they are partial; c) that in the stance of his opponents, real agency is denied to anyone but scientists; that d) sensitivity to local conditions is precisely what existing science is epistemologically and structurally predisposed to neglect; and finally that e) there are multiple ways of knowing the world, and we need to embrace the full range of potentials contained in that diversity (Kloppenburg Jr. 1992).

However, no matter how firmly I agree with such conclusions, I find that the discussion has left out substantial aspects of the problematic. For it is the process itself of diffuse, steady 'scientification' of society and its visible relations with the dominant development pattern, that emerge per se as an increasingly central matter for reflection within the context of the present topic. For instance, when Kloppenburg opens his statement by acknowledging that 'scientific rationality has achieved *de facto* status as the modern epistemic hegemon, the standard against which all other knowledge claims are compared' (1992) he omits to clarify whether he objects to this state of affairs because he finds this scientific rationality at present too narrow and hence reductionistic (the position I hold), or whether he thinks that all possible sorts of knowledge are, as it were, 'equal'. All the same, after having assessed that 'in many places the constitution and character of existing science are being challenged as people come to recognize that the dominant mode of knowledge production does not necessarily serve their interests or meet their needs', at the end of the same article, in answer to Flora, he attributes this effect to the hypothesis that 'existing science is bound to capitalism ideologically, epistemologically, and financially'. I would qualify this conclusion as too hasty (see the 'heaven' formed by the countries of scientifically realised socialism up to some years ago). But it seems true that, as I register elsewhere in this paper, the presently dominant scientific styles are as yet inspired by profit and power and that this explains at least a good deal of their unmistakable reductionism.

Science has long since ceased to pretend to be the source of wisdom and has become an instrument and a common component of our daily life. But what has thereby been gained in terms of quantitative normality might have been traded-off in terms of quality of life or in other terms.[9] Speaking of the quality of science, among the new scarcities that our 'scientified' world might so light-heartedly be creating, could be the intellectual and methodological bases of our college graduates. For example, one of my frequently recurring impressions is that within the mass-produce of scientifically formed personnel and research workers, there grows alarmingly a share who remain totally unaware that they are actually reducing themselves passively to the role of blind instruments of external goals. And it is obvious that the growing impact of 'scientifically-based' interventions by such personnel does not promise a very rosy future for mankind.

In order to safely start with the following reflections, I can happily refer to a very significant case with which most of us are already institutionally acquainted, Dutch agriculture. All I need to do is to 'unearth', more or less pedantically some significant questions that – as it were – lie behind it. In spite of the growing impact of modern technosciences, the art of the locality is a phenomenon that has not yet disappeared completely in most parts of rural Europe. The usual technocratic interpretation of this phenomenon – if and when at all perceived – is in terms of 'deviation' from the norm, and its causes are sought in taken-for-granted resistance to change, lack of adequate know-how and information, survivals from the past, and similar low-level 'scientific' explanations. Quite different conclusions are to be drawn instead, if one realizes that technology shares many typical traits with language(s). Thus, an art of the locality reveals itself as a kind of technico-professional 'logic' or epistemology deriving from an active group life – a product available, in its turn, for exerting a sensate function on the social production of local specificities (but not necessarily a mere re-production of the old). There can be little doubt that among contemporary European farming systems, Dutch agro-industry is probably the one that has been the most deeply and longest exposed to a so-called process of rationalization – an expression implying *de facto* not much more than a quick technological, structural, and organizational change guided along extensive and deliberate steps in a process of homogenization, standardization and formalization of various levels of the social organization of the sector according to a logic of profit and power – all of which are safely rooted in and legitimated by scientific research (of different kinds). Nevertheless, extensive, empirical sociological research carried out in the last years has revealed even in such a 'streamlined' setting:

a the existence of statistically significant differentiation in farm management styles within the same production branch as well as within the same external natural and institutional setting;
b that for each management style, the farmers concerned actively and deliberately pursue, produce and reproduce the same (style), according to a specific rationale which functions as a structuring principle;
c that the endeavours of agronomic R.&D. and other applied sciences and all the associated effects of standardization and formalization as the norm, match quite preferentially a select group of farms labelled as 'vanguard' by State policy;
d that managers pursuing other styles must compensate for the comparative lack of scientifically produced and tested technological and organizational recipes and insights, with their own personal inventiveness and their own professional experience and high-quality craftsmanship (van der Ploeg 1990; van der Ploeg *et al.* 1990; 1991a; 1991b; 1991c; 1992a; 1992b).

In my opinion this proves how active and fertile local agrarian professional epistemologies can be if they can prosper in spite of the contrary influence of a heavy scientifically 'rationalized' agricultural sector. In fact, reductionist science and its products tend to operate as steam rollers over local farm styles/epistemologies; and it takes deliberately pursued craftsmanship to resist such an influence.

It is worth stressing that the Dutch agro-industrial system is certainly one of the most 'research trodden' farming systems in the world – yet trodden by a research style that has been remarkably blind and/or idiosyncratic, since the above results have come, by and large, as an unexpected surprise to the official Dutch research establishment. It might not be superfluous to stress that the difference is due to the fact that the research programme of van der Ploeg *et al.* is focussed on epistemic diversity (on purposely assessing and bringing it explicitly to the fore) – a preoccupation thoroughly absent from the standard agronomic research of the country. (Let me note en passant how infinitely more nuanced should be the authoritarian positivistic slogan 'there is only one science', which could eventually become true only if you duly enlarge the concept of science itself).

The strategic importance of the above research results cannot be underestimated. Taken as such, they indicate that – except for situations of overt political compulsion – an adequately developed individual craftsmanship emerges as an instrument capable of defeating almost any sort of socially sponsored, would-be technological determinism. But there is also a further sense in which their importance remains central for the present topic. Namely, as a first hand reaction, one might be tempted to conclude that analogous situations should theoretically be as frequent – if not more frequent – in other European countries where agronomic research, information services, and the professional education of farmers and technicians are, or have been, far less systematically developed than in the Netherlands. However, I wonder whether at the moment such a conclusion would not be premature and even tricky. The research results in question might also contemporarily express the influence of a specific set of situational variables, namely of factors such as the solid foundation of Dutch representative democracy and the altogether reduced force of paternalism and authoritarianism – implying a cultural tradition of the legitimacy to dissent when 'well intended self-interests' seem to be at stake; thus, the presence of wider possibilities for concretizing a range (or a larger range) of technical and organizational alternatives, favouring a re-evaluation and a re-appropriation of (consistent shares of) local knowledge by the modal farmer in face of the standard proposals issued by the national techno-structure. For most of the peripheral rural regions of Europe such a set of situational conditions might be less pregnant, both on the historical and on the cultural dimension. That is to say that the chances for a profitable utilization of the art of the locality may not result from deterministic technological 'machinery'. Local conditions of the civic society can also lead with different intensity to the said re-appropriation of dormant local knowledge, in spite of the newest waves of disciplining the professional activity of farmers on the basis of a 'blend' of power and new scientific and technological instruments. But of course, even then, our problems with science would be far from finished.

In the last years the number of requests to the techno-sciences for an increase of 'tailor-made' technological production has grown substantially, thereby giving the impression that if only enough scientists would willingly give more attention and research time to this issue, the present, unlucky shortage, in technological and cognitive terms, would automatically be dealt with for a good many farms. As I hope I have convincingly argued, this expectation is doomed to prove a deceiving simplification of facts. There is more at stake than simple personal goodwill in executing one's everyday scientific work. In the end, formalizing concepts, theories, instruments, procedures, relations, etc. means deciding that certain aspects and dimensions of a given phenomenon are more relevant than others for attaining the desired results or tasks. And on the basis of this simple consideration one can arrive at some interesting insights:

1 Most formalizations (concepts, formulae, algorithms, etc.) of common daily application within any scientific discipline are a matter of routine, whereas questions as to the reason and origin of the formalization in question remain safely tucked away in the background.
2 Scrupulous and competent scientists should be permanently aware that most technological products, formal theories, concepts and formalised analytical and action-procedures are in fact tailor-made for the goals and the policies of the top levels of the agro-industrial system; and that, by the same token, they come as 'ready made' or 'wholesale' products to the lower levels. Yet even more decisive is the fact that once a given formalised 'solution' (formula, model, technology, procedure, etc.) has been standardized and institutionalized, it is currently sold to/imposed on a large clientele, as being capable of also obtaining practical effects for which it was not originally intended. Computerized farm technology is a good case in point. Then, on top of all this, comes the fact that the newest technological packages show a remarkable tendency to augment the 'definitory effects' they have on the conduct and/or the factual situation of their users (Benvenuti 1992).[10] Competently trained technical and scientific personnel should constantly be aware of such practical effects.
3 Then, a special sub-category of the former type of problems is the role that the mathematization and algorithmization of science seems to play in the present tendency towards an accrued (algorithmic) 'compressibility' of the empirical world (Barrow 1990). And while I do not pretend to imply that such scientifically obtained 'compressions' are always synonymous with theoretical or methodological reductionism, the fact remains that they can easily fall into the category of a true scientific and scientifically-aided socio-political blend of reductionism (for further considerations about reductionist scientific exercise and local epistemologies see Appendix I from point three onwards). In other words, in producing tailor-made solutions to problems at the top levels of the social system, scientific reductionism is instrumental in bypassing and hampering the existence and value of empirical variety.

And now comes the tricky point, about which any decent research worker should be keenly aware: In itself reductionism need not be the outcome of using formalised logic as such in scientific research. First, because there exists more than one type of logic. Second, because there exist also different ways to formalise probably any of them so as to avoid the production of 'compression'. Current examples of this can be found in so-called traditional cultures like the Hanonòo of the Philippines (Benvenuti 1991). And third, because formal logic as such does not compress anything. It is the human mind which decides whether or not, when, and what part of the sensible world to 'compress', employing logic as an instrument.[11] And even in this last case the result of the scientific enterprise need not yet be compression in the usual sense of the word, if the result obtained is, instead, a higher explanatory capacity of a theory or concept, a deeper insight into and/or a better adherence to reality, etc.

This is already enough to maintain that reductionism can be said to result from extensively practised bad science, in the sense of the use of standard formal logic in scientific research:

1 being applied to the study of certain objects or themes in such a way as to actually prevent other objects and themes thereby connected in the local epistemology from appearing at all in the perceptual field of the research worker;
2 occurring more according to the definitions set by some agencies with 'de 'facto or potentially higher influence than other agencies; whereby
3 choices pertaining rightfully to the realm of political discourse, being transformed into seemingly technical choices substracted from the voice of the actors concerned (a nice technique for having the latter grow increasingly 'peripheral'/powerless).

And, of course, the erasing of local epistemologies is most deeply connected – be it not wholly – with a 'scientific' exercise of this sort. In short, this is a question touching upon the very epistemological basis, conceptions and methods of science, hence trespassing the conventional boundaries between 'fundamental' and 'applied' or 'instrumental' scientific research. Nevertheless, at the practical level of everyday life, the consequences are macroscopic, because it is there that questions of funding, job security, career and prestige exercise a deep influence – often spurious – on the type and nature of research programmes, where 'research' is increasingly employed by the decision-makers as a useful coverage and legitimator for choices already taken, or to be taken anyway on other grounds.

Some Minimal Conclusions

It is quite true that more and better scientific research would not suffice in itself to solve the relationship between central regulation and the potential for local initiatives. However, it is also clear that 'bad science' as defined above means that a good many social actors (individual as well as collective, in the periphery as well as in the centre) remain deprived of primary cognitive and material instruments necessary to reach the goals they might otherwise set themselves. And local specificities are thereby exposed to the danger of erosion. So are local professional symbolisms and epistemologies.

Hence – far from listening to the anti-science mermaid – more and better scientific research can be instrumental in changing both centre and periphery, i.e. more and better scientific research that adheres more fully to existing felt needs. By more and better scientific research (or scientific exercise altogether) I mean research that takes as its disciplinary perspective the pluri-dimensionality and global character of peoples' existence and related exigencies. Let us call it the perspective of the quality of life in order better to assess (discover or even re-invent, if needed) the correct role pertaining to politics, science and technology in the social construction and safeguard of this quality. For reasons of semantic erosion I would object to calling such an approach 'holistic' or 'constructionist' (Bunge 1991). However, more than the label, what matters is a systematic perspective guaranteeing that the double-edged problem of freedom and responsibility of the actors concerned does not vanish in the juggler's hat of some technological 'packaging' or, worse, in that of some research technique. For it is high time to admit that the exercise of Reason (with a capital R) consists in having different forms of rationality cooperate according to the principle that none of them should play a dominating, imperialistic role. A third point of relevance is the too narrow significance presently attached to the concept of economic utility by the dominant, economistic expansionist ideology.

Then, most probably, special institutional arrangements need to be provided for new, 'deviant' types of local initiative. In fact, opposed to the present conception aimed at the 'colonization' and intensive exploitation of natural resources ending in short-term economic expansion, there would have to be a pattern based on different implications, a pattern which, in my opinion:

- favours long-term investments, discarding the principle of pursuing maximal profit in the shortest possible time;
- accepts the conservation principle, favouring the recycling and the intelligent usage of primary and renewable resources;
- supports professional conduct aimed at sparing and utilizing local resources.

In other words, a new kind of 'social contract/covenant' needs to come into being, i.e. a covenant which explicitly concerns the relationship between development and habitat. It seems to me that these simple facts should be enough to show the sort and level of the intellectual demands that must be met successfully by those who endeavour to improve the potential for local initiatives. One needs also to stress the good old sociological insight that a paramount task of every new movement consists of creating its own well-furnished nurseries of new members. In this context I feel that more and special attention should be turned to the agencies of agronomic research and instruction. In fact, their present scientific status of whole or semi-intellectual ghettos renders them generally dominated by an old-positivistic conception of science which is impermeable to the possibility of admitting/perceiving any cognitive dissonance. However, it is also true that such agencies potentially enjoy the best opportunity to perceive the steadily changing relationship between man and nature, and to perceive the need to pass from an exploitative to a cooperative type of relationship with nature. Quite probably this is one of the few fields of interest that can be seen as a kind of 'door' or bridge to allow new waters to stream into the old scientific bedplate of such agencies.

Finally, having stressed the need to improve the professional level of scientific research personnel, one has to admit that, in principle, this need also holds for administrative and political roles. In fact, de-centralization often transfers a great share of the most/more complex problems to the lower levels of official competence and keeps them accumulating there. Then, low-level local officers soon feel the temptation to call in the help of the centre, when one might expect a new round of the uprooting spiral to set in.

(For further discussion on scientific reductionism see Appendix I).

Notes

1 The opinions expressed in this document are solely the responsibility of its author. The latter is grateful to Drs. R. Agelink of Amsterdam University and to Dr. M. Miele and Dr. G.L. Brunori of Pisa University for their comments on a previous draft of the paper.

2 Which means that 'The Economic System' – with its 'advanced' variants and corresponding economistic ideology – has emerged as a kind of vulgar secular religion, propounding the ethical autonomy of 'the' economic dimension of life from the wider spectrum of other moral dimensions constitutive of a given social context (as well as from the still wider gamut of existing social contexts. In this sense Marxian ideology has the same function). E.g. on the occasion of his recent proposal for the constitution of a great North American Free Trade Area, President Bush decided that: 'the principal challenge facing the U.S.A. now is the competition in a global market that changes and expands rapidly' (Corriere della Sera, AUG. 13,1992, my translation). That is, a 'free' trade area strongly expansionist towards the exterior, thanks to ad hoc institutional means, and strongly protectionist towards the internal market due to a corresponding set of institutional measures.

3 The most developed planning form emerges with the diffusion of so called Long Range Planning as an instrument which 'does not limit itself to extrapolating the future from existing trends, but to developing conceptual instruments, such as the life-cycle of the product, the curve of experience and the hypothesis of profitability and cash flow from the range derived from the portfolio analysis.' (Di Benedetto, Rullani, 1990, quoted in Sodano, 1992, my own free translation).
Summarising a rather plethora of literature on the theory, metatheory and philosophy of the State, it must be noted that, generally speaking, central regulation is mostly seen/discussed in connection with a formal/jural notion of the State. However, in our complex societies, the share of such a State in the 'total amount' of existing collective regulation obtained in/by the societal body decreases sharply compared to the regulation obtained by the power strategies applied by a constantly growing number of other collective actors.

4 Whereby we are visibly sailing towards a (potential) suppression of particularities of time and place in both agriculture and diet, because the continuous expansion of sales 'requires', in its turn, an increase in distance as well as in durability of the allocated goods.

5 Which for the same money could also be called 'disintegrated', 'destructured' or 'uprooted' as well.

6 Which is the reason why, at this point, public discussion on the role of science and technology usually develops along two preferred paths: the ritual left-wing accusation of 'the standard view of science' revealing less and less ashamedly its ideological, epistemological, and financial bondage to 'capitalism' (recently integrated with 'State capitalism'); and the more sober admission that the situation is due to the fact that in the last two centuries the main spring coaching and shaping the process of technological development has incontestably been the old logic of profit and power. No matter how I might sympathise with either position, the ritual itself of this kind of discussion frequently hinders a view on, and an understanding of, other relevant dimensions of the problem, both external and internal to scientific practice.

7 Assumed as a structuring principle, economic utility, in a narrow sense, soon becomes a calculus of the 'scientifically anchored' economism that labels as 'disorder' or 'irrationality' all structuration of reality carried out according to another rationale. E.g. this is quite clear in the recurrent campaigns for the 'modernisation' and/or 'rationalization' of farming seen from the (economic utility of) agro-industry. However, reason – the rationality criteria – is an historical product, which evolves during/because of the very process of the social construction of (at least a very substantial part of) reality. According to the classical utility notion as theorized by such authors as Jevons in G.B., Walras in France/Switzerland and Pareto in Italy/Switzerland, economic utility expresses a point of balance in the rates of exchange between the desired good or service and the good or service to be delivered in exchange for it. Hence, in that model, economic utility tends to decrease with the growing availability of the desired good or service. However, even in this sense – referring to a mechanistic and 'instant' type of market – the concept has been amply falsified by our 'managed' markets. And, apart from that, if intended in a narrow monetary sense, 'economic' utility tends to frequently increase, or to render its object more desired when the amount of money connected with its disposal grows, an effect which 'legitimizes' sacrificing other dimensions of individual and collective life.

8 The concept itself of well-crafted, together with its specific ways and means, belongs to local farm-professional epistemology. The example – one in a thousand possible – therefore lends itself to instructive reflections. In fact, there exists already within the EC an incipient special regulation in favour of 'typical' and 'quality' products, which would seem coherent with the goal exposed in the text. However, contemporarily there exists a problem with the definition of such concepts. Or, more accurately, the problem is that of establishing the legitimate bases for those definitions. Should such bases finally be found in/allocated to the sort of criteria and knowledge employed by the food industry, the sense of such a concept could be miles apart from that existing in the art of the locality.

9 The fact is that it becomes increasingly difficult and illegitimate to speak of science as a unitarian phenomenon. E.g. for certain purposes it is certainly theoretically rewarding to make a distinction between science - research - scientific institutional settings and apparatuses – types and aggregates of knowledge – and types and aggregates of technology. Yet on the other hand, each of these categories in turn increasingly influences the others, so that 'science' can still be said to be a specific complex of social productions. And we have just seen, there are scientists who hold that there is only one science.

10 Which means that – even apart from the capacity to put forward more adequate, less biased proposals - in theory a substantial share of the additional research input (1/3, 1/2, 3/4, 9/10?) would actually have to be invested in unmasking and undoing such manipulatory effects for the interested local actors.

11 To give just a very current example: in the usage of algorithms the possible compressions of the world do not stem from the abstract fact of using this technique as such, but rather from the decision to apply it improperly (when it cannot be applied); from what part of reality one has left out of it; how the different elements composing the algorithm are defined and for what use; whether the results yielded by its application are intended in a prescriptive way or as a means to propose or elucidate possible options; etc.

APPENDIX I

Some Reflections about Scientific Reductionism and the Agrarian Question

The text of my paper expresses the opinion that the number of self-perceived and self-labelled 'progressive' scientists practising reductionism is probably quite deceptively high. I am aware that this formulation might sound irritating to those who – having never even thought of such a possibility in connection with themselves – prefer to skip over the epistemological level of their own disciplinary practice altogether. But a sore truth is that reductionism is not monopolised by the conscious partisans of a 'top-dog' perspective (be it of a right- or left-wing type). For example, this applies quite visibly to the die-hard structuralists and canonical Leninists among the various shades of Marxian social thought. However, in their case, I am not implying any strict causal bond between the two – on this occasion the correspondence is most probably due to reductionism automatically suiting better all dogmatic and technocratic thinking. But it is not limited to such thinking; and here the discourse should decidedly acquire more nuance. Being mostly associated with a 'constructionist' conception of science, reductionism is for example, frequently recognizable among well intentioned extensionists, 'change agents', communicators, rural animators and rural leaders motivated to move the local situation 'ahead'.

No matter how important the theme of reductionism may be, and how almost collateral with the topic of the paper, it remains impossible to see the two as identical, 'reducing' thus the one to the other. However, long experience shows me that the fear of applied scientists to engage in 'abstract', 'theoretical' (or worse: 'philosophical') problems often renders them unexpected – unknowing but not innocent – collaborators of the social forces (that they see) oppressing or curtailing those in whose favour they believe themselves to be operating. The various western institutions for International Cooperation actually thrive on this sort of 'halved' scientist.

I think it fair to say that – at least at an applied level of professional activity – the present techno-sciences are not primarily interested in 'explaining' deeds and situations of the phenomenological world. Their endeavour, instead, is primarily to construct new realities. Therefore the technocrat – be she/he a natural or a social scientist in a disciplinary sense – is only as an exception interested in explaining local specificities with their possible variations and/or in understanding their nature and reason. They do not have enough of an eye for the 'whys' of such things. And the explanations they give of the same are mostly of a well known stereotypical sort. Generally these come down to remnants of past historical situations, or 'deviations' from scientifically-based or constructed models.

The practice of employing models in scientific work has also become, of late, more and more general in the social sciences. In the most pronounced positivistically influenced cases of scientific constructionism, the scientist faces the situation or object of study as either 'fitting' or as 'not fitting' the model - there being no third possibility in this procedure. And this amounts to a first reductive step. A second step in the same direction is taken (albeit indirectly) whenever a case under study 'fits' the model and is – 'therefore' – automatically also perceived of /declared to be 'rational', while the opposite case is deemed to be, 'hence', non-rational. However, the empirical world is entirely a blend of forms (some 'pure', some less so), transitions amongst forms, nuances, adaptations, etc. And who decrees what is 'pure'? Of course the scientist's model.

So far so good, for there is no other way to solve the task of perception. But the problems begin at this point. In fact the (modern) scientist's model is likely to be based on formal reasons. Yet in itself the formal reason is no longer interested in the specificity of the object as such: it is a form without content, and a mechanism without a programme. The functioning of contentless Reason cannot teach us the significance of a truly rational activity (Granger 1967). A few significant problems related to this methodological state of affairs can be synthesized as follows:

1 The growing production of a techno-scientific output following a 'verification' (i.e. the materializing of something that thus far had existed, if at all, only in the form of a possible blueprint) of purely formal-instrumental models of thought, may increase the number of new objects made available to mankind; but it says nothing about the rationality as such of the construct or of the activity in question;

2 Today, most scientific disciplines show a strong tendency (develop strong internal pressures) to extend the formalization process to the whole of their disciplinary body. However, through this formalistic illusion or epidemic, the concerned scientist hypostatizes self-constructed structures, forgets the operations through which such structures came into being, and comes therefore to a deformation of human reality.

So much for the first and the second reductionist steps. But there are more steps possible, because reductionism is not inherent in the use *per se* of models, but in the way of going about these.

3 In fact, in the domain of human facts, structures, settings, etc., there exist local epistemologies. Scientifically constructed models can be employed in order to express, chart and make explicit such different epistemologies (or alternatively, their most significant reciprocal differences, etc.). This happens when the (sensitive and skilled) research worker endeavours to maximise the 'fidelity' of his model vis-à-vis the object of study in order to obtain a 'respectful description' of the situation. Another non-reductionist usage of models is obtained when this technique is employed, for example, to amplify the number of possible options accessible to actors of a given local epistemology.

But today, scientific models are actually mostly not used to perceive – let alone respect – local universes of meaning. They serve, on the contrary, to bypass, force, correct, and change these local universes of meaning so as to have them substituted by heterogenous and heteronomous 'projections' of something (whereby the concept of 'descriptive model' too can be reduced to a Jack-of-all-trades instrument).

4 Such a third reductionism is almost immediately followed by a fourth and more subtle one. In fact, the first type of model (the orthodox descriptive sort), in as far as it is meant to be a faithful reproduction of something, becomes an instrument of knowledge and insight for the actors concerned, as well as for possible third parties, in the same way a Frans Hals' portrait or an old Dutch landscape by Hobbema are also a source of insight into the nature of the object portrait. However, the second type of model does not intend so much to further knowledge about its own object of attention, but rather 'to do' something, to begin with – a something which the model proposes, not necessarily through a

parallel furnishing of adequate instruments for that goal (which is a step further than the former case).

What consequences can be drawn from what has been said so far in this Appendix? Generally speaking, *reductionist* (usages of) scientific models are an attempt and a procedure to guarantee the validity of the expected results through the possibility of executing automatically a series of step-by-step elementary operations. In fact, the ideal result to which *de facto* such usage is inspired in its idealtypical form consists in the fictive construction of a sort of symbolic machine, which by the way is, or corresponds to, the significance of the present trend at axiomatizing and formalizing scientific knowledge following mathematical algorithms (Granger *op cit.*). However, a machine built that way can only result in a verifying sort of tool. And this is what massively happens *de facto* at the applied level by adapting praxis to the verifying machine/ model, instead of having the machine verify (support, strengthen, etc.) local epistemologies. But an efficient reason, that is, a reason which creates scientific knowledge, is not formal. Such reason is the constructor itself of formalisms (which guides the application, interprets and controls the results) being as such a far more primogenous and fundamental structuring element.

Unfortunately, the gradual substitution of creative thinking in everyday life by ritualized axiomatization and formalization of knowledge – such as obtained at our down-to-earth institutional systems of professional instruction – actually amounts to the annihilation of an unknown source of new potentialities, for the latter are being currently sacrificed on the altar of a stricter streamlining of the agro-industrial system in the attempt to govern a rapidly increasing complex reality. Hence, science constructs anew formalisms of a second degree, material or conceptual machinery in order to verify formalisms of a lower order. However, this process cannot be repeated indefinitely: the potentiality of formalism as such gets lost (neutralizes itself) in this repetitive exercise. Then, the intended streamlining emerges as an uncontrollable surplus of complexity.

10 Theoretical Aspects of the Study of Endogenous Development

Bill Slee

Endogenous development has emerged as a powerful idea in development thinking, but in the absence of any clearly identifiable theoretical roots, at least in the discipline of economics, the concept should be subjected to careful scrutiny. The question should be asked whether economic theory to date has largely failed to identify certain important features of development, encapsulated in the term 'endogenous development', or whether 'endogenous development' is an illusion, rooted in bourgeois liberal responses towards the perceived failure of many past development strategies?

Endogenous development might be considered as having a number of distinguishing characteristics. These include local determination of development options, local control over the development process, and the retention of the benefits of development within the locale. But, rather than constituting a model of development with clearly identified theoretical roots, endogenous development is more readily characterised as an idealised descriptive contrast to frequently observed patterns and processes of development. Endogenous development is locally determined, exogenous development is transplanted into particular locales and externally determined; endogenous development tends to lead to high levels of retained benefits within local economies, exogenous development tends to export the proceeds of development from the region; endogenous development respects local values, exogenous development tends to trample over them.

Definitions of Development

Economists have often been uneasy about development as a concept and have thus opted instead to explore growth. Whilst it is possible to measure growth in a unidimensional manner (not always without difficulty), measuring development is more problematic, involving trade-offs between growth and equity, between productive and social investment and between short term growth and sustainability. Thus, Leftwich (1991) asks whether democracy should be regarded as a necessary condition for development and Batie (1989) has noted the tardiness of agricultural economists in absorbing ideas about sustainability into their thinking.

Some attempts to grapple with the concept of rural development pay more than lip service to the complexities of the concept. Dower (1988), for example, differentiates between growth and development, arguing that development might be seen to embrace self-determination and sustainability in addition to increased economic activity and output. Stern (1989) notes that 'the desired end-state (of integrated rural development) will certainly include income and jobs but also other social, cultural and environmental goals, such as adequate housing and social facilities, and various forms of cultural expression.'

A further important point is whether development is an end point or a process. This raises many questions about means and ends. If development is an end state does it matter by what means that end has been attained? Many of the countries that have achieved high rates of economic growth have done so with the support of undemocratic regimes (eg South Korea, Taiwan). Normally development is regarded as a process, but this in turn raises the question of whether development is the process of developing or the process of being developed. If the process is one of developing, is it of significance whether the process is facilitating or controlling?

Development is not only a contested concept amongst academics and practitioners but also between developer (often in the form of a development agency) and those who are experiencing development.

> *'At the local level, aspects of traditional culture and quality of life may temper attitudes on the nature of economic development. Intermediate technology may be preferred to sophisticated technology. Migration to cities may be resisted. Local control and small indigenous business may be seen as essential for local integrity. All these features and many more may represent a conscious choice between local values, small-scale development and, from the grassroots perspective, a superior quality of life rather than higher per capita incomes.'* (Wenger 1982: 13)

The development agency operating in the region studied by Wenger has effected significant changes in its policy and whereas it could legitimately be argued that in the early 1980s it discriminated against indigenous firms, this had been replaced by the late 1980s by an increasing emphasis on support for indigenous businesses (Stern 1989).

Economic Theory and Endogenous Development

This section examines the concept of endogenous development in the context of selected contributions from economic theories concerning development. Particular attention will be paid to the roles of the rural sector in the overall process of development. The theories and models selected for scrutiny will be representative rather than comprehensive and will include both liberal/capitalist and Marxist thinking on the subject.

The array of theories and models that have sought to illuminate economic aspects of the process of development are largely devoid of reference to endogenous development or related concepts. Reference to a standard economic text on agriculture and economic development such as Ghatak and Ingersent (1984) reveals critical scrutiny of a number of models to explain the role of agriculture in economic development. The models discussed are typically premised on the assumption that, in a variety of ways, agriculture nurtures the process of development. The agricultural sector is seen as a provider of food at non-inflationary prices; as a source of increased purchasing power to fuel sales in the industrial sector; as a source of investment capital for the industrial sector; or as a potential source of foreign exchange earnings to support the development process (Ghatak and Ingersent 1984).

Most models of the development process postulate a dynamic relationship between a modern industrial sector and a traditional sector. Dual economy models are a typical example of this approach. Lewis postulated a process of labour shedding from a traditional sector, replete with surplus labour to the urban industrial sector. He envisaged successive rounds of capital investment in the industrial sector drawing more and more of the surplus labour out of the rural sector until the commercialization of agriculture is triggered (Ghatak and Ingersent op.cit: 100). The significance of this model lies not in its explanatory power, but in its clear identification of the process of agricultural and rural development as being exogenously determined by the capitalistic industrial sector.

Within the broad array of Marxist thought, rural areas are also viewed as largely incapable of endogenous development. The pre-capitalistic rural economy is characterised by an inward looking self-sufficiency. Rural communities are viewed as enslaved beneath traditional rules, living an undignified, stagnatory and vegetative life. Outside the early industrialised capitalist economies the transformation effected by capitalistic development on rural areas leads to the replacement of self-sufficiency with export-oriented crop production and the substitution of locally produced craft products for imported mass-produced goods. These changes again stress the exogenous nature of the development process. Indeed the whole terminology of Marxist thinking on development is replete with references to the subservience of rural areas to the capitalist core. Colonial relationships between centre and periphery directly imply an exogenous set of forces operating on the region (see Baran 1973; Frank 1969).

Both approaches reinforce the conception of rural development as dependent development. Within the capitalist paradigm much attention is given to the means by which modernization can be speeded up. Thus, emphasis is placed on the provision of capital and finance in the rural sector (to get around the problems of exorbitant interest rates charged by local lenders), the introduction of new technology (to overcome the disadvantages of customary practice and primitive technology), and the provision of infrastructure (to link the area more effectively to the external world). Such changes are all likely to increase the extent of external control and incorporate rural areas more fully into national and international markets. Within the Marxist approaches the predominance of external control is self-evident. The globalization of markets and the associated concentration of power will ensure that exogenous forces prescribe the nature of development.

Developments and Modifications of Traditional Thinking

The conventional wisdom on development has been substantially modified by both theorists and practitioners. From both the liberal and the Marxist approaches new ideas have emerged which offer new perspectives on the contribution of endogenous factors to development processes.

Within the liberal approaches a number of different strands of thinking have developed. Three particular strands are explored further: First, the potential for spread effects to diffuse outwards from the initial locus of development; second, the extent to which local culture can be seen as a modifying influence on development processes; third, the contribution of practising development agents.

The assertion that spread effects will arise as a result of development in a particular location is implicit or explicit in most liberal formulations of the development process. These spread effects can arise either naturally, as in the Myrdalian conception, or can be contrived through the location of growth poles in regions where it is intended to stimulate development artificially.

It might also be asserted that an alternative form of spread effect arises as a result of remittances being sent back to rural areas, or of reverse migration where the primary motive is not financial. Rather than the agricultural sector being a source of capital for the developing urban sector, it may become a destination for capital and wages earned in other sectors. Increasingly this capital is used in affluent industrialised countries to acquire environmental commodities (as positional goods), as well as being used to provide sources of capital for an agricultural sector that has neither accumulated profits nor the capacity to acquire credit from commercial sources. Thus, a fragile agrarian sector may be bolstered by apparently irrational injections of capital, either directly by means of contributions to family members engaged in farming, or indirectly through increasing the value of rural property as a result of demands for retirement or vacational use. It is recognised that this process of reverse migration can create tensions between the recipient community and the incomers, especially where the incomers are unconnected to the indigenous population (Forsythe 1982). The significance of this process is twofold: First, it implies a reversal of the normal direction of capital flows and the introduction of capital to support 'traditional' ways of life; second, it is recognised that the reconstituted rural community can modify development pressures and mediate the development process.

A second set of modifications of normal development models can be found in the work of anthropologists and ethnographers (eg Strathern 1984; Cohen 1982; Long 1981) who argue that local culture mediates the development process, even within an apparently homogenous culture like that of the UK. Furthermore, local culture is seen not as a residue or as an anachronism but 'the persistent 'production' of culture and attribution of value becomes an essential bulwark against the cultural imperialism of the political and economic centres, and thus provides fundamental means by(sic) keeping the communities alive and fruitful' (Cohen 1982: 6). If economists ignore 'the enormous significance with which people invest their cultural distinctiveness' (Cohen op cit: 2) they will fail to fully understand patterns of development. Not only can development occur where neither market forces nor policy instruments have directed it, but the characteristics of development can take on specific forms. Thus, a remote island community in the Northern Isles of Scotland is able to resist the general pattern of decline and establish a strong fishing industry, albeit with support from a regional development agency (Cohen 1987). The initiative for the development was firmly rooted in the local community and the style of the development reflected key features of local culture.

The third modification of traditional liberal thinking comes from the largely atheoretical observations of development activists and practitioners. Perhaps the clearest statement of this is found in the work of Chambers (1983), who, highly sensitive to the failings of both liberal and Marxist agendas for development, offers a set of practical proposals and guidelines to enable development intervention to operate more effectively. Chambers' 'balanced pluralist approach' (Chambers *op. cit*: 44) suggests that development agents should engage in a dialogue and learn from the intended beneficiaries of development. Chambers' solution is bottom-up development, a challenge to established procedures, breaking out of top-downwards thinking, participating in decision making with the poorest, helping them to articulate their demands for services and rights and learning by acting on the ground in development actions with those that most need help (Chambers *op. cit.* Ch.8).

Here is evidence not so much of endogenous development but evidence of local values being considered as a desirable ingredient in the development process. The change agent is still external; the development process still exogenous but development is not so much imposed as negotiated. This recognition of the need for a development dialogue between developer and developed is reinforced by Stern (1989).

The Marxist approaches have been modified in three ways that might impinge on the question of endogenous development. First, it has been argued that 'there is no iron law that compels capitalist agricultural development to take precisely the same course in other (than NE Scotland) settings' (Carter 1979). Second, the assertion that family units comprise a transitional class has been subjected to considerable debate (Friedmann 1986; Winter 1984) which has implications on the nature of development in certain regions. Third, the debate about capitalist restructuring and the capacity for rural regions to be affected by this spatial restructuring also has implications for theorising about development.

The suggestion that the commonly described Marxist model of agrarian development should operate uniformly has been challenged by Carter (1979). He argues that the existence of a peasantry in north-east Scotland that provided cheap inputs into the expanding capitalistic sector of the industry, actually enabled capitalist farming to develop in its own idiosyncratic form. Whereas in other parts of lowland Britain the proletarianization of peasant farmers took place relatively rapidly, in north-east Scotland the process took much longer. Thus, while it is possible to use Marxist analysis to explain the extraordinarily rapid agrarian development of the region, it is unreasonable to expect that the development of capitalistic agriculture will always take the same form. Therefore it can be asserted that local factors mediate and differentiate the development process, and models and theories which fail to identify this may offer weak explanations of observable patterns of development.

The extent to which peasants and small family farms have survived the ingress of capitalism into the rural economy has led to much debate about the status of family farms where the functions of management and ownership of capital *and* provision of labour are carried out by the farmer and his family. Farming is by no means a unique example of a small enterprise with family labour. Indeed many rural businesses are of this kind. Tourist businesses, other service businesses, some food manufacturers (e.g. French rural bakers) are characterised by their imperfect fit with the idealised Marxist model of mature capitalism.

Within the mode of production described by Friedmann (1986) as simple commodity production, the small firm can be linked into more advanced capitalism in all ways except its use of labour. Although some (Winter 1984) have asserted that the peculiar nature of land explains this 'incomplete' form of capitalism, this fails to explain why other sectors of the economy, operating without land as an organic input, possess similar structural features. The failure of normal capitalist structures to develop in these sectors may reflect the limited or uncertain returns to particular forms of economic activity, and the utility of this 'incomplete' mode of production to mature capitalism. Thus, in rural tourism the part-time tourist provider offers accommodation in economic space that is unexploitable by normal capitalistic firms. This occurs because, in a period of economic difficulty, the family unit can partially disengage from the market, or reduce its rewards for labour to levels that would not be tolerated by hired labour.

Ironically simple commodity producers may have greater autonomy than firms where capital and labour are clearly separated. Decisions as to what product to produce, say farm produce or farm tourist 'produce', may be conditioned not just by external opportunities but by characteristics of the family life cycle, and autonomous decisions by the farm household. To the extent that such decisions are made within the (farm) household they are endogenous, although it is probable that many small family businesses are locked into wider circuits of capital (by credit arrangements etc.). The extent to which development decisions are genuinely autonomous may therefore be questioned. What is unquestionable, however, is the existence of large numbers of simple commodity producers in the least advantaged sectors and regions.

The third elaboration of Marxist thinking concerns the spatial manifestations of mature capitalism (Urry 1984; Allen and Massey 1988). The struggle for profit forces firms to exploit labour pools that have hitherto been unexploited and thus it is possible that areas remote from the capitalist core can be economically activated by decisions made literally thousands of miles away. Hence, in rural Ireland cheap female labour is used to process North American insurance claims. A relatively unsophisticated product like a bicycle can now have major components manufactured in Japan and the US and be fitted together in locations with cheaper labour markets, like Taiwan. In the struggle to keep production costs down, rural economic space is increasingly used in many countries. Where 'development' proceeds by this route (by creating new employment opportunities and increasing economic activity in rural areas) it cannot be regarded as endogenous development. This branch-plant approach to regional development has often been criticised for ignoring the needs of the locale and for failing to establish economic activity which has a local entrepreneurial base. Firms associated with this type of economic activity are likely to be footloose and be all too ready to exit the region during recessions (Firn 1975).

These elaborations of Marxist thinking are not mutually exclusive. Carter's (1975) assertion (of the different forms of capitalist development) is supported by evidence of the differential responses of different regions to economic change, both in an historic and a contemporary context. Whilst some regions may be dominated by simple commodity production, others may be affected by the centrifugal movements of capital into cheap rural labour markets. However, what is significant is the extent to which endogenous decision-making and local control can be retained under simple commodity production, whereas, in the restructuring model, development is exclusively externally controlled. The passivity of rural workers may be seen as an asset to be exploited in the struggle for international competitiveness.

There are parallels and contrasts in the liberal and Marxist reformulations. Both acknowledge the existence of 'spread' effects, albeit within different conceptual structures. Both acknowledge the existence of a bundle of factors that influence the course of development. However, the extent to which endogenous development can be postulated is restricted to its identification as a cultural variable within the liberal formulation or a local effect within the Marxist formulation. Within simple commodity production it is possible to postulate a degree of endogenous development, although this mode of production still operates in association with other more normal capitalistic forms. Chambers' liberal plea for bottom-up development represents a *crie de coeur* on behalf of the least advantaged, which tends to reaffirm the contention that exogenously controlled development often ignores the interests of the least advantaged.

Endogenous development thus hovers in the shadows of some of these reformulations but rarely occupies a position of prominence. Endogenous development is not so much a concept with clearly defined theoretical roots but more a perspective on rural development, strongly underpinned by value judgements about desirable forms of development.

Residual Questions

The principal question facing economists is to explain how a concept which has been so marginal to mainstream thinking in economics should have acquired such centrality in the activities of development practitioners. Endogenous development strategies are currently being activated in locations as different as the ghettos of Atlanta and the rain forests of Amazonia.

Two principal explanations can be offered. First, it can be argued that endogenous approaches to development are rooted in the responses of marginalised groups to pressures for their assimilation into wider social and economic structures. Second, it might be asserted that endogenous development has become a tactic in effecting the economic subordination of particular groups or regions.

The first argument, that economic, social and cultural pressures on certain groups leads to a clearer articulation of their differences from wider society, and the incorporation of these differences in economic behaviour, has been used to explain the reaffirmation of Samish identity in northern Scandinavia (Snell and Snell 1975). However, the emergence of movements to articulate Samish interests were a direct result of the liberal welfarist responses of the nation states of the region, which created opportunities both for assimilation into the 'normal' modes of development and for the reassertion of ethnic identity as a framework within which economic activity could take place. Cohen's (1987) observations on the Shetland Islands tend to support this hypothesis, that actions by development agencies can create opportunities for locally-based development.

The second assertion, that the support of endogenous development is a tactic for achieving more effective assimilation of groups that have often been marginalised from mainstream economic activity, has been put forward to explain the policies in Ireland towards the Gaeltacht areas of the west of the country (Williams 1990). The support of the ethnic identity of the western areas is funded by national and international flows of funds from the capitalist core.

Both of these explanations question the myth of genuinely endogenous development. Autonomous vernacular development represents a challenge to the nation state and to perhaps the advance of capitalism. However, the liberal nation state may inadvertently precipitate a dynamic process of negotiated development whereby individuals and groups are given resources over which they have some allocative responsibility. For example, the decision of a number of development agencies to support a group of crofters (small part-time farmers) in their bid to acquire ownership of a large estate in the north of Scotland indicates the potential for development agencies to challenge the status quo.

More often, 'endogenous' development is a means of achieving more effective development of a conventional type. The difficulties of creating enduring benefits to regions that operate under significant handicaps of peripherality have long been recognised. Development agencies have been established to aid the development process. Often in the past the development agencies operated with very top-downwards styles, encouraging at times a significant amount of inward investment, but not a great deal of locally-based entrepreneurship. The principal development agency in the north of Scotland, Highland and Island Enterprise, (formerly the Highlands and Islands Development Board), had a very top-down approach to development in its early years of operation and attracted a great deal of public and academic criticism (Carter 1975). The subsequent metamorphosis of the agency's strategy for development to one which was more focused on the support of endogenous entrepreneurship may have been influenced by the bitter experience of bad debt arising from major projects associated with external investors. Many agencies now have a much better understanding of the factors that inhibit endogenous development and are prepared to act in ways to reduce the inhibitory factors by providing a variety of business and community support services.

The processes of capitalism generate uneven development. The potential successes of endogenous development strategies lie less in their ability to resist these processes than to work with them. Certain attributes of mature capitalism may offer opportunities to areas and groups that have hitherto been largely ignored by the processes of development. For example, the growth of demand for soft tourist products, craft products and for regionally-specific foods are all signs of a public dissatisfaction with mass-produced goods and a desire for differentiated products. The pursuit of global markets by trans-national firms may leave unexploited niches in economic space. Artisanal production may be able to survive or even expand in these niches, but is likely to be the victim of predatory raids from larger firms should the niches expand. Simple commodity producers are likely to be less amenable to predation than larger capitalistic firms and may be able to survive by adapting to new markets. Whilst it may appear that the adjustment strategies of simple commodity producers appear to comprise endogenous development it should be recalled that both their past survival and future prospects depend on their incorporation within a wider framework of capitalism.

Development agencies have thus adapted their *modus operandi*, without altering their fundamental aims and objectives. They have recognised that long-run development gains are likely to be secured more effectively by encouraging local entrepreneurship than by inducing footloose branch-plants into the area. The same packages of infrastructure development, grant-aid, loan finance and business and community support services are still in evidence, but the agencies have learned to adapt these elements to the local social and cultural context.

In addition to recognising the need for a development dialogue with the recipient community, it has also become apparent that proliferating agencies must interact effectively amongst themselves. In developed countries there are often conflicts between central and local government and between agencies with overlapping functions. Thus, in the recent past the farmer diversifying into rural tourism in England could receive grant aid and advice from at least three agencies, the Agricultural Advisory Service, the Rural Development Commission or the Regional Tourist Board. No formal mechanism existed for ensuring that an integrated view of rural development was being pursued (Slee 1990). A number of development projects have been pursued which show the benefits of agency collaboration (e.g. Parker 1989).

A further strategy which has been pursued by many agencies is the use of animateurs and networkers. These individuals usually operate over a relatively restricted area, often have networking responsibilities in that they try to achieve collaborative action by agencies, and endeavour to maximise the amount of indigenous activity. They provide communities with a conduit to external support services and aim to catalyse development by helping communities to recognise the options confronting them.

It must, however, be emphasised that these changes from a branch-plant strategy to local entrepreneurial support, from single agency activity to integrated action, and from a traditional bureaucratic support structure to the creation of animateurs with networking functions, does not alter the fundamental nature of development. External forces will be the principal determinants of development. Endogenous forces may colour the nature of the process.

Conclusions and Discussion

Rural areas will continue to be affected by developments and modifications in mature capitalism. The effects include those arising from global restructuring processes and from amenity-seeking behaviour, the latter more especially in the most developed economies.

The unevenness of development is an inevitable concomitant of capitalist processes. At times efforts have been made to reduce this unevenness by policy measures and agency activity. The nature of agency activity has been modified, principally because of the perceived failures of top-downwards development strategies. The modifications in strategy have often sought to foster greater levels of local entrepreneurship and to generate developments which encompass social as well as economic changes.

It would be erroneous to describe these changes in development practice as a substitution of endogenous development for exogenous development. Both are examples of dependent development, although endogenous development strategies may provide rather more opportunities for locally-based social, economic and cultural circumstances to shape the development processes.

The significant differences in development strategies pursued offer opportunities not so much to refine development theory but instead to apply known economic techniques to assess the effects of the different strategies. Comprehensive audits of development projects are to be preferred to intuitive appraisals, ideally embracing cultural, social and environmental effects as well as the economic dimension. The potential contribution of economists is considerable. The local, regional and national multiplier effects of projects can be estimated, the cost-effectiveness of different agency strategies can be explored, and the distributional consequences of particular actions can be assessed. Intuitively it might be expected that 'bottom-up' endogenous development strategies would perform favourably under the scrutiny of economists. Unfortunately, the evidence to date is still too fragmentary to be able to offer any generalizations.

11 The Relations Between Central and Local Powers as Context for Endogenous Development

Antonio Picchi

Any discussion about endogenous development must deal with the complex and often quite contradictory relations between central and local powers. This applies especially to Italy, where the debate on endogenous development echos and inspires to some degree the autonomist boosts of the early 1990s.[1] Notwithstanding the very high degree of centralization in Italy, during the last decennia, we have lived through an intensive, widespread and self-propelling process of endogenous growth, especially in Emilia Romagna, but also in central Italy (mainly Tuscany). This has resulted in a type of diffuse industrialization (Bagnasco 1988) mainly grounded in the emergence of small-scale and medium enterprises (SME). This is in marked contrast to the pattern typical for the industrial triangle in the north-western part of Italy (Mailand, Genua, Torino), based on large to very large industrial enterprises.

What we are witnessing is a specific phenomenon: that is, the general recession is exacting a heavy toll on the industrial triangle, whilst the relatively more endogenous type of development characteristic of Emilia Romagna is maintaining its dynamics.

In this chapter, I will first discuss some of the phenomena typical for endogenous development in Emilia Romagna. Second, I will discuss some aspects of central policy that function increasingly as a hindrance to the further development of the regional economy. Finally, I discuss how at regional and local level, more often than not through concerted actions, the rigidities of central regulation have been corrected and/or neutralized. The chapter ends by proposing some of the most required changes in the arena by central, regional and local powers.

Local Instances as Expressions of Endogenous Development

Endogenous development is to be understood as local development, produced mainly by local impulses and grounded largely on local resources. In Emilia-Romagna it is clear that the variety of endogenous developments that have taken place critically depended on 1) the importance of the agricultural sector for the provision of the capital and manpower needed to create non-agricultural enterprises; 2) the ability of rural workers to extend their skills, networks and management capacities towards new fields and arenas; and 3) the desire for self-employment, which is deeply rooted in our history and culture, and was projected by local farmers and their children on other sectors in order to create a variety of new jobs. From these elements arose a regional economic framework consisting of 1) an extensive network of small and medium enterprises,[2] often deeply rooted in the various localities; 2) a wide-spread and highly flexible combination of pluri-activity at household level and part-time work in the enterprises concerned;[3] 3) an economic role for farming that remains strategic from several points of view; and 4) a dense system of interdependencies between the different economic sectors and subsectors contained in the regional economy. This particular economic framework has been supported strongly by regional and local power centres. National policy had no major positive influence.

Knowledge of the dynamics and expressions of this particular type of development (and of the resulting framework) has been crucial for regional and local policy-makers to be able to play a positive role in the process. Currently, we are organizing knowledge about endogenous development around the concept of 'local instance', which refers to extra-urban areas with well developed economic activities (not necessarily the main economic activity), whose products and/or services trigger new local economic activity which produces positive multiplier effects through the rest of the regional economy. The region entails 26 of these local instances[4] (CENSUS 1991), five of which are situated in agriculture, 16 in manufacturing industry and five in tourism. These 26 local instances for Emilia Romagna compare favourably to the 118 for the whole of northern Italy. They frequently represent the main income source within the local economy; sometimes they have acquired a true corporate image in national and international markets. It must be noted that this process also involves several drawbacks, such as the initial widespread pollution, specific disarticulations between subsectors, and spatial expressions which in the beginning were quite chaotic. However, through regional policies, such problems and drawbacks have to a large extent been overcome.

Table 1 presents a general overview of local instances born out of endogenous development processes. Some of these local instances will be commented upon in order to highlight some of the mechanisms that played a role in their emergence and/or reproduction over time.

In relation to the food industry, it is important to mention that it is very strongly linked to localized pockets of primary production. A large part of the food industry is organized in cooperatives, most of which have clear domestic roots (Picchi 1990). Quality, origin and specificity of the products produced are strategic, both at the level of primary production and at the transformation level. It is through this combination that the value-added to local economies is considerable and quite different from that which results from the more 'industrialized chains' that link production and transformation (De Roest 1990).[5] The Emilia Romagna region strongly supported the establishment of new transformation plants as well as the modernization of existing ones, especially as the strategic importance of quality, origin and specificity could be strengthened through these interventions.[6] The development of cooperatives was equally well supported. And finally, the region tried to strengthen the organic links between agricultural production and the transformation industry through the promotion of inter-professional agreements (for the last 14 years such agreements have been institutionalized). These agreements gave special attention to the issue of new uses of waste products to reduce pollution.

The *ceramic industry* is a typical example of a new industry started by farmers. The ready availability of clay from neighbouring hills allowed the production of floor- and wall-tiles. The industry started on a very small scale, serving mainly local needs. Farmers and farmers' sons became the first entrepreneurs in this field. The boom that followed initially provoked a number of countryside ravages, but through better planning and a simultaneous reorganization of farming (from wine-production towards breeding) these initial problems were corrected and resolved. The ceramic industry of Emilia Romagna now has a stronghold in international markets.

The *mechanics industry* is a good example of the interlinkage between regional and local entreprise sectors. The typical local instances in the agricultural area (such as the production of Parmesan cheese, hams, etc) require a number of particular innovations, whose design needs to be fitted to the precise conditions of the local styles of farming.[7] These same local instances, therefore, imply an interesting market for SME within the mechanics sector. As a matter of fact the linkage between a dynamic farming sector and the local mechanics industry is considered to be one of the main driving forces behind the regional economy.

Similar expositions could be developed regarding other local instances as indicated in Table 1. The *textile industry*, for example, was initially deeply interwoven with the domestic activities of rural families, and many of the SME now existing in this sector were born from local initiatives begun by farming families. The same goes for *tourism*. In this case, however, such interdependencies are not only of an historical nature. Agriculture itself has developed in importance through agro-tourism,[8] vegetable growing for tourist consumption and most recently through the production of medical herbs.

Table 1 Main Local Instances in the Emilia-Romagna Economy

PROVINCE	AGRICULTURE	MANUFACTURING	TOURISM
Piacenza	tomatoes garlic	food industry	
Parma	tomatoes diary industry (Parmigiano-Reggiano) onions	food industry ham production	thermal bathing
Reggio Emilia	diary industry (Parmigiano-Reggiano) pork	ceramics agricultural machinery textiles	
Modena	diary industry (Parmigiano-Reggiano) pig breeding small fruits	mechanics industry car industry food industry ceramics	mountain tourism summer and winter
Bologna	fruits vegetables	shoes clothing mechanical industry	bathing
Ferrara	fish production seedlings fruits		beaches; nature as attraction
Ravenna	fruits	ceramics food industry	beaches; natural bathing
Forli	poultry fruits	shoes food industry	beaches nature as attraction
Rimini	vegetables	mobiles	beaches congress facilities

If we now switch attention to primary production, again some typical local instances can be discussed which highlight strategic aspects. *Tomato-growing* as such is wide-spread all over the Po-valley. However, in Emilia Romagna, it has gained a specific advantage since at the level of transformation there has been a solid development from a concentration on just one end-product – tomato-sauce – towards differentiation (peeled tomatoes, concentrates, purees, juices, etc). This same tendency stimulated again SME for food transformation technologies. The most well-known example of an agricultural 'instance' is, of course, the production of the Formaggio Parmigiano-Reggiano, or Parmesan Cheese. This local instance is characterized by a dense and well organized network of farms, small cooperative cheese factories, an 'umbrella type' consortium and a strong set of interlinkages with regional banks and research institutes. The area it covers consists of nearly one million hectares, including 25,000 farms, 720 cheese factories and 157 storing facilities. It remains a strong sector for its high quality, specificity and origin of its produce. Public supervision (especially the regional one) is oriented to guaranteeing a high quality of product.

Pig breeding originated from the share-cropping farms that once formed an important phenomenon in Emilia Romagna. They were mainly bred and raised for home consumption. As far as there emerged some commercialization, it was based on a strict unity between primary production and transformation. Simultaneously there emerged larger production units directly associated with the cheese factories (in order to use some of the by-products of cheese-making for the fattening process). The core of the local instance as it manifests itself nowadays consists of factories oriented to the production of pork and especially hams. Craftsmanship and special skills, as well as the use of specific local resources (such as the winds from the Apennine mountains) remain crucial. The region is actually trying to reduce the pollution problems associated with the concentration of pig breeding in particular areas.

Fruit growing covers 93,000 hectares (of apples, pears and peaches). Cooperative activities in storing, transformation and commercialization account for 95 percent of total volume. The region stimulated the introduction of a trade-mark policy and introduced integrated pest management over large areas. There remain considerable problems regarding the quantitative planning of production.

The Rigidity of National Policies

So far I have outlined aspects of at least some of the typical local instances that are both the result of as well as a mechanism of endogenous development in the Emilia Romagna area. The patterns of local development involved were largely achieved without any help or stimulation from central levels. As a matter of fact, central powers in Italy do not recognize the phenomena of decentralized growth initiatives (be they at regional or local level). Just two forms of regional policy have been implemented during the last decennia: the policy for the Mezzogiorno which has been extremely wasteful and inefficient and in any case controlled by central powers, and that designed for the mountain areas, which became decentralized but remained without any substantial funding. Some regions and mountain communities tried to become the protagonists of their own development, others have never managed to escape from the subordinate position they hold vis-à-vis the central ministries. However, in both cases, the global situation remains characterized by the following features:

- Rome defines which norms and functions are incompatible with local development;
- The variety and complex distribution of local interests is perceived as the main obstacle for any central programme;
- It seems that in Rome it is thought that the most interesting opportunity contained in existing relations between central power and local settings, lies in the competition among the localities to see which can obtain the biggest slice of the financial cake and which can establish the more favourable 'clientele' relations with Rome.
- Between central and local powers there is an ongoing and never-ending debate as to what area lies in whose competence, and consequently there is a continuous fight over the redistribution of resources.

Beyond all this, centralization has blocked the effective participation of the regions (and local powers) in unification and integration at European level. The 'partnership' formula (EC-State-regional entities-local entities) as proposed by the EC (implying that decisions are delegated to the lowest possible level) has not yet been accepted by Italy's central administration, although such a principle should already have been extended to all current EC programmes. Secondly, most current EC programmes suffer from the uncertainty of national co-financing.

The foregoing explains why the regions have supported the proposal for a referendum aimed at eliminating several central ministries (especially those that have most expressed the drive towards further centralization).[9]

Strengthening Endogenous Development in Emilia Romagna

The foregoing illustrates the extremely negative climate at central level for endogenous development, a climate which at first sight appears to be at odds with the dynamics of the endogenous development described earlier. At least one of the intermediary factors which helps to explain this rather paradoxical situation, is regional policy. In Emilia Romagna, endogenous development has been strengthened by several mechanisms that, taken together, have compensated and neutralized to some extent negative central forces. Amongst these are the following:

1. A persevering trend towards self-improvement of local public administration;
2. the traditional commitment of public bodies to help industries and enterprises through a good network of effective services (passing on technological and organizational innovations, setting correct agendas for research, professional training, etc);
3. the development and institutionalization of intermunicipal planning mechanisms aimed at strengthening local inititiaves;[10]

4 the constant updating of planning instruments in order to reach the maximum levels of security needed for private entrepreneurs and other local initiatives, especially in strengthening interlinkages and creating new synergies. In this context it is to be stressed that the agricultural sector has never been considered a sector on its own, but has always been included within the total matrix of activities (at whatever level).
5 the IVth Regional Programme (1992-1995) foresees specific subprogrammes to increase the effectiveness of and to reach the different mechanisms relating to endogenous development in different regional areas;
6 the Emilia Romagna region delegated several of its functions to provinces and mountain communities in order to strengthen local bodies and their autonomous capacity to intervene in the local economy. This shift of functions concerns, among other things, the planning and implementation of several agricultural programmes, the design of professional training programmes and currently an extension into the domains of soil conservation and tourism is being considered. In addition, some regional services will be removed to the provinces;
7 an application of general EC programmes (such as PIM) to local and regional conditions and perspectives, strengthening where possible the existing and promising trends initiated within the different local instances.

Changing the Arena: Towards New Relation Between Central and Local Powers

Although rigid forms of centralization are countervailed by several regional and local responses, the overall setting is still not favourable to a fuller liberation of the forces entailed in the local instances and regional defence-mechanisms described earlier. Strategic items that remain on the agenda are:

- a full application of subsidiarity-principles (that is, whatever decision can be taken at the 'lower' level, should not be taken at the 'higher' level). Policy formulation, planning, implementation and monitoring, involving more partners (EC, national state, local powers) have to be structured according to this principle. This is especially important for agrarian and rural development policies.
- the already proposed reform of regional and local institutions needs to be carried out as soon as possible. This especially concerns the recognition of local autonomy to dispose of resources (among other things local and regional taxes). Actually, the funding of regions, mountain communities and municipalities depends basically on the national state and since the latter is involved in a more or less permanent crisis, the

problems at central level are mostly resolved by cutting down the resources destined to regional and local levels.

- regional and local competence concerning the development of local economies etc., needs to be recognized and institutionalized.

All this does not imply that there is – at regional level – a blindness over the need to coordinate and articulate the different (and sometimes contradictory) development projects elaborated at local and/or regional level. However, the correct response is to be found in the revitalization of already established mechanisms: a 'permanent conference for the relations between state, regions and provinces'; the interparlementary commission for European issues, the CINSEDO (a body linking directly the different regions); the inter-adminstrative committee for the coordination of structural interventions financed by EC, etc. Through such structures for coordination, local initiatives might be better articulated than through the still very rigid central power structures that exist to date.

Notes

1 (editor's note) Picchi's paper was written in 1992, shortly before the sudden collapse of the central political power structure in 1993. It is interesting that the decentralization of the Ministry of Agriculture, proposed in this chapter, was actually realized in 1993 after general consultation with the voters on the issue.

2 In Emilia Romagna we count 81.1 enterprise per 1000 inhabitants; for Italy as a whole this is 65.7 per 1000 inhabitants.

3 Decentralisation of SME in rural areas improved demand for work outside agriculture and it stimulated the strong expansion of part-time work in farming.

4 In the most recent analyses the number of local instances is higher (see also Table 1 of this chapter). This is partly due to the dynamics of development processes in the region, partly due to better statistical methods based on more abundant material and in particular due to a more accurate interpretation of interprovincial instances.

5 Another important aspect is that most seasonal work in the transformation plants is underpinned by rural families.

6 EC Reg. No. 355/77 and 866/90 could be used for these purposes.

7 It is exactly at this point that large industries for farm mechanization and implements are unable to compete: their designs are far too standardized to fit into the specific conditions of farming in the styles of farming concerned.

8 This goes back to the 1950s when local banks gave tourist grants at low interest rates. Regional laws and PIM measures supported a range of organic interventions afterwards. The integration with agriculture concerns also the selling of local products. PIM supports local product promotion agencies which cover a range of local products from farming and SME and other services.

9 Arguments that sustain the proposal for a referendum are 1) central legislation increasingly penetrates the domain and autonomy of local instances, 2) the ineffective application of the principle of subsidiarity (that is, that decisions are taken on an adequate level, and 3) that government policy, including financial policy, often makes any continuity at regional level impossible.

10 From these first experiences arose several municipal associations (even at interprovincial level). The region empowered these new-born associations through the creation of Districts which have achieved good planning experiences.

12 The Rural Development Challenge in OECD Member Countries[1]

Christian Huillet

Rural Development in the OECD Context

One third of the people and nine tenths of the territory of OECD member countries are rural (see Table 1 and Figure 1). The rural world is in a period of major transformation. Development is rapidly changing some areas, and many others are losing population. Agricultural policies – the traditional government tool for dealing with rural problems – affect an ever shrinking portion of rural people and economies, and come at higher and higher costs. At the same time, many member countries believe that to maintain overall societal equilibrium, a healthy countryside is an increasingly necessary balance to rapidly spreading cities.

In 1992, the OECD Council at ministerial level asserted that:

> *'The economic and social problems of rural areas, whose solution may be decisive for the success of agricultural reform in many countries, are particularly complex. They should be addressed in an integrated and cost-effective fashion. This would require adjustment policies, and policies to accommodate and capitalise on the diversity of economic, cultural, social, environmental, and resource bases of rural areas. Within the framework of a comprehensive rural development policy, local initiatives and partnerships will be of central importance.'*

and again in 1992 that:

> *'Rural development relates to a broad range of social as well as economic dimensions. Agriculture is a major part of the rural economy in OECD countries. Ministers emphasised that rural development should be addressed primarily through an integrated rural development policy, rather than only through agricultural policy. The primary focus of rural development policy should be the reduction of impediments to, and the promotion of, viable economic activities. Such a focus would contribute to efficient adjustment in agriculture. This in turn would improve the long-term viability of the agricultural sector and its economic and social contribution to rural areas.'*

Table 1 Rural Population and Area by Member Country; Rural Communities' Share of National Totals*

Country	Rural Communities	
	population	area
	national total = 100	national total = 100
Australia	32.4	99.7
Austria	42.6	91.2
Belgium	9.2	43.1
Canada	40.9	99.8
Denmark	42.3	85.9
Finland	56.8	98.5
France	36.8	90.3
Germany	20.3	50.3
Greece	39.1	96.5
Iceland	39.0	99.7
Ireland	46.3	98.5
Italy	21.9	72.1
Japan	27.2	86.6
Luxembourg	29.9	80.6
Netherlands	8.1	36.2
New Zealand	19.0	99.0
Norway	60.0	98.7
Portugal	35.7	87.5
Spain	30.3	92.9
Sweden	42.6	97.8
Switzerland	19.7	78.2
Turkey	59.4	93.8
United Kingdom	16.9	73.2
United States	44.1	94.8
EC Average	24.6	79.6
OECD Average **	35.5	96.5

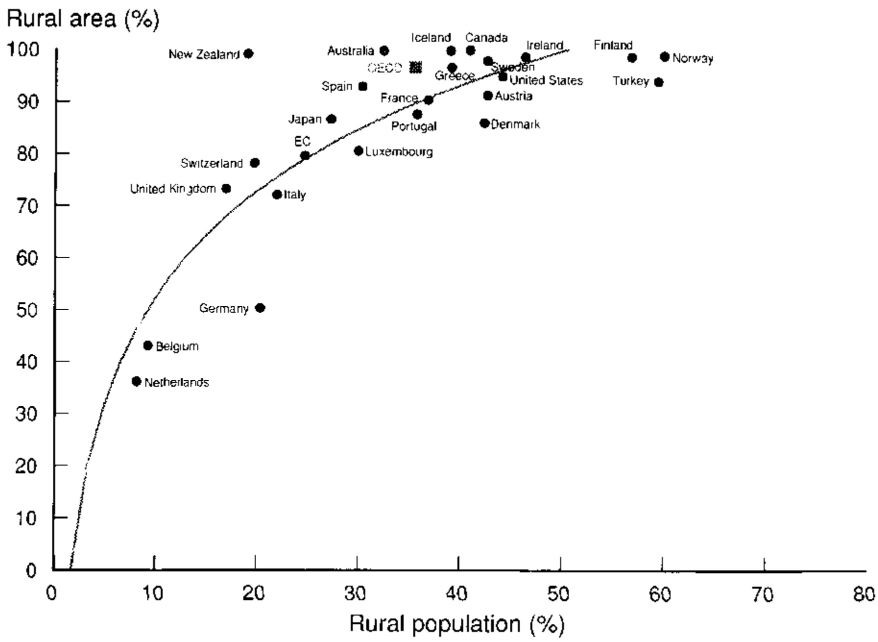
'Rural' communities = local communities with population density below 150 inhab./km2, 500 inhab./km2 in the case of Japan.

* Calculations based on most recent data available

** Japan not included; see not above

[OECD(93)RDP/PRI-1.T2]

Figure 1 Rural Population and Area by Member Country



[OECD(93)RDP/PRI-1.F3]

Definitions and Concepts

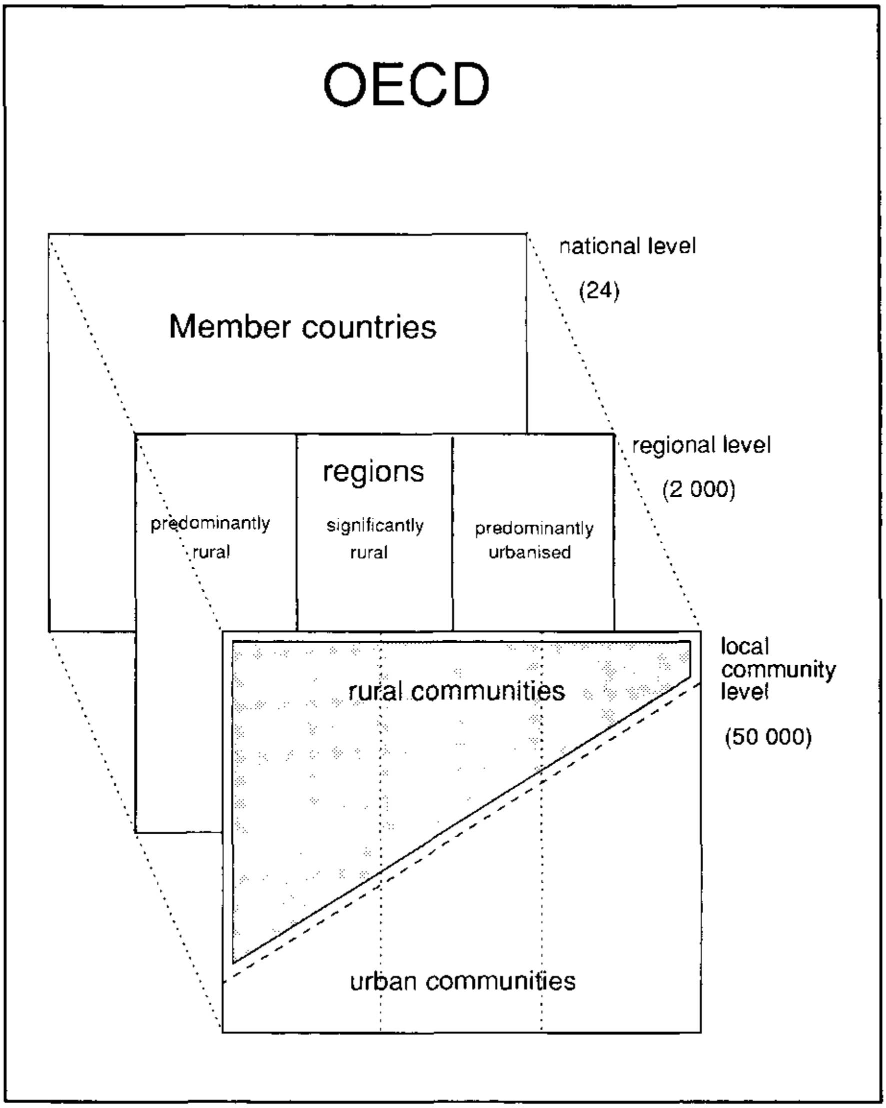
What Rural Means

The OECD treats rural as a spatial or territorial concept. It is interested in all the people, land and other resources in the open country and small settlements outside major urban centres. It is not restricted to any particular use of land, degree of economic health, or sector. Member countries share an interest in the trends that shape rural economies and in the measures appropriate to deal with rural problems; but they recognize that the diversity of rural conditions (see Figure 2) and national goals means each country will need its own policies for rural development.

What Agriculture Means

Agriculture like forestry, mining, commercial fishing, and manufacturing is an economic sector. Agriculture is especially important in rural areas because it employs about one-quarter of the rural population in OECD countries, and with forestry, uses most of the rural land. But agriculture alone cannot be the source of a vital and growing rural economy; no net farming jobs have been created in member countries in several decades.

Figure 2 Territorial Scheme and Terminology



The Rural Development Challenge

The central challenge for rural development is to foster an improved national balance of economic opportunities and social conditions, utilizing an appropriate mix of market and non-market mechanisms to improve national economic performance, while safeguarding and developing important aspects of the rural heritage.

Overall conditions for many rural areas and their people justify the Ministers' repeated expressions of concern. The gap between many urban and rural communities that, for various reasons, are unable to exploit new entrepreneurial opportunities and face a shortage of good job options, is widening on several measures of economic and social well-being. This may threaten sustainability and the potential for future development of rural communities. In the economic realm, many rural areas still rely heavily on the primary sectors, especially agriculture, for economic activity and jobs. However, agricultural employment has been contracting for decades. The new jobs that have prevented or slowed the rate of rural depopulation are in other sectors, such as consumer services, construction and recreation. This trend will continue no matter which agricultural policy reforms are adopted. The future health and viability of most rural economies depends mainly on new entrepreneurial and employment opportunities in growing sectors. Rural development policy and agricultural policy address different goals by different means. They are not interchangeable but they are complementary.

There are often important differences among rural areas, which may be divided for descriptive purposes broadly into three types (see Table 2):

- *Predominantly rural regions*: Remote areas which usually have the lowest population densities, often the lowest incomes, and older populations depending heavily on primary sector employment, and generally providing the least adequate basic services.
- *Predominantly urbanised regions*: Many of these regions have been gaining population, have employment bases in one or more of the secondary or tertiary sectors – farming is still a key part of land use – and are likely to face potential threats to their environmental, social and cultural heritage.
- *Significantly rural regions*: The economic and social vitality of individual communities within these regions varies considerably. Their economies are more likely to depend on a mix of primary and secondary sectors. In many countries, larger scale farming operations are likely to be found in these intermediate areas (see also Figure 3 and 4).

Objectives of Rural Policies

The goals of rural development are both economic and societal. Many members are also explicitly committed to providing opportunities for rural citizens to share a standard of living generally comparable to national norms. Achieving these goals requires establishing an integrated set of objectives, such as increasing net job creation; reducing dramatic disparities in mean incomes and 'under-employment', and; ensuring rural people have reasonable access to essential basic services. However, it is generally recognised that it is not feasible or beneficial to seek to preserve every rural community by attempting to forestall all changes and structural adjustments. For some rural areas the practical goal is to maintain certain minimum living standards and the rural fabric. This includes attention to indigenous or other culturally distinct groups in rural areas who face special problems. In all cases, policies should be chosen weighing the full costs and effectiveness of action, and the possibility of promoting means for rural areas and people to make a successful structural transition.

Another important rural development goal in many member countries is to identify, develop, and/or protect key national elements of the built and natural environment in rural areas (*management of public goods*), especially where it cannot reasonably be expected that private market transactions alone will secure their future at socially optimal levels. Many of the amenities and heritage characteristics of rural areas are the product of generations of interaction between human activity and the natural environment. Many do not require public intervention or management. On the other hand, virtually all member governments have programmes to provide heritage facilities and services directly, or to ensure their protection, as well as to encourage heritage activities by private citizens and firms. Examples include national parks, forests, reserves, monuments, land use controls, and environmental regulation. The complement of 'public interest goods' and the mix of private and public action to provide them at a socially desirable level varies, depending on costs and other factors like national history and culture, aesthetic judgements, proximity to major urban centres, private property rights, and population density.

Table 2 Typology of Regions by Degree of Rurality : Share of Population and Area in National Totals*. Typology Based on the Share of Population Living in Rural Communities

Country	Population		
	predominantly rural regions	significantly rural regions	predominantly urbanised regions
	national total = 100		
Australia	23	22	55
Austria	40	39	22
Belgium	2	17	81
Canada	33	23	44
Denmark	39	38	23
Finland	47	32	21
France	30	41	29
Germany	8	26	66
Greece	47	18	35
Iceland	35	8	57
Ireland	62		38
Italy	9	44	47
Japan	23	34	43
Luxembourg	-	100	-
Netherlands	-	15	85
New Zealand	-	61	39
Norway	51	38	11
Portugal	35	24	41
Spain	19	46	35
Sweden	49	32	19
Switzerland	14	25	61
Turkey	58	30	12
United King	15	17	68
United States	36	34	30
EC Average	17	31	52
OECD Average	28	32	40

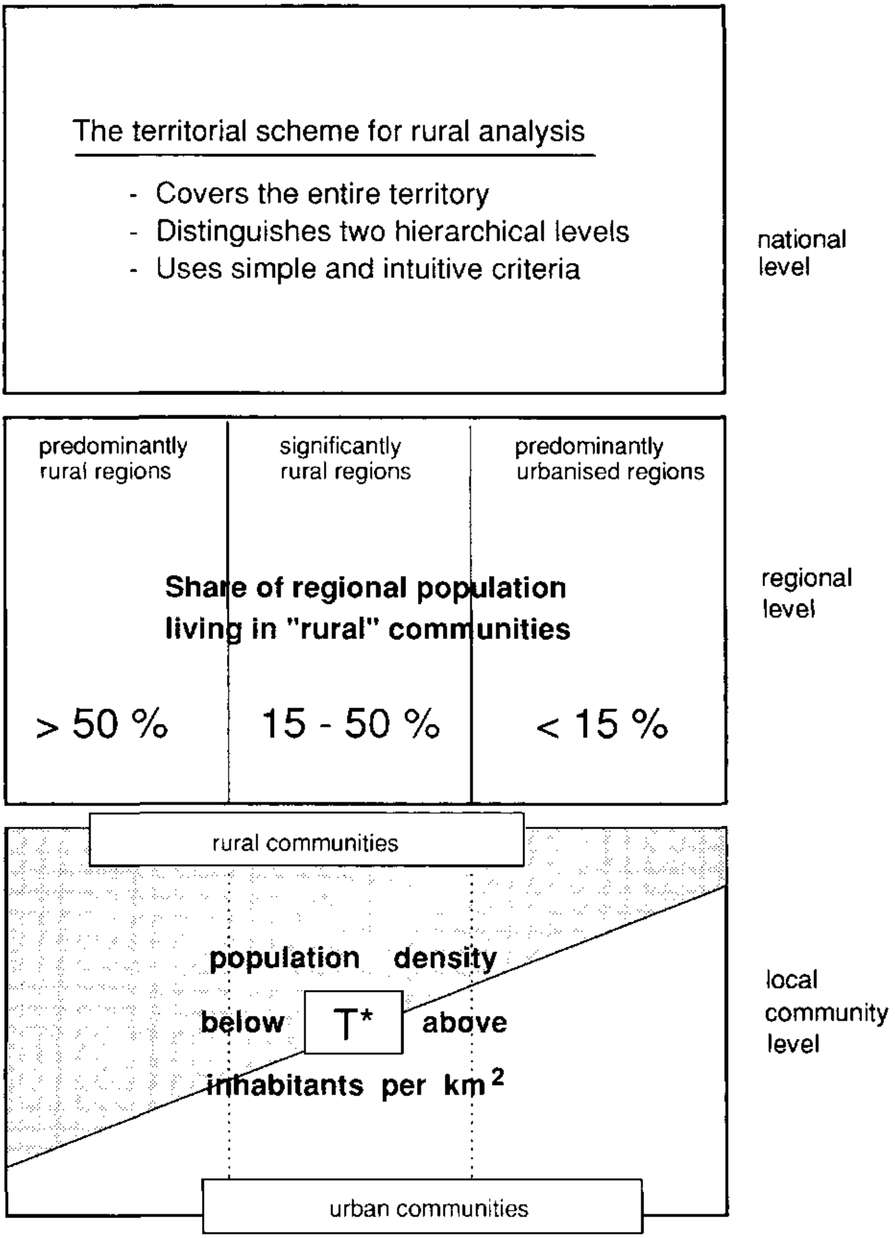
Country	Area		
	predominantly rural regions	significantly rural regions	predominantly urbanised regions
		national total = 100	
Australia	92	8	0
Austria	71	28	1
Belgium	15	28	57
Canada	95	4	1
Denmark	68	31	1
Finland	83	16	1
France	61	34	5
Germany	19	39	42
Greece	81	16	3
Iceland	75	24	1
Ireland	91	-	9
Italy	26	54	20
Japan	59	33	8
Luxembourg	-	100	-
Netherlands	-	34	66
New Zealand	-	95	5
Norway	84	16	0
Portugal	81	13	6
Spain	55	39	6
Sweden	88	10	2
Switzerland	54	29	17
Turkey	82	17	1
United King	52	22	26
United States	85	10	5
EC Average	49	34	16
OECD Average	87	10	3

'Rural' communities=local communities with population density below 150 inhab./km2, 500 inhab./km2 in the case of Japan. For explanation see Annex 2.
Typology of regions according to the share of rural population: 'predominantly rural'=more than 50%; 'significantly rural' =15-50%; 'predominantly urbanised' = below 15%.

* Calculations based on most recent data available.
** Japan not included; see note above

[OECD(93)RDP/PRI-1.T3]

Figure 3 Territorial Scheme and Definitions

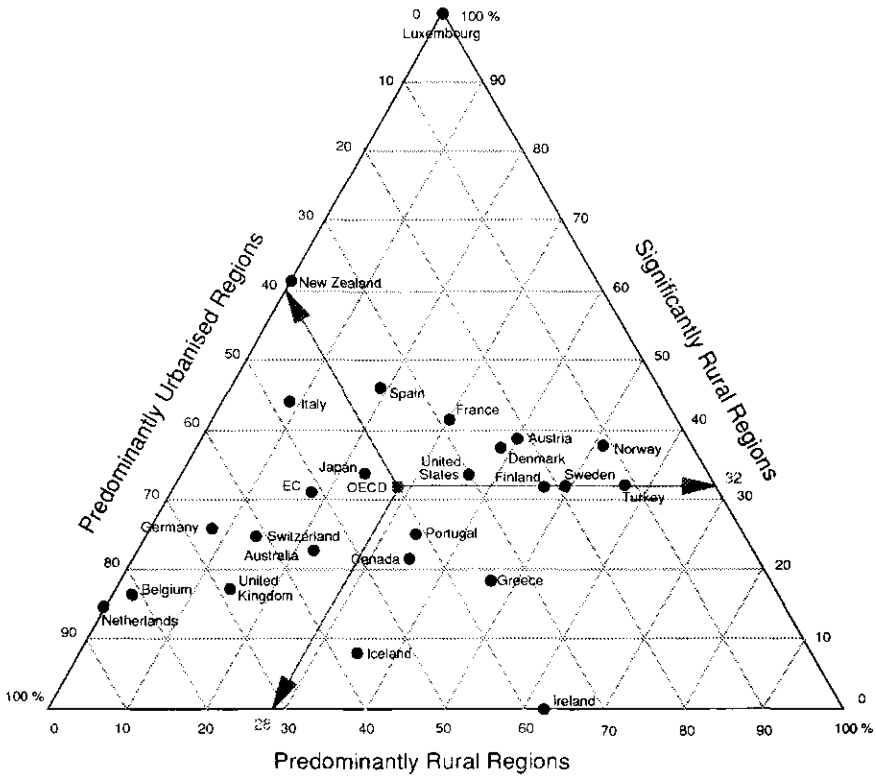


* 150 ; in the case of Japan 500.

[OECD(93)RDP/PRI-1.F2]

Figure 4 Distribution of Population by Type of Region

-- Regional population share in national total (%)



National Policy and Programme Responses

Rural economies are experiencing two kinds of difficulty. First, employment opportunities are declining in primary and secondary sectors on which many rural areas depend. Fishing, mining, forestry and agriculture are all undergoing substantial employment contraction as they become more productive and efficient. In many countries, the manufacturing sector is beginning to follow the same pattern. With few regional or national exceptions, most rural employment growth in recent decades has come in other industries, especially consumer services, construction, recreation, and the public sector. Second, rural areas have not shared proportionately in producer service employment, a major engine of national economic growth which has been concentrated in and around large urban centres. Most rural places lack the natural advantages of agglomeration and economies of scale sought by such industries. Many are not well connected to the networks linking major urban nodes which are critical sources of information, innovation, technology, and finance which facilitate development.

A Two Tiered Approach

• Addressing these disadvantages requires a two-tiered approach, comprising general measures that address common rural circumstances, and sets of measures appropriate to the circumstances of each type of area. However, it is important to recognise that policy changes at the international level may also act to facilitate or retard the achievement of member countries' rural development goals.

• *General national measures* include macroeconomic policies conducive to economic growth and programmes to reduce the isolation of rural places, such as education, accessible modern communication, and transport systems. Their availability in rural areas will depend heavily on economic feasibility and they should be undertaken in an environmentally appropriate way.

• *Selective measures* appropriate for each type of area depend on an understanding of the major differences in the rural areas as well as the potential effectiveness of such measures.

Present Special Policies Employed:

A wide range of special policies or measures have been employed by member countries to meet their specific rural development objectives. These measures can be classified into broad categories such as:

- agricultural policies;
- leadership training and local capacity building;
- technical assistance;
- incentives for private sector action;
- environmental policies;
- subsidised credit and direct investment;
- improved government and intergovernment co-ordination;
- transfer payment and special employment programmes;
- community development;
- special health, education, and other human capital programmes; and
- transport and other infrastructure programmes.

Information gathered from member countries suggests that we do not know enough about the effectiveness and efficiency of these approaches, and that additional evaluative work is required.

Strategic Considerations

Past efforts to promote rural development have often concentrated on sectoral subsidies and industrial recruitment activities. However, important new strategies focus on local leadership business expansion, and entrepreneurship. Measures to facilitate the adoption of such strategies and provide resources for their implementation are important ingredients in rural development policy. Of particular importance in such strategies are local development approaches which represent the broad spectrum of rural community interests, support community based leadership, foster self-reliance, and promote an entrepreneurial culture.

New entrepreneurial opportunities exist in virtually every sector, not only those that are growing rapidly like tourism and recreation, but even in those like agriculture where there is net contraction. Examples include new products, niche markets, and further integration of production and marketing. Entrepreneurial decisions are best rooted in local circumstances, taking into account resources, comparative advantage, and opportunity costs. While no single sector offers the solution to all rural economic problems, all may contribute. Where development potential is limited, cost-effective measures to ensure basic levels of services are important, especially those like health and education which protect and develop human resources. However, assistance in providing other infrastructure and only slightly less basic services is often desirable, depending on costs and resources. Better services not only contribute to equivalence in standards of living, they also help preserve the rural fabric, and an adequate level of public services is often a precondition for economic development.

Agriculture, forestry, and other primary sectors are uniquely important in most rural areas, because of their environmental and amenity contributions, both positive and negative, and because they are significant employers of rural people. Sound, economically efficient farming operations and diversification of on-farm and off-farm activities are important components of the well-being of most rural communities. Reformed agricultural policy will contribute most to rural development when it facilitates adjustment to changes in the structure of the sector and is a complement of comprehensive rural development policy. In this context, it is important to recognize the multi-functional role of farming and farmers' contributions to 'public interest goods'.

The above discussion highlights the importance for future rural development policy of a coordinated and integrated approach.

Institutional Dimension

Changing rural conditions pose a fundamental challenge to member countries in finding more effective institutional arrangements for formulating, implementing and evaluating policies and programmes of rural development. Given its territorial and multi-sectoral character, the making of rural development policies and programmes involves an increasing array of actors at every level of government, but also in the private sector and in the voluntary network. In response to this, countries have endeavoured to improve co-ordination and simultaneously encourage wider participation by a variety of actors.

Like other important subjects, rural development policy requires an institutional focus. The essential tasks that must be performed are to identify and articulate rural concerns in the appropriate framework, not merely as a by-product of a sectoral focus. They also include monitoring and analyzing rural conditions and trends, ensuring that rural areas are taken into account in other national policies, and operating programmes specifically aimed at rural development.

Authorities at the intermediate and local levels have critical roles in rural development even where the national government has the leading responsibility. Central governments should be receptive to indispensable initiative and leadership by and from the intermediate and local levels. Whichever level has the primary role, central and intermediate governments need to pay complementary parts in an atmosphere of co-operation. There are many examples of effective collaboration that involve different levels of government, multiple sectoral ministries, private business, trade associations and voluntary organisations. Neither partnerships nor decentralising and devolving authority and responsibility can substitute for certain functions that only central governments can perform, however.

Note

1 The opinions expressed in this note are those of Dr. Christian Huillet, Deputy Head of the Rural Development Programme of the OECD, and not necessarily those of the OECD itself.

13 Regional Marginalization, Styles of Farming and Technology Development

Dirk Roep and René de Bruin

The Specificity of the Dutch Veenweiden Region

In the Netherlands, 30 percent of pasture land consists of *veenweiden,* that is, pastureland on peatsoils. From a cultural-historical point of view *Veenweiden* is the typical Dutch landscape of endless lowlands with water-fitted ditches. About 40 percent of these lowland areas are located in the provinces of Holland in the western part of the Netherlands, and referred to as the western Veenweiden region. The landscape still reflects the way in which the former peat-swamps were colonized. At the end of the Middle-Ages ditches were dug to drain the surplus of water. At right angles from the banks or borders of a river or higher situated strips of land, colonists dug ditches into the swamps to favour natural drainage. This type of cultivation led to the typical open-field system of small fields divided by long ditches. The windmill, and later the diesel and electric engine, made it possible to drain huge amounts of water from large areas (*polders*), thus favouring the cultivation of peatland far below sea-level. Draining the Veenweiden will always remain essential for cultivation, as it soon turns to peat-swamp again.

Historically, there is a clear relation between established control over ecological conditions and agricultural productivity and methods. Peatsoils are very moist and only suitable for pastureland. Therefore, dairy farms dominate in the western Veenweiden region. Along with the presence of nearby markets and the entrepreneurship of the farmers, the region has established a reputation for farm-made dairy products such as cheese (i.e. Gouda and Leidse) and butter. Despite the growth of big dairy industries during this century, farm-produced dairy products are still of significant importance. Peat-soil consists of about 40-60 percent organic material, and when properly drained it is a fertile and productive soil. However, when drained, the soil oxidizes, which results in the sinking of the peatlands (about 2-5 cm per year). This implies that the level of draining has to be modified regularly. The humid and organic nature of the soil also puts limits on the carrying capacity of the Veenweiden. Deeper-level draining will significantly improve the carrying capacity, as has been done in large-scale projects or on a small scale by farmers themselves. Nevertheless, heavy mechanization has remained problematic in rainy periods. It is evident that the productivity of the Veenweiden depends heavily on water management and draining. The control of water and the necessary adaption of drainage to agricultural needs is a basic issue in the interrelation between agriculture and ecological conditions and it has provoked many disputes.

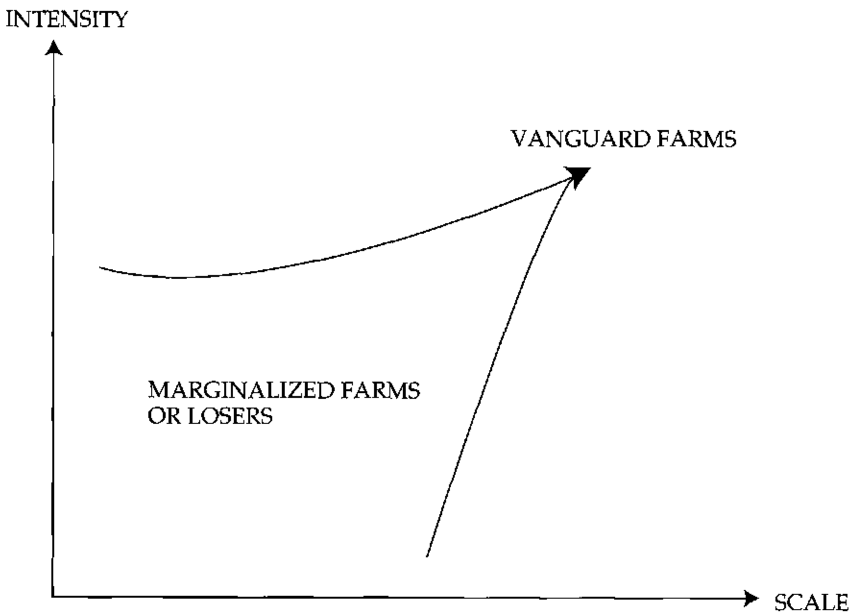
The interaction between the management of ecological conditions and the development of farm practices, especially its variation over time and space, created the ecological conditions for the typical peatland vegetation and wildlife of the Veenweiden region, which is now appreciated for its open and scenic character: a 'green heart' within the most industrialized and urbanized part of the Netherlands.

Scientification: the Systematic Elimination of Specificity and Diversity

Until the 1960s, farm practices were in general developed and optimized under a diversity of social and ecological conditions. This resulted in specific agricultural production processes which in turn reproduced or even strengthened diversity. However, due to the scientification of farming during the last decades, the nature of this interaction between farm practice and ecological conditions has changed significantly. Science-based technology reflects a productivistic perspective on agricultural development: a maximization of productivity under optimized production conditions. To control experimental conditions or to reconstruct them under optimal production conditions, the design and development of science-based technology was concentrated in large national research institutes and subsequently tested on experimental farms. Specificity and diversity were systematically eliminated from the process of design and development. A rational application of science-based technology presupposes the experimental production conditions at the farm-level and a consequent structuration of farm practices according to the embodied logic. Science-based technology thus became the guiding image of farm development. Through intensification (higher outputs per cow or hectare) and scale-enlargement (more cows or hectares per labour unit) agricultural productivity has significantly increased during the last decades.

As science-based technology became the main driving force, substantially supported by policy, its degree of application in farm practices became an important instrument to measure 'modernity'. Farmers, their farms and complete regions were classified in terms of 'advanced' or 'backward'. Assuming that the best farmers rapidly adopt 'modern' science-based technology and realize the highest productivity, their farms were identified as 'vanguard farms' (*Koplopers* in the Netherlands, *grand intensif* in France and *azienda di punta* in Italy). This normative model of farm development is schematically represented in Figure 1. Farmers who did not develop or developed too slowly, were given up. Regions were classified in terms of their suitability for the technological model. If ecological obstacles, such as those in the lowest parts of the Veenweiden, were considered important, such regions were simply seen as inadequate for science-based technology. From this perspective regions lacking the necessary dynamics would inevitably become marginalized, while agricultural production would be concentrated in the 'growth poles'.

Figure 1 The Prevailing Normative Perspective on Farm Development

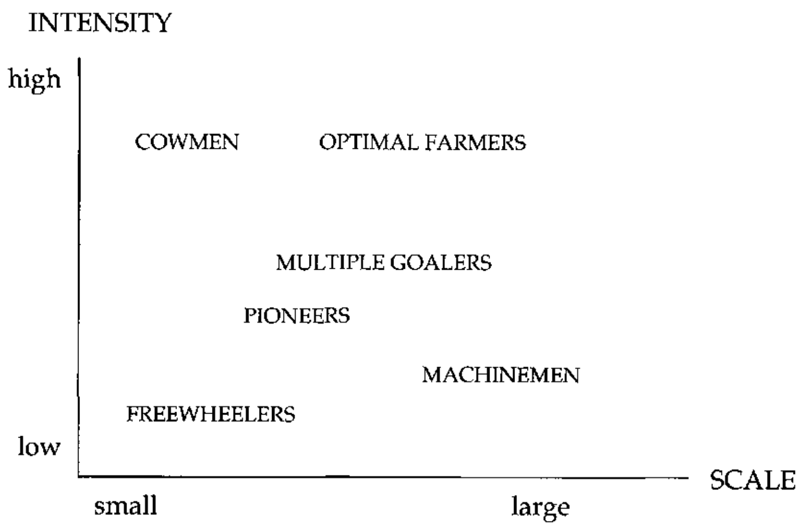


Scientification thus fundamentally changed the interaction between farm practices and ecological conditions. From the productivist point of view the application of science-based technology is an undeniable success story. But for the Veenweiden, with its specific ecological conditions it has several limitations. Firstly, regional specificity can never be completely modelled according to optimal production conditions: peat-soil will always be peatsoil. A radical lowering of the water level is, for instance, one of the critical preconditions for science-based technology. But this has caused many derived problems, such as increased oxidation and sinking land. With many other problems, this called for a new research agenda. Secondly, the creation of conditions for modern technology has generated various conflicts, for instance with respect to the protection of the Veenweiden nature and landscape. Thirdly, the restructuring of farm practices was resisted by farmers with other ideas about farm development and the relation between farm practices and ecological conditions. The political project of science-based technology thus generated its own counter-powers with different perspectives and interests.

Styles of Farming: Differential Patterns of Social Dynamics

Despite tendencies to greater regional uniformity of farming practices according to the unilinear model of agricultural development (see Figure 1), a recent study (van der Ploeg and Roep 1990) of the Veenweiden shows that a diversity of farming practices persists there. The study identified various styles of farming: specific combinations of farming practices and strategic and meaningful aspects of farm labour. A style of farming is connected with a specific idea and model of farm development.

Figure 2 A Social Map of the Styles of Farming in the Veenweiden region



Styles of farming can be identified and analyzed by using extended interviews with farmers, focussing on technical and economic aspects of the production process. The strategic and meaningful aspects of farm labour, the variety of farming practices, strategic elements of management, and norm and values, are conceived from the perspective of the farmers themselves. This methodology reveals the relevant diversity as perceived by the farmers and their classification of these differences. It generates a 'social map' which positions and characterizes each style of farming.

Studying styles of farming has brought us to the conclusion that diversity is consciously reproduced by farmers. Each style of farming reflects a specific normative perspective on farm development (how 'good' farming practices are socially defined), and can be regarded as a structuring principle for farming practices. Farming styles differ from each other in the breeds of cattle they adopt, the management of pasture-land, the use of off-farm capital, the use of family labour, dependence on bio-chemical inputs, etc. Styles of farming comprise different ways in which internal and external relations are structured and how these are interconnected and co-ordinated in a specific model for farm development. We will give a brief description of the styles of farming identified in the Veenweiden region, portraying six farmers. In each portrait the key-issues of farm management or development are stressed. These portraits were then used in a survey among 100 farmers, asking them to classify themselves.

Multiple-goalers

'I like a double-purpose cow. The milkyield per cow is important, but so are the revenues from the sales of cows and calves. I focus breeding and selection on cows with a high residual value. Thanks to the moderate production I can milk more cows and thus sell more calves, so the revenues from the sales of cows and calves are an important source of income.'

Freewheelers

'I'm an elderly person without a successor. I manage to keep costs low and can still make a living on the farm. In the long term my farm will not be up to date, and I will sell it.'

Cowmen

'I love working with cows, feeding and caring. It is my hobby to attain high milkyields. Therefore I pay special attention to breeding and selection, as well as to forage production. The balance between feeding and milkyield is essential to reach high yields. The co-ordination of all these tasks puts a limit on the number of cows one can properly manage.'

Pioneers

'I have a relatively small farm in a disadvantaged area. For me this is no reason to leave farming, because farms like mine may have opportunities to survive in the future. Exactly because of our backward position, we are more prepared to explore new possibilities and anticipate markets, for instance integrating the conservation of nature in farm management or organic farming methods. I regard myself as a pioneer.'

Machinemen

'I prefer working with machines; in the fields and maintaining then. I organize work in the cowshed and in the fields as efficiently as possible. Maximal production with a minimum of labour, that is the economic base of my farm.

> *I don't reach high milkyields per cow, but that is not a problem. I can earn the same revenues through the larger number of cattle.'*

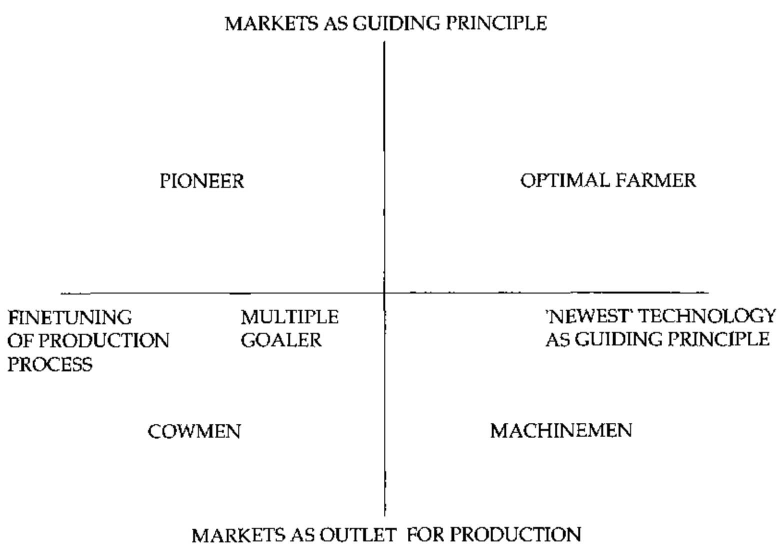
Optimal farmers

> *'In my opinion a good farmer is always increasing production, more cows and higher yields per cow. This requires optimal equipment and special attention to the newest technology. One must not be afraid to make large investments. It gives high costs now, but one has to be prepared for the future.'*

Each style represents a specific model of farm development, in which different positions vis-à-vis the market and available technology are chosen. This is illustrated in Figure 3. Farmers use different market possibilities and technology and sometimes even create new opportunities (in the case of the 'pioneers'). A specific structuration of farming practices also includes a specific interaction with the ecological context. Ecological conditions are 'read' with the farmer's eyes and this determines what they see as minimal or ideal conditions for 'proper' farm development.

'Optimal farmers' produce primarily for the European bulk-markets

Figure 3 Styles of Farming as Differential Strategies



and try to minimize production costs by maximizing the output per ha or cow in combination with scale-enlargement. The ecological conditions of the Veenweiden are seen as a limitation to this strategy. In the past 'optimal farmers' (more than other styles) have made interventions to change the ecological conditions. To achieve their project they have tried to adapt ecological conditions to their own needs. Supported by state subsidies and using science-based technology, they created optimal conditions for intensification: high bio-chemical inputs, the introduction of high productive grasses, and mechanization of land management. Little space was left for safeguarding natural and landscape qualities. Intensification and mechanization have reduced ecological variation, and the typical Veenweiden vegetation is rapidly vanishing.

'Pioneers' have a different opinion about 'good' farming practices. On their farm the interaction with ecological conditions is structured from a different perspective. By using the particularities of the Veenweiden, the 'pioneers' try to change a situation of relative backwardness into an advantage. Farm management is directed to the production of high-quality products for regional markets. An example of such a product is farm-made cheese of high-grade quality, which is sold either directly or at regional markets. The production of this cheese needs high-quality milk. Consequently all elements of farm management have to be structured to produce quality milk: the productivity of cows, the use of concentrates, the production and quality of forage, the type of grasses that are used etc. 'Pioneers' more then 'optimal farmers' are interested in quality. While 'optimal farmers' deliver their milk to the dairy industry for the production of cheese for anonymous markets, 'pioneers' use the specific ecological conditions of the Veenweiden to make themselves known to groups of interested consumers. They regard the character of the Veenweiden as an economic opportunity and develop it into a regional product. They need no radical interventions in ecological conditions although there is need for improvements. They try to find an equilibrium between farming practices and ecological conditions instead of intervening in the ecological system itself.

This implies the development of adapted farming practices, based on adequate technology especially developed for the 'pioneers'. However, until now, science-based technology has been unable to provide such technology. Pioneers must selectively use what is appropriate and depend on their own skills. They have also created a network among farmers to exchange knowledge and to develop adequate technology. The degree to which the creation of such a social basis is successful determines the potential dynamics of this style of farming. A strong social basis may serve to challenge main-stream policy and science-based technology and become a starting point for sustainable agriculture.

What has been said about the 'pioneers' is true for other styles as well. Each has its own dynamics and social basis, which should be taken into account by technology development and policy. They may be the *social carriers* (cf. Edqvist and Edqvist 1979) providing valuable answers to a growing number of problems in agricultural production and rural areas. They embody the potential to reverse the process of regional marginalization.

Figure 4 The Design and Application of Technology

	I	II	III	IV	V
A	OPTIMAL FARMER				
B					
C			PIONEER		
D					

I - V: differential sets of ecological conditions

A - D: differential patterns of farm practices

a specific pattern of farming practices. 'Pioneers' for instance might be located at the intersection of set 'III' and 'C', and so on. The concept of adequate technology acquires a specific meaning within this analytical scheme. The adequacy of available technology is related to the position in the scheme or, in other words: *what is regarded to be adequate depends on the style of farming.* The design of adequate technology should take into account the specific conditions and the specific structuring of farming practices in which it will be applied. As argued above, science-based technology has been exclusively orientated to the construction of 'vanguard farms'. The recent debate on sustainable agriculture has questioned this exclusivity. To a certain extent specificity has been brought back into the development of technology at national institutes, although mainly as a concession to optimal conditions. Technology has been modified to be applied also in less optimal conditions. In Figure 4, this can be illustrated as a gradual shift from 'I' to 'II'. In this sense the design of sustainable farming practices will also be a scientific construction, disconnected from the differential patterns of social dynamics. Adequate technology requires bringing specificity and diversity back into the design. This requires a reorganization of technology development, new perspectives on the relation between farmer and scientist, between scientific knowledge and farmers knowledge, and so on.

If the different styles of farming in the Veenweiden can be viewed as a number of potential answers to specific problems, then the notion of adequate technology is in fact a plea for the differentiation of technology development. The 'pioneers' in the Veenweiden, may serve as *social carriers* for the design of more adequate technology to revitalize regional production and to counter marginalization. To be successful, the support of people other than farmers is needed, and this is what a group of farmers in the Veenweiden region have been organizing. They started with the idea to produce a region-specific farm-produced cheese. By mobilizing various actors, from policy-makers to scientists and their own organizations, they were able to get their project on the agendas of regional politics and research institutes. This group has opened up new perspectives for a region that is becoming marginalized and has tried to design a regionally specific style of farming. This has meant the creation of new market opportunities and the development of adequate technology.

Conclusions

With socio-political movements against the productivistic model becoming more powerful and the problem more urgent, the call for a new relation between farming and ecological conditions is becoming stronger. Sustainable farming practices require bringing specificity back into the design and development of technology. As the study on styles of farming in the Veenweiden has shown, this new concept already exists in practice, as a reaction to the threat of marginalization. The doom of rural poverty and the exodus from rural areas has made people aware that farmers play a role in the rural economy and in the management of nature and landscape. The different styles of farming represent potential 'answers' to the rural crisis and some of the farmers, especially 'pioneers', are ahead in developing a regionally specific production system. They may serve as social carriers for a more adequate design of technology development.

The methodology presented in this paper may be a valuable tool to identify patterns of social development in a region. It may also result in an inventory of the way in which farmers handle problems and propose answers. The concept of 'styles of farming' may serve as a guide to the development of regional agricultural policy in which the development of sustainable agriculture is a central issue.

14 Linking Technological Research to Different Problem Definitions, Perspectives and Interests in the Countryside

Cees de Roest and Silvio Antonello

The way in which technology develops in agriculture is one of the issues that has received considerable attention in recent literature. Most interesting is the approach which analyzes the different paths technology takes in relation to specific regional conditions. Such an approach gives special attention to the relationships between the pedological, physical, social and economic conditions of an agricultural region and the characteristics of the technology applied in different agricultural systems.

In this paper we focus on two different milk production systems in Italy: the production of Parmigiano-Reggiano (Parmesan) and Grana Padano cheese. A milk production system can be considered as the interrelated whole of interdependent technologies, manpower skills and production structures of both the farm and the milk processing industry. The differences between systems have their origin in the ecological and physical conditions of the production area and in different cost/price relationships. Our attention will be concentrated on the two above types of cheese because they are similar and used for the same culinary purposes. They are, however, produced in two different ways: the first on a small, artisanal scale, the second on a larger scale with more industrial concepts.

We describe first the different technologies used on the farms and by the milk processing industry, focussing in particular on the origins of these differences, as these have created the basis for different social and economic paths of development and for different problem definitions by research centers. We then analyze the economic results of both systems at farm and regional level. Finally, we discuss the threat to the Parmigiano-Reggiano cheese production system from the increasing standardization requirements of supermarket chains, which are considered to be incompatible with the system.

Historical Background of Hard Cheese Production

The first documents certifying the existence of a hard cheese produced on the right bank of the River Po date back to the mid-1300s. It is therefore possible that the processing of cow's milk into what was much later, in

1934, to be called Parmigiano-Reggiano was common practice even in previous centuries.

It is common opinion that the production of Parmigiano-Reggiano was first carried out by Benedictine monks. This is likely to be true for two reasons: First, the Benedictines were the only ones in 1200 who bred cows in sufficient numbers to produce the amount of milk needed for a whole 20 kg cheese. Second, the innovative technique of double heating the milk at different temperatures and salting to allow conservation were only possible in elementary laboratories.

As far as the geographic origin of Parmigiano-Reggiano is concerned, we can presume that the cheese was born in the area between the Via Emilia (the main road across the Emilia-Romagna region) and the River Enza which still separates the provinces of Parma and Reggio Emilia. Up to the last century, the Parma diocese extended as far as the area under the civil jurisdiction of Reggio Emilia. This is the reason why the cheese produced in that area was called only Parmigiano for a long time. A similar hard cheese, produced in Lombardia on the left bank of the river Po, was also for a long time called Parmigiano.

The denomination Parmigiano-Reggiano is quite recent, dating back to 1934, after many parochial squabbles between Milan (claiming the denomination of Parmigiano only for the cheese produced in the Lodi area), Parma and Reggio Emilia. A formal Act of the Constitution of the Consorzio determined the Parmigiano-Reggiano production area, which corresponds exactly to the present one. At the beginning of the fifties the Consorzio for the production of the Lombardian counterpart was founded (the former Parmigiano of the Lodi area in the province of Milan), which defined the limits of the production area for the second hard cheese of Italy, baptized with the new name – Grana Padano (see Map 1).

Technology in Parmigiano-Reggiano and Grano Padano Cheese Production

The two cheeses share almost 30 percent of Italian milk production. Most important is the Parmigiano-Reggiano cheese, consuming about 15 percent, followed immediately by Grana Padano which consumes about 13 percent. In the eighties their production increased significantly (Figures 1 and 2).

Historically, dairy farms in Lombardy (where 60 percent of Grana Padano cheese is produced) were characteristically large farms and in Emilia-Romagna (the production region of Parmigiano-Reggiano) small and medium-sized farms. Some of the differences in technology between the two areas can be related directly to these differences in farm structure and size, which in their turn generated a different scale of operation in the milk processing units where cheese production takes place.

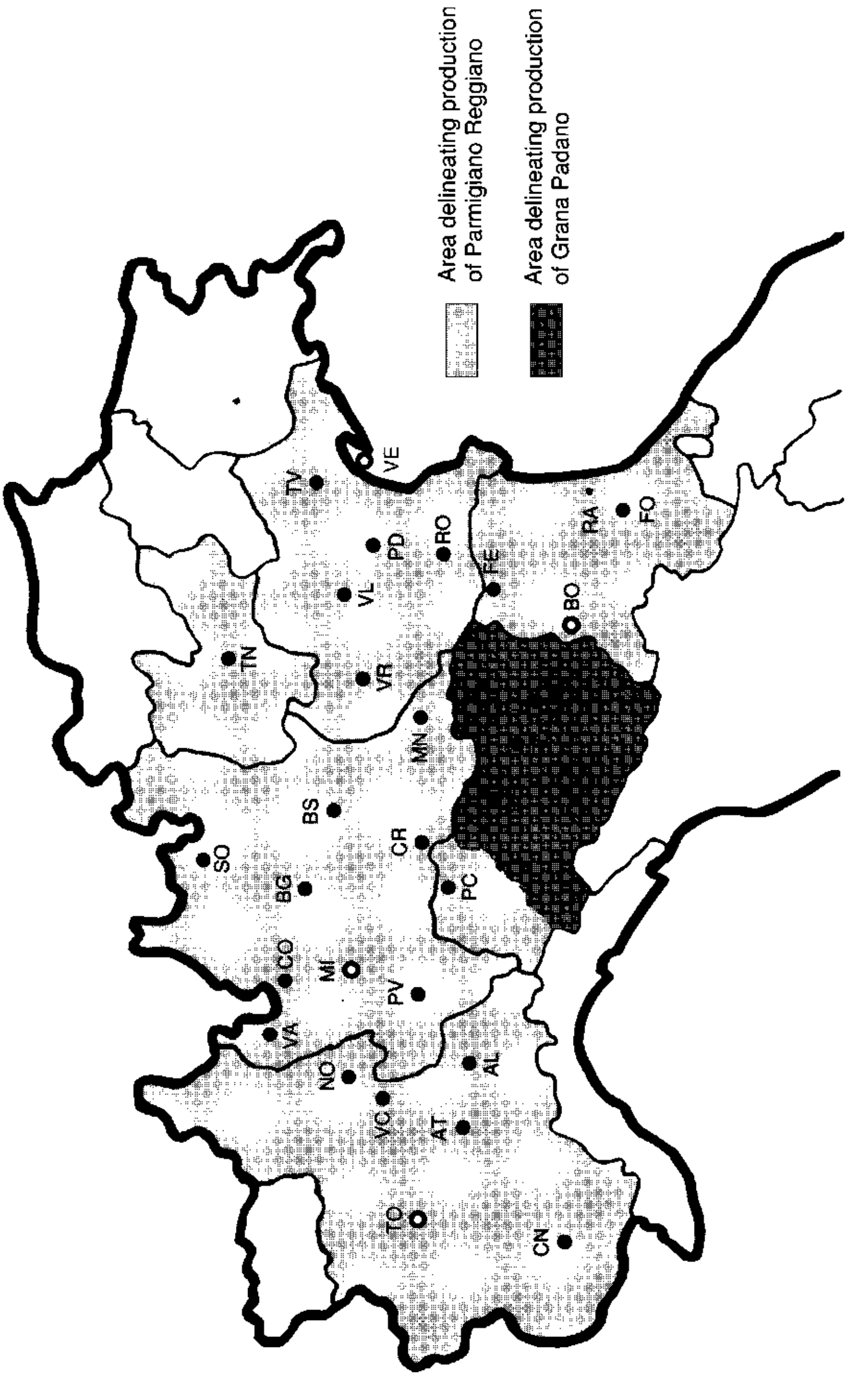

Area delineating production of Parmigiano Reggiano
Area delineating production of Grana Padano
TV
VE
PD
RO
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Figure 1 Parmigiano-Reggiano and Grana Padano Cheese Production 1981-91

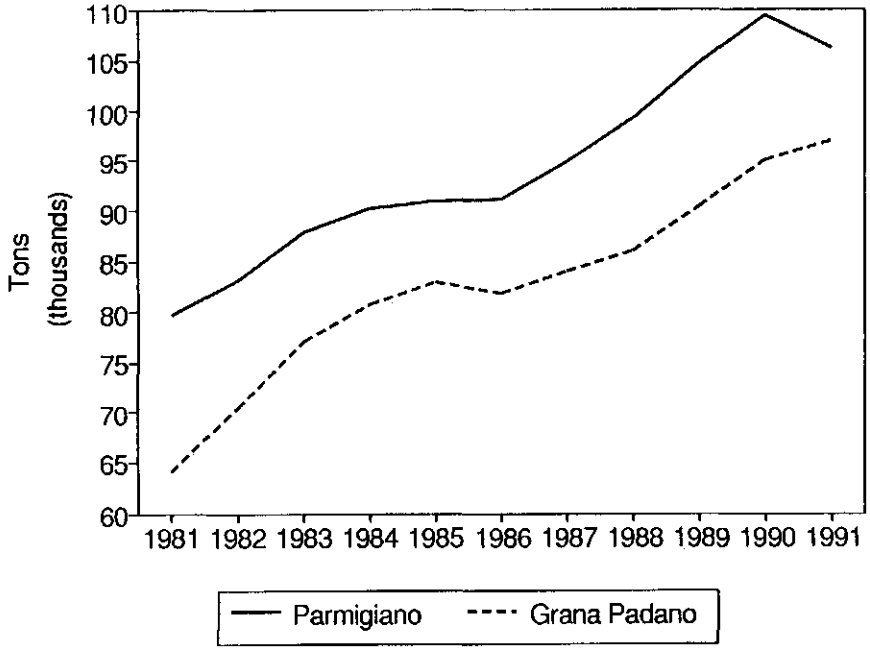


Figure 2 Share in Total Italian Milk Production 1981-90

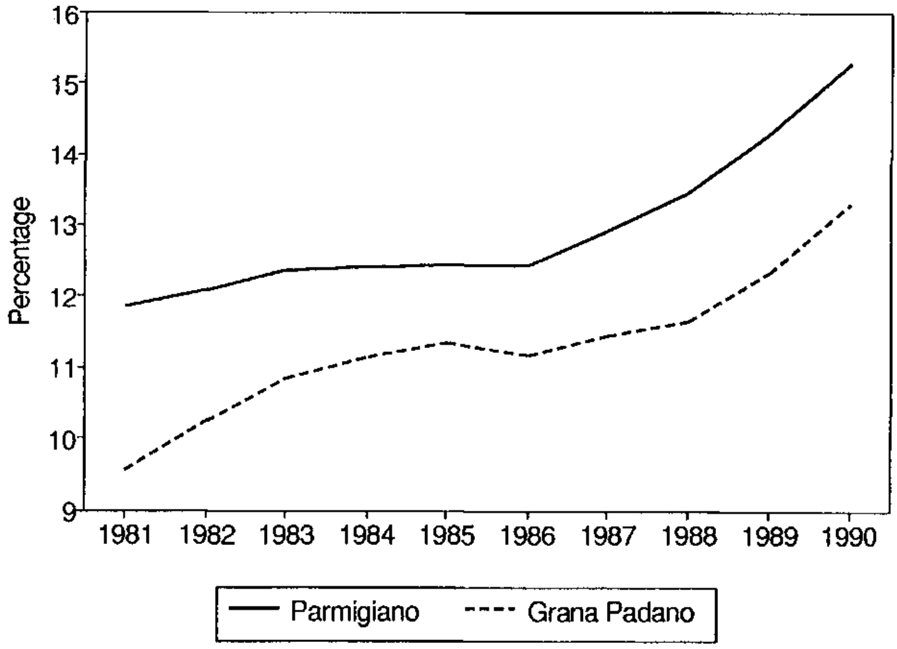


Table 1 The Principal Differences Between the Two Dairy Systems

	Grana Padano	Parmigiano-Reggiano
1 main feedstuffs used on the farm	maize silage grass silage concentrates	hay concentrates with limitations
2 milk processing in cheese factory	two times a day with partial skimming	once a day with a mix of skimmed evening milk and whole morning milk
3 treatments	chemical additives (formaline, lysine)	no additives

Parmigiano-Reggiano cheese is produced in about 800 small-scale processing units (see Map 2) with an average working capacity of about 2,000 tons of milk per year. Grana Padano cheese is produced in larger processing units and in some cases on an industrial scale. On average, 5,400 tons of milk annually are processed in a Grana Padano plant.

A very important difference in feeding practices between the two areas is the prohibition of silage in the Parmigiano-Reggiano cheese area. The fear of microbial contamination of the raw milk is the reason for its ban on farms delivering milk for Parmigiano-Reggiano cheese. In Lombardy, however, the abundant use of maize silage is characteristic of feeding practices. Drier and more sandy soils in this region create ideal production conditions for this crop. The composition of concentrates in the Parmigiano-Reggiano cheese area is also subject to limitations. It is forbidden to add a series of byproducts to the compound feed. Hence, local compound feed plants specialize in the production of adapted feed for local dairy farmers who produce milk for Parmigiano-Reggiano cheese.

There are also some differences to be observed in the processing of milk for the two cheeses, although in many respects the process of cheese production is similar. Both put raw milk into small cone-shaped basins from which the two forms of cheese are extracted. In the Grana Padano area, however, productivity is much higher due to a more pronounced division of labour during processing. More parts of the process are mechanized and cheese processing is carried out twice a day. Another important difference is that in the Grano Padano plants chemicals are added to the milk in order to prevent the development of microbes derived from feeding silage in the stables. Without using additives the long ripening period of Grana Padano cheese (15 months) could be disturbed by the presence of these microbes. The production process of Parmigiano-Reggiano cheese is based on mixing the morning whole milk with the partially skimmed milk of the previous evening. The product can be considered completely natural as no additives are used and cheese processing takes place only once a day. The dairyman responsible for processing must be endowed with special skills which mark a pronounced division of labour during processing.

Thanks to substantial documentation, we know that since its origin and until the mid-19th century, Parmigiano-Reggiano underwent no processing innovation. The innovations of the last 150 years can be summarized as follows:

a the elimination of saffron as a colouring agent (which gave it in the beginning its yellow colouring)
b the use of whey-ferment to increase cheese compactness
c the introduction of steam heating instead of wood heating
d the replacement of the old small wooden basins with aluminium basins
e the use of the Notari curd knife to cut the curd
f wet instead of dry salting
g the elimination of the final colouring
h mechanization and automation of the recircling of the milk in the basins (though still in many dairies these operations are carried out by hand)

Basically, the only changes in production techniques for Parmigiano-Reggiano have been those aimed at improving the productivity of the dairyman.

Economic Aspects of Production at Farm and Regional Level

Smaller farm size and feed restrictions (forage and concentrates) cause higher milk production costs for the dairy farmers. A comparison of the milk production costs of the two regions confirms that the artisanal way of producing milk generates higher milk production costs on farms (see Tables 2 and 3). Costs are about 15 percent higher. The major difference observed is in the purchase of compound feed. In the Parmigiano-Reggiano cheese area these costs are higher because of the ban on using any type of silage. In Lombardy the use of maize silage significantly reduces the input of concentrates. However, the higher quality of Parmigiano-Reggiano cheese is reflected in its higher price on the market (about 12 ECU/kg in the shops) and, due to a mainly cooperative system of processing, this higher market price is translated into a higher off-farm milk price (Figure 3). The more labour intensive technology used on the farms in the Parmigiano-Reggiano area, causing higher production costs, is offset by a higher off-farm milk price. This higher price also generates a higher income per working unit in the less-favoured mountainous areas.[1]

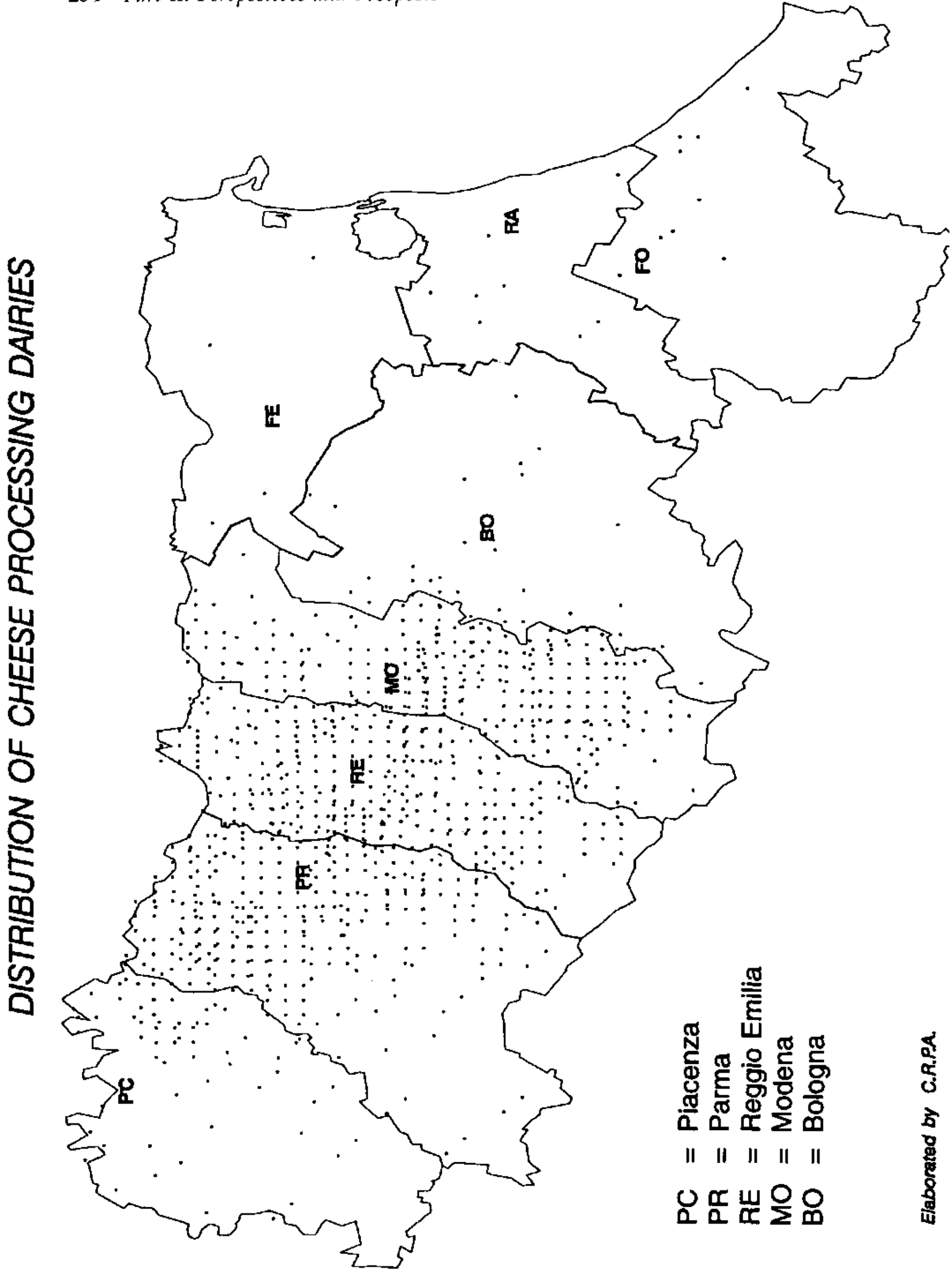

DISTRIBUTION OF CHEESE PROCESSING DAIRIES
PC
PR
RE
MO
BO
FE
RA
FO
PC = Piacenza
PR = Parma
RE = Reggio Emilia
MO = Modena
BO = Bologna
Elaborated by C.R.P.A.

Table 2 Characteristics of the Samples

	Lombardy	Parmesan cheese area
Number of farms	426	18
Farm size (ha)	32.2	24.2
Forage area (ha)	25.5	21.2
Milking cows	51.3	45.0
Price of milk (lire/kg)	681	814
Labour input (AWU)	3.3	3.4
Production per cow (kg)	6300	5370
Cows/AWU	15.5	13.4
Cows/ha forage area	2.0	2.1
Milk production /ha forage	10803	13372

Source: Pretolani (1991) and own calculations on ERSA data.

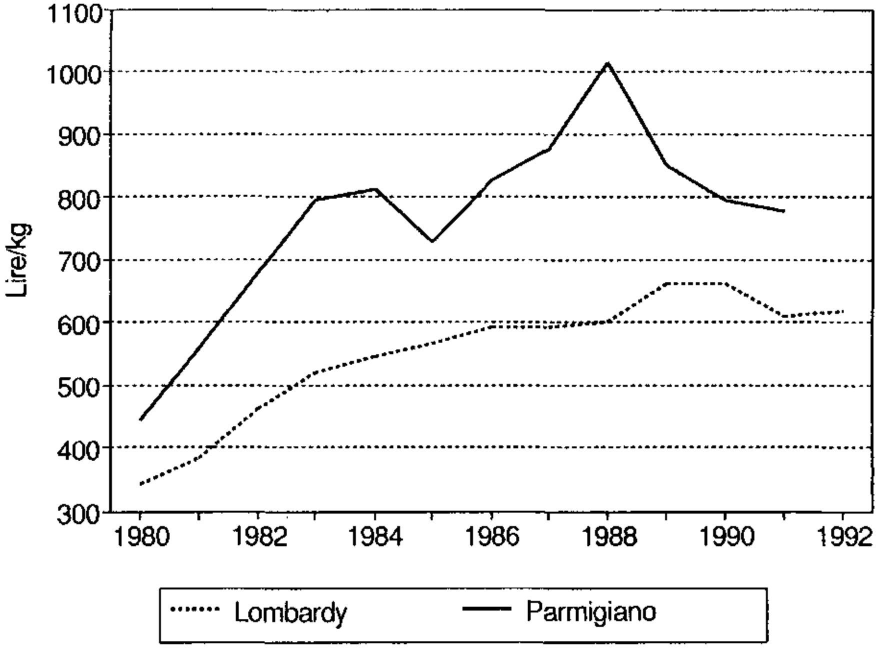
Table 3 Milk Production Costs 1989

	Lombardy		Parmesan cheese area	
	Lire/kg	%	Lire/kg	%
Purchased feed	172	25.8	239	31.7
Other cattle costs	28	4.1	38	5.0
Forage production costs	72	10.8	53	7.0
General costs	28	4.1	31	4.1
Machinery and buildings	36	5.4	59	7.8
Labour	268	40.2	251	33.3
Interest on loans	64	9.6	83	11.0
Total production costs	666	100.0	753	100.0

Source: Pretolani (1991) and own calculations on ERSA data.

Incomes in the Lombardian plains are higher than in the plains of, for example, the province of Reggio Emilia. In the plains of Lombardy, characterized by large-scale farms, economies of scale more than offset the lower milk price paid, whereas in the plains of the Parmigiano-Reggiano cheese area, the smaller farm size, generating higher production costs, results in a lower gross income per working unit. Interesting, however, is the fact that in the mountain area of the Parmigiano-Reggiano zone, incomes are definitely higher than in the mountains of the Lombardy region. The mountain areas of the province of Reggio Emilia (RE), Parma (PR) and Modena (MO) reach income levels which are almost double those achieved in the mountain areas of the provinces of the Lombardy region. Thus, the high quality production of Parmigiano-Reggiano cheese presents an efficacious way of defending agricultural incomes against further marginalization in mountain areas.

Figure 3 Milk Prices in the Lombardy and Parmigiano-Reggiano Cheese Areas



Research Activities in the Parmigiano-Reggiano Cheese Area

The special regulations for the production of Parmigiano-Reggiano cheese laid down by the Consorzio[2] can be considered as the basis for specific technological developments. The whole system expresses a demand for research on adapted technology which differs considerably from the research questions posed in the Grana Padano area. Some examples will illustrate this statement.

As mentioned earlier, the prohibition of silage in the Parmigiano-Reggiano area has forced the farmers to use more concentrates per cow to satisfy the energy requirements of cows with increased genetic production capacity. To sustain the high milk production levels per cow, which still lag behind those achieved in the Grana Padano area, involves high costs. The only way to lower these costs is to increase hay quality. The specific technology developed to do this is the technique of drying hay twice. The principle of the technique is based on a first short drying of the forage (mainly alfalfa) in the fields, which reduces losses, and a second drying that is done in the hayloft using forced ventilation. Traditional haylofts can easily be converted by inserting special ventilation vans. In spite of the higher energy and investment costs, this technology turned out to be successful, since the higher costs are compensated for by a significant reduction in input of concentrates.

But it is not only a question of developing specific technology. New technology introduced with success in the Grana Padano area was actually prohibited in the Parmigiano-Reggiano area. Here we refer to the mixing of roughage and concentrates, creating a basic ration for cows better known as unifeed. The Lombardian dairy farms have been very eager to adopt this new technology as it fits well in a maize silage-concentrate ratio. The mixing of these two ingredients is easily done and results in a good basic ratio. The unifeed technology on the Parmigiano-Reggiano dairy farms would lead to a mixing of hay with concentrates, but in this case water has to be added in order to achieve a successful mixture. The final quality of the product, however, is very doubtful, as moulds can rapidly develop. It is for this reason that the Consorzio has blocked the introduction of this technology on Parmigiano-Reggiano dairy farms.

These two examples illustrate how the strict quality requirements of Parmigiano-Reggiano cheese have given rise to the need for specific technological development. Newly developed technologies that fitted well in some milk production areas were unsuited to the milk production system of Parmigiano-Reggiano resulting in the creation of new technology for this latter area. Thus the path of technological development is specifically linked to endogenous resources and follows special quality requirements which differentiate Parmigiano-Reggiano cheese from its major competitor on the hard cheese market.

The Hard Cheese Market and the Dairy Industry

The large-scale dairy industry in Italy has never been interested in Parmigiano-Reggiano cheese production, because fresh cheeses such as Taleggio and Italico, and other fresh cheeses produced by large private companies such as Galbani, Invernizzi, Kraft and Locateli, and owned in many cases by multinational enterprises, offer higher profits, often resulting in higher value-added (see Table 4).

As demonstrated, the value-added produced by Parmigiano-Reggiano cheese remunerates a higher labour input on the farms and in the processing units. The advantages of cooperative processing units combined with a high quality product are fully exploited. The high value-added of fresh cheeses produced in many cases with an industrial quality concept, however, remunerate lower labour input and capital intensive production processes.

Table 4 Valorization of Different Types of Italian Cheese

	Wholesale price (lire/kg)	Kg cheese per 100 kg milk	Value per 100 kg cheese (lire/kg)
Parmigiano-Reggiano	14.500	6	87.000
Grana Padano	11.400	6	68.400
Gorgonzola	5.975	13	77.675
Italico	6.525	14	91.350
Taleggio	6.675	14	93.450
Provolone	7.625	8	61.000

Source: Comitato Produttori Parmigiano-Reggiano Montechiarugolo.

In the following scheme, a rough indication of the structure of the production-trading chain of Parmigiano-Reggiano, Grana Padano and fresh cheeses is given.

	Parmigiano-Reggiano	Grana Padano	Fresh cheeses
Dairy farms	small-medium sized labour intensive	medium-large sized labour intensive	medium-large sized capital intensive
Cheese factory	idem	idem	idem
Trading	prevalently small retailer	retailers and supermarket	prevalently supermarket

Parmigiano-Reggiano cheese is still sold on the market mainly by small retailers. In the last few years a rapid increase of food selling via supermarkets has been noticed in Italy. As a consequence, even a product like Parmigiano-Reggiano cheese, which has traditionally been sold by small retailers, is increasingly directed towards the supermarket chains. The scale enlargement tendencies in the processing and trading sector of Parmigiano-Reggiano cheese are generating a series of new demands on the product which can be considered as an exogeneous force threatening the viability of the ParmigianoReggiano cheese production system. The last part of this paper highlights these aspects.

The Factors Threatening the Ecosystem, and Possible Answers: the Negative Power of Marginal Areas

One of the main reasons why Parmigiano-Reggiano cheese (even when it was named differently) has maintained its own identity for about 800 years, is that it is strictly linked to the production area of origin. It is produced in a limited area, and is mainly consumed in that same area. Moreover, the price does not allow for mass export to countries where consumer habits express no particular demand for this high-priced cheese.

This identification with the territory has been threatened on several occasions during the past centuries and always in conjuncture with crises for the Parmigiano-Reggiano cheese. For example, during a short period in the first half of 1800, some producers of Bibbiano (at that time the area with production quality supremacy) decided to process milk into Emmenthal with the assistance of Swiss technicians. It was the way local dairies tried to solve the price crisis of that particular period.

What adds to the threat is the extremely rigid processing structure, which leaves no room for diversifying the product. All the cheese factories produce only Parmigiano-Reggiano, with butter as a by-product. An alternative to producing Parmigiano-Reggiano would be to produce other types of cheeses or other milk by-products, but these do not bring sufficient return to cover the higher production costs of producing milk on these farms. A serious threat is posed by modifications in the final consumer distribution channel, now largely in the hands of strong finance groups which operate on a multi-regional or national basis. In this increasing mass distribution system, Parmigiano-Reggiano has to compete with lower-priced products characterized by higher flexibility due to a production area as wide as the major part of the Po-Valley.

The economic policy of these trading channels calls for the following requirements:

- High standardization of the product (in time and space);
- Concentration of supply and
- Prices that make the markup margin of Parmigiano-Reggiano attractive in comparison with competing products.

The Parmigiano-Reggiano ecosystem has never experienced so great a stress as at present. The reasons are mainly due to the rapid reorganization of the distribution system in Italy, a process which has already largely taken place in the northern countries of the EC. Below is a short list of some of the consequences for the Parmigiano-Reggiano production process due to the standardization pressures exercised by exogenous forces.

a Until 1984, genuine Parmigiano-Reggiano, which was produced from April to November, was distinct from Vernengo which was produced in the winter months. Nowadays, owing to the standardization of the product in time, this old distinction is no longer made, which has also contributed to the slowing down of the market to the unfavourable situation found today.

b The standardization of the product in space causes a considerable boost towards so-called dairy 'rationalization'. Owing to the introduction of labour-saving technologies, dairies tend to increase their size through a concentration in space, merging and closing the less cost-efficient ones.

c The increased competition among dairies has led to lower off-dairy selling prices for cheese and as a consequence to lower off-farm milk prices.

d The defence of incomes leads to scale increases and to the improvement of technical efficiency. As individual milk quotas have been ineffective, scale increases have been possible without difficulty. The most recent agricultural census data on cow numbers for 1990 confirm this statement. The improvement of technical efficiency leads to an increase in the milk yield per cow. This increase has been fast, not gradual. The result is a growing negative correlation between the quantity and quality (casein, proteins, fat) of the milk produced in the area which is entirely used for the production of Parmigiano-Reggiano.

e The scale increase of farms is causing an increasing lack of balance in farm structure. This phenomenon could have far reaching effects on the internal balance of those dairies which operate on the traditional cooperative principle of one vote per person. This principle is likely to be replaced by the capitalist one where each member's importance is proportional to their contribution. Formally the situation is not yet quite like that, but the political weight of the large-scale producers is out of all proportion to those who work on a smaller scale.

f This is not only a problem of democracy but of milk quality and of the milk premium system too. In fact, a 'quality-based' system has introduced a series of parameters on the basis of which milk quality is measured. The farmers who have increased their productive scale, who have considerably higher milk yields, and who have mechanized and automated their farms are able to produce better milk, especially in hygienic and sanitary terms, but not necessarily better as concerns caseins, proteins and fat, which are essential for the production of Parmigiano-Reggiano. The considerable power of large-scale farmers to influence cooperative decision making has led to the accent being placed on the hygienic characteristics of the milk in the premium system and to the neglect of the importance of the casein content of milk. In this way large farmers obtain higher premiums on milk prices, whereas the dairies are facing growing difficulties in milk processing because of a drop in the casein content of the milk.

The different methods of processing according to the seasons, the artisanal and small size of the structure of processing and the high number of dairies scattered over a wide production area, traditionally generated high variability in the quality of the product and to consequent parrochial squabbles about where the 'best cheese' was produced. The corresponding discriminatory consumption patterns led to a different remuneration for the different qualities. First-rate stores were distinct from those selling an inferior quality product to less well-off customers. There used to be a wide range of cheeses from which one could choose for flavour (strong vs. mild); for colour (yellow vs. white); for seasoning, etc. The standardization required for large distribution leads to the gradual disappearance of all these differences. The aim of the trading chains is to have only one type of Parmigiano-Reggiano in time and space. The same cheese in January and in July, in the province of Modena and Parma; in the Appennines and along the River Po.

h For centuries the milk for Parmigiano-Reggiano was produced by cows called 'Formentina'. This breed orginated through selection from many different sub-breeds named after the places where they were reared: Piacentina, Ottonese, Reggiana, Parmigiana. In the same area another breed originated from the Modenese and Carpigiana breed, and in the Appennines of Tuscany and Emilia, from the Montanara. Nowadays, many of these breeds no longer exist. The small number of surviving cows (very few reared on small farms) are of concern only to special programs for the survival of ancient breeds. There are two main reasons for their rapid decline. The first is that they produce a smaller quantity of milk (less than Holstein-Friesians), although of an excellent quality. The second reason is that machine milking is not adapted to them, or in other words, they are not compatible with the technological package of the farms.

The replacement of the local livestock breeds with foreign cattle results in some important side effects, especially when its aim is to try to boost the productive performance of the cows. The first is that the fresh grass-based feeding system is gradually replaced by a hay-based one in order to ensure the same feeding to the cattle all year round and to obtain as homogeneous a milk as possible. This standardization of the feeding practices serves the purpose of eliminating Vernengo (a winter cheese less in demand on the market) and favouring the production of the same Parmigiano-Reggiano all year round. The second consequence is that the increase in average farm production requires an increasing amount of feed from outside the farms and the Parmigiano-Reggiano production area. This is the case not only for compound feed, but also for roughage produced in remote areas, sometimes at 400km distance. In this way the essential relation between fodder production, cattle feeding and milk production has become weaker.

i Scientific research and experiments concerning animal production and cheese quality have been the basis of the Parmigiano-Reggiano ecosystem for a very long time. Parma, Modena and Reggio Emilia are the seats of Universities where the agricultural departments play a leading role. Beside these Faculties, there are many agricultural schools whose purpose is to strengthen the skills of the producers of Parmigiano-Reggiano. For a long time local scientific research was linked to Parmigiano-Reggiano cheese. Every innovation, or better, the coding of new practices by farmers and dairymen, was subject to the historically acquired characteristics of Parmigiano-Reggiano which were not allowed to undergo alterations.

This relationship between scientific research and the typical Parmigiano-Reggiano production system has recently become weaker. The most worrying tendency is the one which aims to explore the suitability of technologies in use in areas like the Lombardian plains for the Parmigiano-Reggiano cheese production system. Such technologies relate to different cattle feed systems, the possibility of milk-cooling on the farm (to avoid twice-daily delivery), the possibility of improving the processing of milk through the robotization of the dairies, etc. Such research is nowadays very well accepted in Emilia, and is financed and supported at private and public levels. But research topics such as the analysis of the relationship between dairy size and the quality of Parmigiano-Reggiano, or between the restructuring of dairies and the response capacity of the productive base, especially in the less favoured areas of the Appennines, are far less attractive. In other words, also in the Parmigiano-Reggiano production system, scientific activity is becoming increasingly disconnected from the locality and the specificities contained within it. 'Progress' is understood, at least in most scientific circles, to be an *adieu* to the locality and the simultaneous embracing of more *universal* values.

Now one might wonder what the future of the Parmigiano-Reggiano cheese might be. The conclusion to be drawn from what has been reported so far suggests that it could be pessimistic. The gradual indifference to the ecosystem could lead to a more pronounced standardization of the product along the lines of the strategies of large-scale distribution, and this will have concomitant effects on the quality of the product.

People used to say that 'Parmigiano-Reggiano is good when it is good!'. Nowadays this could be questioned. Parmigiano-Reggiano might become in future 'fairly good' – with less production discards, fewer kinds of second choice cheeses but also fewer excellent kinds of cheese. Small specialized retailers maintain that, on average, the quality of other hard cheeses like Grana Padano is reaching that of Parmigiano-Reggiano. Yet, if one wants a first-rate cheese, one still has to ask for Parmigiano-Reggiano. This is undoubtedly so, because the consumer prices of the best Parmigiano-Reggiano are still far higher than those of the competing Grana Padano.

Although centrifugal forces with highly disintegrating powers prevail in the ecosystem of Parmigiano-Reggiano, there are still a few 'resistance' factors. The main one is the influence that the less favoured areas bring to bear on the entire Parmigiano-Reggiano area. In the Appennines of Emilia modernization meets with greater difficulties. First of all territorial morphology places many obstacles in the path of scale enlargement of the farms and the merging of dairies. The distinctive features of a mountain environment do not allow the assimilation of a 'universal' development model. Beside natural, geological, and climatic factors, the local culture also opposes external innovations. This social resistance, in the weakest area of one of the strongest ecosystems of Italian agriculture, does not find many political supporters. Actually, in political and scientific regional circles, beyond the usual show of solidarity, the prevailing idea is to help agriculture in the mountain areas in Emilia by favouring tourism, so that agriculture loses any economic interest and becomes a slave to ecology.

The highest quality of Parmigiano-Reggiano can be found in those areas where the milk production per cow and the fodder production per hectare is low, where the dairy size is small and where the production and processing costs are high due to less favourable production conditions. But at the same time, because of the more artisanal way of production, a higher percentage of cheese is discarded in these areas. In other words, the variability of quality is still large. Only a small part of the entire production of Parmigiano-Reggiano is produced in the mountains in Emilia, but their share in total production might decrease as a consequence of the closure of farms and dairies.[3]

The large distribution chains are not interested in the Parmigiano-Reggiano produced in the mountain areas, because production is too small for their market strategies. It is significant that a proposal to trade the Parmigiano-Reggiano produced in the mountains with its own recognizable trade mark has met opposition from the Consorzio. Such 'diversity', limited to a very small amount of produce, should not have worried anyone, nor would it have disturbed the larger Parmigiano-Reggiano market. However, it has been considered a threat to the interests of those market agencies aiming for a homogeneous, standardized product, such as the supermarket chains. They are the ones who are less worried about the maintainance of the Parmigiano-Reggiano cheese and its ecosystem as it used to be in the time of Bizzozzero and Zanelli.[4] Only the maintainance of this system, with its high variability, can guarantee the distribution of a conspicuous value-added, remunerating the labour of a high number of small- and medium-scale farmers. The private interests of these agencies do not necessarily coincide with the public interest of high, medium remunerated occupation levels in a still declining economic sector like agriculture.

At the present time, the Parmigiano-Reggiano ecosystem can be better protected, and a development strategy for its weakest sub-areas better established, only if quality is defended and the unreproduceability of the product in space and time is promoted in opposition to a quantity-based strategy aimed at the most homogeneous product possible.

Notes

1 The gross income per working unit was calculated at municipality level for the year 1982, relating single gross standard incomes to agricultural census data of 1982. By means of an aggregation of agricultural municipality incomes, sub-regional incomes were calculated (see Map 2 and Figure 4). The provinces of Reggio Emilia (REm), Modena (MOm) and Parma (PRm) belong to the Parmigiano-Reggiano production area. The remaining provinces of Sondrio (SO), Piacenza (PC), Bergamo(BGm), Brescia(BSm), Como (COm) and Varese (VAm) are areas in which Grana Padano cheese is produced.

2 The Consorzio Parmigiano-Reggiano is the official body responsible for the quality control of cheese in the whole area. Production regulations have been adopted by this body and are controlled by its employees. A similar body has been created for Grana Padano cheese, but has much less influence on production practices.

3 Until now milk production in these areas has resisted fairly well. The last agricultural census data of 1990 indicated with respect to the 1982 figures a small increase in cow numbers in the mountainous part of the Parmigiano-Reggiano production area.

4 Well-known researchers and extension officers at the end of the 19th century occupied in research on the quality of the Parmigiano-Reggiano.

15 Farming Systems Research for Sustainable Agriculture

David Gibbon[1]

In this contribution I aim to examine, in the first place, the evolution and development of Farming Systems Research (FSR) within the context of the agricultural and rural development systems of developing countries. Secondly, the continuing inflexibility of agricultural research and educational institutions, and some problems with the implementation of FSR itself are discussed. It is considered that the methods and techniques of analysis and interaction with clients that have become widely accepted in recent years, offer the best chance for more relevant and sustainable research outputs and that these may have some useful application within the analysis of endogenous development patterns in Europe.

Agricultural Research: Some Important Characteristics

Formal agricultural research in developing countries has been strongly influenced by western scientific thought and bears many of the characteristics of the physical and biological scientific tradition (Arnon 1989). Early in the development of agricultural science, a reductionist approach to problem solving developed and disciplines became clearly defined and proliferated. The focus on commodities was also strong as a result of the colonial political and economic pressure to exploit crops and livestock products which satisfied the demands of growing western industrialized societies (Mansfield 1950).

The second strong feature of research has been the belief, by research planners and scientists, that formal research and extension is the principal source of new ideas and technologies that will benefit all farmers. Research and extension institutional structures were developed to support the transfer of the technology model of development (Biggs 1990).

Within formal agricultural research institutions, the role of social scientists has been peripheral, although agricultural economists have made major contributions (Collinson 1981; Norman 1980) in the design and assessment of alternative technologies, in the evaluation of the outputs from research and in the study of labour and markets. However, the integration of social scientists into the research planning and implementation process has been rare and often difficult due to a lack of understanding of their potential role from both natural and social scientists (Maxwell 1986; Rhoades and Booth 1982). It is possible that this is one of the reasons why so much research output is of little value to the majority of the world's farmers.

Research policy has also had particular biases. Many policies in developing countries have tended to focus on commodity based commercial agriculture and have supported inputs and marketing of products through a variety of direct and indirect subsidies. Little attention has been given to equity issues, either within or between households, and very few research systems serve the needs of poorer people in the community. Rhoades considers that research has moved through a series of distinct phases since the 1950s – production, economic, ecological and institutional – which have reflected the priority concerns of particular decades (Rhoades 1989). Sustainability appears to be the current focus of attention (Hart and Sands 1990), although institutional issues seem to be increasingly of interests (not becoming important until 1995 according to Rhoades).

A problem facing many research systems in developing countries is that their institutional structures and organization were set up many years ago to serve very different economic and political environments. Underfunding, inadequate human resource development and inflexible work planning, mean that there is little scope for innovation or the ability to respond to the real needs of a range of clients (Trigo 1986). The recent concern with resource degradation and environmental quality issues has highlighted the fact that many agricultural research systems are very poorly equipped to deal with these aspects of resource use and misuse. In many countries these issues are often dealt with by different ministries and often with little integration with related fields.

Farming Systems Research and Development

Farming systems research has been around for many years in many guises, but it was the uneven effects of the Green Revolution transfer of technology model of agricultural research and extension that prompted a focus on systems thinking and the development of a more client-sensitive systems approach to the prioritizing and implementation of research. It was felt by many that significant areas of the tropics, notably those experiencing high degrees of climatic and environmental risk, and with relatively low productivity potential, were poorly served by conventional research. (Shaner, Philip and Schmel 1982). The fact that many millions of people occupied these areas was an additional incentive to pay more attention to them. The move was also accompanied by substantial support from major donors, and expectations that significant results could be achieved in a short time (Frankenburger *et al.* 1989). The International Agricultural

Research Centres also gave farming systems research substantial initial support (Dillon, Plunknett and Vallaeys 1978).

Although FSR approaches have developed through a variety of individuals, institutions and regions, there are a number of key elements that are, or should be, common to all. These are:

- Farming systems research requires researchers to develop an holistic perspective of the real social, economic and political environment that is experienced by rural communities. Researchers need to develop an initial understanding of the farm, the household, a community or a resource user group as appropriate units of analysis.
- A specific client orientation is possible, following the study and identification of differentiated groups of farmers and user groups. This approach has developed because of the experience of conventional research outputs which have tended to favour better-off farmer groups at the expense of poorer rural people, and better endowed areas at the expense of resource-poor or marginal areas (Chambers 1983).
- As most scientists are trained in one discipline, it is normally necessary to put together multi-disciplinary teams (natural and social scientists) for farming systems research to be effective. These teams are required to develop interdisciplinary analytical and operational approaches, although the assembly of a multi-disciplinary team does not guarantee an interdisciplinary approach.
- Farming systems research is intended to focus on problems identified by and with farmers.
- To be effective, farming systems research also should be well linked to other scientific programmes which can provide specific support and skills to solve particular problems, to extension agencies and to planners and policy makers.
- One of the most important features of farming systems research is that it should develop in a dynamic, flexible way and continually respond to changing circumstances in an iterative manner.

It is important to recognize that a number of different approaches to FSR have developed during the last twenty years (Gilbert, Norman and Winch 1980; Simmonds 1984; Fresco 1984). However, too much is often made of these differences (Pillot 1990). Most are based on the same principles and many programmes have drawn on the most appropriate tools for particular circumstances (see, for example, the FSR programmes at Khon Kaen in north-east Thailand (KKU 1987).[2]

Problems of Concepts and Implementation of Farming Systems Research

Despite the very positive approach that developed with the introduction of FSR, there have been and remain problems with the limited scope of the original concept and in the ways in which the approach has been implemented or operationalized (Davidson 1987; Marcotte and Swanson 1987; Oasa 1985). When the concept was first introduced there was an understandable need to develop a clear focus and boundaries of analysis and to agree on a methodology of research that researchers and extensionists could work with.

This led to two problems. One was the focus on the farm household as the principal unit of analysis. While this was appropriate in some circumstances, it is not always the case. Other groupings may be appropriate and there are important intra-household differences that need to be recognized (see below). A number of writers also placed the farm in the context of a hierarchy, implying important linkages up and down the hierarchy (Conway 1985; Hart 1982). This again is only partially useful as there are often important linkages between farms and common themes that need to be analyzed across similar farming communities. The Francophone approach to farming systems analysis perhaps provides a broader concept of farms as part of the landscape and wider community (Pillot 1989). There is a recognition here that both the farm and the community (however that is defined) are necessary units of analysis.

A second major problem area is the 'stages' approach to implementation of FSR which appeared in the early literature and remains dominant in many systems (Norman 1980; Shaner, Philip and Schmehl 1982). This involves a four- or five-stage process of diagnosis, design, experimentation, testing and dissemination. While this has given many researchers an agenda and framework, it has also often resulted in an excessive focus on the initial, diagnostic phase of research. Many research teams have spent far too many resources and time on the initial study and collection of information on farming systems, on agro-ecological zones, on the development of farm typologies etc., but this has rarely been very productive. With the limited time horizons of projects, researchers have often not gone very far beyond this initial stage. In view of the dynamism of many systems, the delay caused by this excessive emphasis on initial diagnosis can result in proposals and experimental plans that are already out of date or inappropriate by the time they are implemented. There has been a very slow recognition by researchers of the need to consider a dynamic, interactive relationship between researcher, extensionist and farmer, and to initiate activities that support the process of technology development in a variety of ways simultaneously (Thapa, Green and Gibbon 1988).

Yet another major problem area has been the inadequate understanding and analysis of household differentiation, particularly with respect to gender. This is despite the recognition of the importance of gender many years ago and the incorporation of social scientists into research systems. This positive move has not been developed further as many research systems still have little understanding of the importance of gender analysis, both as an initial step and as an integral activity in research.

Agricultural research institutions remain dominated by the natural sciences and focus on scientific problem solving and technology generation. Farmers or potential technology users are still only peripherally involved in research planning or decision-making and scientists remain dominated and guided by the prevailing western scientific paradigm. Most of these last problems have arisen from the inappropriate structures that have been created in many institutions with the introduction of FSR. While some countries have created FSR Institutes (for example, Thailand), many have attached FSR units or sections to existing research structures (for example, ICRISAT, ICARDA, projects in Ghana, Tanzania, India and Indonesia), almost treating FSR as another discipline or commodity. This approach has also been evident within the context of projects, although many have claimed to have an overall systems perspective, few have been able to develop such a perspective within the prevailing institutional and policy framework.

The other area where farming systems research has failed to have an impact is in agricultural educational programmes, particularly at degree level. Most agricultural educational institutions have developed structures that reflect the proliferation of disciplines which have emerged over the past thirty years. A new field or area of study can be accommodated by creating a new sector, but it is very rare that a new concept stimulates the rethinking of the structure and programme of an institution. This has happened at Hawkesbury Agricultural College (now part of the University of Western Sydney) in Australia (Macadam 1985 and Sriskandarajan 1990). Medium term or short courses which are designed to re-orientate disciplinary scientists continue to be in demand and can be found both in developing and developed countries.[3]

Another rather puzzling feature of farming systems research programmes has been the tendency for researchers and their immediate collaborators to imagine that they can quickly develop relevant research outputs that will benefit the lives of many rural people. Researchers are only one group of actors within rural areas and it is unrealistic to think that by their actions alone they can have a profound effect on rural livelihoods. It has been increasingly realized that many other agencies that work in rural areas have a better understanding of the priorities, particularly those of poorer people, than researchers, and a number of formal research systems now recognize the need to link up with these agencies if they are to be effective in the future (Welland, Farrington and Davies 1990).

Current Developments and Innovations in Systems Research

The experience gained during the last twenty years of FSR has prompted many improvements in the quality and relevance of research. These lessons have been learned through the activities of many substantially funded (by a variety of international and national donors) farming systems research projects, support for institutional development of FSR, the activities of the Florida FSSP group, the annual Farming Systems Symposia held in Kansas, Arkansas and Michigan and the increasing willingness of a range of journals to publish FSR findings (eg. *Experimental Agriculture*). New journals have also appeared. (*Journal of the Association for Farming Systems Research* and *Extension and the Asian Farming Systems Research* and *Extension Journal*)

These changes have come about against a background of constant changes within farming systems themselves and the continuing problem of rural poverty and differential access to resources. Other changes have been the growing recognition of the importance of off-farm income, particularly among poorer groups, and the need to broaden the boundaries of farm systems studies to incorporate market influences and a political economy perspective (Biggs and Farrington 1990). Yet another important influence has been the growing demand for systems of resource management that are environmentally benign and sustainable in both ecological, social and economic terms.

A number of writers, non-government agencies and institutions (Chambers 1983; ILEIA 1990; Richards 1985) have supported a strong populist approach to FSR based on the belief that alternative or improved technologies can only develop with and by farmer involvement in the whole process. This requires major changes in attitudes, approach and role of researchers and extensionists (Chambers and Ghildhyal 1985; Chambers, Pacey and Thrupp 1989) and invites farmers to set the research agenda. Developments of this approach have focussed strongly on participation of farmers and the inclusion of farmer knowledge and farmer experimentation in the research process (Haverkort *et al.* 1991a). All this work has had a significant effect on some research systems and projects which have attempted to reorient their research programmes to incorporate farmers at all stages of the process. Ashby has had some success in involving farmers in varietal selection and evaluation (Ashby *et al.* 1987). World Neighbors also incorporate farmers into their research and extension activities (Bunch 1985). Lightfoot and others have developed ways of getting farmers to represent their farming system and key flows and interactions in novel and interesting ways which greatly assist diagnosis and design of alternatives (Lightfoot *et al.* 1989).

Other developments of this kind have involved the recognition that particular user groups may be a more appropriate unit of analysis of collaboration (Gibbon and Schultz 1989; Fernandez and Salvatierra 1988). This has been a major step forward as it moves away from the rather limiting concept of the farm and nuclear family as the sole unit of study and develops different socioeconomic groupings for further interaction.

The techniques of agro-ecosystems analysis developed by Conway and others (Conway 1985) have been adopted and refined by many projects and programmes and incorporated into rapid rural appraisal and participatory rural appraisal techniques. These have developed in response to the problems created by large surveys – the production of large amounts of information which was rarely utilized in the short term. However, although these techniques are undoubtedly very useful, they are no substitute for regular monitoring and interaction with client groups. There is a danger that important features of rural societies may be missed, particularly those associated with differentiation within and between families.

Equity issues are not handled well by these techniques, but they have been by those groups who have made a particular study of gender and decision making in rural households (Poats *et al.* 1988). Much of this work has been carried out by non-economic social scientists and those with a particular concern for the role of women in rural development. This important work still remains somewhat marginal to mainstream agricultural research, probably as a result of the slow institutional innovations that have occurred in this area. Agricultural research institutions remain dominated by disciplinary trained natural scientists who are invariably male.

There have been many useful developments in the art and science of field experimentation and there has been an increasing recognition of the importance of informal research techniques (Biggs 1980; Chand and Gibbon 1991; Chand and Gurung 1991) and of qualitative information and the monitoring of experience (Sumberg and Okali 1988).

An exciting recent development has been the growing interest in the role of NGOs as effective agents for relevant, client oriented technology generation. This is not to belittle the important outputs from many formal systems as a recent study of technology generation has shown (Merrill-Sands *et al.* 1989), but is a recognition that researchers are often few in number and cannot serve all potential clients effectively. The current study initiated by ODI (Farrington and Amanor 1990) arises from the fact that many governments now recognize that some NGOs can often operate much more effectively at the community level than many formal government agencies, and it makes sense to develop working linkages with them (Berdegue 1990; Gilbert 1990). Many NGOs are also working with poor people who have little access to inputs and other resources. Perhaps as a result of this situation, many NGOs are involved with the search for technical solutions which do not involve high external inputs and many are engaged in organic, ecological or biologically based farmer participatory research and development (Baker and Norman 1988; Haverkort, *et al.* 1991b). This work must be of importance in the search for more sustainable solutions for the future and needs more serious support.

Some institutional innovations have been notable during the past ten years, both in research and in education. The analysis of problem areas in research by multi-disciplinary groups of scientists and extensionists has been widely accepted. The creation of 'working groups' or 'research thrust teams' and joint interdisciplinary treks are standard techniques used by Lumle and Pakhribas Agricultural Centres in Nepal (Chand and Gibbon 1990; Gibbon, Thapa and Rood 1989; Matema and Galt 1988) and the operation of the adaptive research planning team approach was and early development in Zambia which has been a notable success (Kean and Singongo 1988).

All this very positive work indicates that farming systems research teams are constantly innovating and developing new ways to make research more effective and relevant to peoples' needs. However, this does not mean that there has been positive change in all agricultural research systems. Far from it. There are many institutions, particularly those which are well established and with a strong commodity mandate, that have strongly resisted the introduction of a systems perspective, the participation of farmers in the research process and the integration of social scientists into research planning and implementation (the author has experienced these features in recent reviews of research in Ghana, Tanzania and in Indonesia).

Lessons and Future Needs

The lessons from this experience fall into three main areas. The first concerns the nature of institutions and points to the need to restructure many in order to accommodate new paradigms and flexibility in approaching the problems of particularly vulnerable rural groups. This applies both to research and educational institutions (see the Hawkesbury experience). In addition, many research institutions need to develop formal linkages with other rural change institutions. To support these changes, policies need to be directed towards the needs of particular groups and not continue to favour those who satisfy short-term economic efficiency criteria. Institutions also need to revise value and reward systems in order to encourage other ways of thinking, multi-disciplinary teamwork and outputs and farmer participation.

The second relates to the approach and methods of research. The foregoing analysis of experience points to the need to be concerned with participation and empowerment of farmer/cultivator clients. This means changing the role of scientists and utilizing farmer experience as educators and planners. A related point is the need to accept that technical change has a political economy dimension and that therefore much broader criteria are needed in the assessment and understanding of change in production and processing systems. This theme is closely related to the focus on endogenous development, a goal that may be difficult to realize in practice but maybe a valuable guiding principle or counter to strategies that rely excessively on externally derived support.

The third concerns the present and future needs of communities, both in production and consumption patterns and the need to manage resources and the environment in a sustainable and life enhancing manner. It is clearly no longer possible to separate the perceived requirements of individuals, communities and nations from the impact they have on non-renewable and renewable resources.

Conclusions

This selective review of the contribution of farming systems research to the development of agricultural research and rural development has highlighted a number of issues that may have relevance for the research projects within Europe. Farming Systems Research has been focussed on the development of farming systems from within, i.e. through the principal reliance on endogenous human and natural resources. It has also increasingly recognized the important divisions in rural society and the need for researchers to work in different ways with groups who have varying priorities, real and perceived, and particularly with the poor and marginalized members of societies. The other important conclusions from recent experience are:

- The analysis of farming systems must be dynamic and involve client producers at all stages.
- Research cannot be undertaken without some degree of accountability, to farmers, to other researchers and extensionists and to policy-makers.
- Greater emphasis could be placed, the study on and the involvement in the process of change through the continuing interaction of multidisciplinary teams with farmers.
- Sustainability of production and livelihood systems is of great importance. These cannot be achieved without close understanding of environmental change and community/resource interactions, particularly with respect to energy consumption and food security needs.
- A systems perspective in both research and intervention activities would seem to be essential in order to achieve outcomes that benefit the majority of resource users.
- Many agricultural research and educational institutions still need radical restructuring in order to make much of the above possible.
- Social scientists need to play a much more central role in agricultural research planning, priority setting, design analysis and interpretation of outputs.

Notes

1 This paper is an invited contribution to the first major meeting of the CERES Project group. As the author has extensive experience of Farming Systems Research (FSR) and development in many developing countries in the tropics and sub-tropics, it was considered that the techniques and methods of Farming Systems Research as they have been developed and applied in the developing world may have some application and relevance to the situations that are being studied in the CERES project. The paper has been written with this in mind, although there are few direct references to the current project work by the co-operating centers. The review of Farming Systems Research experience is based on participation in and assessment of research with a farming systems component or emphasis over the past twenty years.

2 The ICRA course in the Netherlands and France, short courses at Florida and other US Universities, courses at the University of East Anglia.

2 This includes: ICARDA Farming Systems Research Programme 1977-80; Agricultural Research Review, Zambia 1981; Agricultural Research in Somalia 1983; Farming Systems Research in the SAFGRAD Programme in West Africa, 1984; Agricultural Education Review, Philippines, 1984; Farming Systems Research in Bangladesh, 1985, Farming Systems Research at BAU, Bangladesh, 1986; Farming Systems Training in Asia, 1987; Turkana Waterharvesting Project, Kenya, 1987; Farming Systems Research Development at Pakhribas, Eastern Nepal, 1987-88; MARIF Project Review, Eastern Java, 1990; Farming Systems Research Workshop, CRIG, Ghana, 1990; Review of Farming Systems Research projects in eastern India, 1990; Farming Systems Research Annual Workshop, Tanzania, 1990; KWAP Review, Kenya, 1990; Farming Systems Research Training Workshop, Mtwara, Tanzania, 1991; AFRENA Review East Africa, ICRAF, 1991; Review and Workshop on MARIF Project, Indonesia, Oct. 1991. Many of the reports from this work are not published. Some are listed in the bibliography and may be available through the author.

16 Quantitative Techniques for Rural Development, With Particular Reference to Input-Output Analysis

Kenneth J. Thomson

The great nineteenth-century physicist Lord Kelvin said, in effect, that if something cannot be measured, it cannot be understood. Whether this dictum applies as much to the social as to the natural sciences might be debated at length, but it can certainly be argued that in applied policy discussions (as opposed to academic conceptualisation) numbers speak louder than words. It is only by defining classifications and relationships in rigorous terms that public intervention can be properly articulated, operated and assessed.

This paper discusses rather briefly some general aspects of quantitative techniques for the economic analysis of development, before describing in more detail the well-known input-output method of regional economic analysis, with some results from Scottish applications.

Three criteria may be suggested when considering quantitative techniques for use in economic analysis. The first is the *degree of correspondence* between reality and the theoretical assumptions embodied in the mathematical relationships employed. Of course, in order to apply this criterion, reality in terms of the behaviour of individuals and socio-economic groups concerned must be 'known'. There is often plenty of scope for ignorance or disagreement here, especially in areas little studied for their remoteness or difficulty. An exact fit between theory and reality cannot be expected in any case, but an understanding of the ways in which the results may mislead should be present.

In the present context, general concern might be felt in two main aspects. First, the standard market-clearing equilibrium of neoclassical economic analysis may be a poor representation of agricultural and rural structures undergoing long-term pressures and change. In such circumstances, a persistent degree of *dis*equilibrium in resource markets (land, labour, etc.) might be expected, although this raises serious theoretical and modelling problems. Second, previous empirical analysis may have been carried out in a different context from the one currently under study, so that relationships previously established may no longer apply. For example, a period of agricultural expansion may be ending, or a new product or economic activity may be previously unknown in the rural area concerned. Clearly, whether known behaviour is reversible, or how novel components of the rural economy will relate to traditional structures, are issues of concern.

A second criterion for quantitative analysis is the *practicality* of the technique. A highly sophisticated method for which data does not exist, or is or will be seriously outdated, is almost useless in practice (though it may suggest variables and behaviour of potential interest). Computational methods have progressed very much in recent years, indeed to the extent that a more relevant consideration is likely to be the professional capabilities and knowledge of the analysts themselves. Where familiarity with local and industrial conditions is also considered important, a real dilemma faces the management of relevant research, and some compromises may be required.

Thirdly, the *purpose* of the quantitative approach needs to be considered. For whom is the analysis being carried out – local people, fellow economists, policy administrators, and/or national politicians, for example? Different audiences will have different priorities and levels of appreciation, and a simple technique may carry more conviction than a sophisticated one, especially if the bald numbers can be embellished with sound descriptive text. After all, in a decision-making context (which is not the only one conceivable, but has particular relevance in the present context), the informational content of the results rather than the mere accumulation of 'knowledge' is what matters. Thus it is important, for example, whether the object of the exercise is to select particular areas for attention, to think up new policy instruments, or to assess the effectiveness of existing ones. It is unlikely that the same quantitative tool can be equally useful in all three of these tasks.

The 'success' or failure' of rural development can be judged, at least from one point of view, in terms of the degree to which changes to, or stimulations of, specific production enterprises in the rural area(s) targeted have substantial positive backward and forward (upstream/downstream) effects in those rural areas, or, on the contrary, exhibit a high degree of 'leakage' to other areas, with little local impact.

Input-Output Analysis

A standard econometric tool for intersectoral investigations is input-output (IO) analysis (Leontief 1966; O'Connor and Henry 1975). From its early days, the technique promised an operational general-equilibrium model of an economy, and since then it has so grown in importance that official IO tables are produced in several countries, based on a Standard Industrial Classification (SIC) of sectors. These tables can be regarded as an elaboration of the national economic accounts, and, used as the basis for IO analysis, offer one route to simulation modelling of alternative economic situations, alongside (say) estimated Keynesian or HarrodDomar econometric models.

The IO technique is well known, and will not be detailed here. Briefly, the IO table contains the financial flows of sales and purchases between different sectors of the economy (including, where appropriate, household and government consumption and import/export vectors) for a base year (usually several years in arrears, due to complexities of data collection and collation). The 'upstream' linkages of final expenditure in any one sector can therefore be traced back through the different sectors, as raw materials, services, labour, etc. are required to produce, first the commodity concerned, and then successively the intermediate products required in its manufacture, the production of those intermediates themselves, and so on. Mathematical matrix inversion accomplishes the calculation of the total 'multiplier' effect in one step, and produces multiplier coefficients, representing the average amount of economic activity associated upstream with unit expenditure, for each sector. With the (heroic) assumption of linearity in the underlying production functions, the leap can be made to using these coefficients as the predictions of the overall economic effects of an additional unit of expenditure. A common extension from the expenditure multipliers is to employment and income multipliers, so as to assess the relative significance at the economy-wide scale of various sectoral activities.

The long-term significance of regional economics in large countries led to the development of regional input-output models from the early 1950s (Isard 1951; Richardson 1972), but for several decades most of this work concerned either the application of the IO method to a single geographical region, or represented a locational elaboration of the single national model by means of multi-regional (or interregional) analysis. In the single-region case, with the need to reduce the rest of the economy (and world) to a single external vector, the general-equilibrium nature of the model is lost, while to build IO tables for several regions is a daunting task, especially if as is often the case with regional analysis, the focus of the model-builders is on a particular region.

For good statistical reasons, general regional economists have normally adopted an administrative division of the national economy, with each region centred on one or more large settlements containing higher-order service providers such as government offices, long-distance transport and advanced social services, and often with large-scale industrial plants requiring special statistical and IO treatment due to their monolithic structure. Such an approach is understandable, and possibly the only suitable method for certain policy purposes, but it clearly does not fit well the agricultural and rural approach, where there are obvious difficulties in defining rural areas, especially where economic activity is relatively intense, as in urban fringes and in leisure areas. In such work, a mixture of reliance on the SIC (some industries, such as farming and forestry, being regarded as rural by definition) and detailed survey fieldwork, must be resorted to.

IO Analysis for Agriculture and Forestry

A number of attempts have been made to apply IO techniques to agriculture, forestry and the rural economy generally. Midmore (1991) has edited a useful compendium of agricultural IO studies, pointing out (p.1) that 'in contrast to most other activities, a large proportion of its revenue is accounted for by purchases of materials and services from other industries, and also a large proportion of its output is sold to processing industries before passing to final consumers'.

In fact, about 43 percent of the value of final agricultural production (FAP) of EC-12 agriculture is accounted for by consumption of inputs (the remainder being gross value-added), but the recorded range of variation is high (CEC 1992). Amongst member states, Belgium, Germany, Portugal and the United Kingdom show input shares of FAP of over 50 percent, while in Greece and Italy purchased inputs account for less than 30 percent of FAP. The largest item of purchased inputs is feed (about 40 percent of total costs at EC level), with fertilisers, energy, upkeep and repairs of farm implements, and services (such as veterinary provision) each accounting for a further 10 percent or so. However, these shares also vary considerably from country to country, with the Netherlands showing feed as nearly 57 percent of the total, while in Greece the figure is only half that, with fuel and implement costs each accounting for around 20 percent.

Many of these national differences are of course accounted for by the dissimilar patterns of commodity enterprises from country to country (it is well known that, say, upland grazing animals can require fewer purchased resources than horticultural crops), and by differences in production techniques. Little pattern is discernible in the purchasing patterns over time (at least since 1985); overall, and perhaps rather surprisingly, the significance of intermediate farm 'consumption' has grown in line with production, though greater growth and variation is notable in the three newer member states, perhaps as their agricultural sectors modernise towards the more intensive and heavily capitalised northern pattern.

In any case, these data serve to indicate that the upstream linkages of agriculture are liable to be complicated, partly since some animal feed is purchased from other farms, either locally or from elsewhere in the country, while the rest is imported or manufactured (mainly from farm products or by-products) as compound feeds. Again, in the livestock sector, quite complex flows of young and old animals between different farm sectors are common, with associated problems of seasonal variation and year-to-year stockholding. In standard IO work, these interfarm transactions will be 'netted out' in the analysis, thus losing some of the main endogenous features of interest. Downstream, the pattern of sales of farm produce will vary, but it will often be the case that the farm commodity is taken from the farm to a centralised storage or processing unit, there to be transformed in time and space to a very wide set of uses.

Combining agricultural and regional interests, Leat and Chalmers (Midmore 1991, Chapter 6) have attempted to apply IO techniques to the north-east region of Grampian in Scotland. This is a mixed lowland/ upland area, with a substantial farming and agribusiness industry in the hinterland, alongside traditional provincial settlement activities and in recent years a prosperous oil sector based on Aberdeen. They defined 9 crop and livestock activities, 8 agriculture-related sectors (milk processing, distilling, etc.) and a further 'other' sector, and used farm survey data (as collected for the EC's FADN/RICA system) to determine purchasing patterns and hence the IO coefficients. In some versions of their work, rural Grampian (i.e. the complete administrative region minus the local capital city of Aberdeen) was used as the 'economy' under study. Table 1 gives some typical data and results coefficients from this work.

Table 1 Rural Employment, Grampian Region, Scotland, 1986

	Share*	Change**	Quotient***
Government	17.3	1.4	1.088
Retailing	8.9	24.0	0.949
Construction	8.4	-17.9	1.270
Agriculture	8.3	-13.7	2.421
Social/Personal Services	7.3	16.2	1.326
Hotels, Catering, etc.	6.3	10.2	0.935
...			
Food Processing	4.1	131.2	1.288
Fishing	3.4	-0.2	2.340
Forestry	1.1	23.9	2.471

* Share of total rural Grampian employment, 1986.

** Change in employment, 1981-86.

*** Ratio of rural Grampian to total Grampian employment shares.

Source: Brown and Leat, *Developing Grampian and its Rural Economy*, Scottish Agricultural College, Aberdeen, 1988.

Leat and Chalmers's multiplier analysis indicated that reductions in agricultural output resulting from adjustment to the Common Policy would result in significant local effects, for example that for each farm job lost, approximately one off-farm job would also disappear. Estimates of the effects of milk quotas and set-aside were provided. However, local development might be sustained if raw materials for the processing industries could be obtained from elsewhere (albeit at the cost of processing employment in other regions), while a 10 percent expansion in rural tourism in

Grampian would offset a substantial proportion of threatened farm employment.

IO analysis is currently being applied to forestry in Scotland and Ireland (Psaltopoulos and Thomson 1992), and to avoid prematurity and preemption the results so far will not be reported here (some preliminary results are detailed in Psaltopoulos and Thomson). However, the research employs the Generating Regional Input-Output Technique (GRIT) first developed in Australia (Jensen et al. 1979) to modify the national IO table of coefficients to (hopefully) more accurate regional ones, in order to avoid the costs of primary data collection or analysis. Forestry IO throws up some peculiar problems, some of which are also evident in the work of McGregor and McNicoll (1989). In particular, 'input' and 'output' are so separated in time that the usual linkages are irrelevant for most analytic purposes. Rather, timber harvesting is normally *followed* by planting; and there are a number of important non-timber aspects (water collection, leisure, game shooting) of forests which may be of interest.

Further, although government may be as deeply involved in forestry as in agriculture, public intervention in forestry often operates in a completely different way (e.g. tax regimes, fire-fighting services, public plantations) than is found for agriculture. Similarly, private forest enterprise is often larger-scale and more remote than is found in many agricultural subsectors. All these differences affect the objectives to which a completed IO table may be applied, and the way this is carried out. For example, McGregor and McNicoll (1988) analyse the impact of joint investment in afforestation and wood-processing plant, rather than simply planting, since (in Scotland at least) the viability of two large-scale investments is at stake.

Implications for Endogenous Rural Development

The material above offers a number of insights into the potential of IO analysis as a useful tool for analysing the economic effects of rural development possibilities, especially those involving the use of land. First, it offers a 'macroeconomic' framework for conducting such research. Although the SIC framework used for national accounting purposes may not be ideal for the purpose (in particular, the vital tourism component of rural development is difficult to tackle in this way), it does offer comparability with national statistics and parameter estimates from other studies, and can perhaps be adapted to be more suitable, for example by dividing some or all sectors by endogenous and exogenous control or ownership.

Second, it focuses attention not only on the primary locus of change (e.g. the construction of a small factory in a rural town, or the development of a local leisure specialty such as water sports, golf or game shooting), but also on the linkages to other local enterprises. The overall success of a rural development may be as much dependent on the 'endogeneity' of upstream and downstream sectors in offering repair facilities, accommodation, and 'by-services' such as tourist visits to local factories, as it is on the viability of the initial impetus.

In turn, this raises the issue of appropriate 'regions' for rural development analysis. It is an unfortunate fact of life that administrative regions almost invariably contain a sizable centre of population which detracts from the 'rurality' of the region as a whole. Indeed, it might be said that the standard local government regions are almost completely the wrong set of boundaries for the present purposes. Without very detailed statistical data, or primary data collection, little can perhaps be done about this, except to caution that, once conclusions about a particular standard region have been reached, further thought should be given to the local geography of the implications drawn.

Third, input-output analysis goes beyond the usual one-dimensional range of statistics required to establish eligibility priorities for regional rural assistance (CEC 1988; Copus and Leat 1992) by seeking to measure the regional economy as a whole. In this way, it may suggest multi-sectoral development of a kind directed to maximise total local impact, i.e. development which is integrated from the point of view of its net economic effect rather than its administrative character.

None of the above seeks to downgrade the importance of other aspects of endogenous rural development, for example stimulating local enterprise, encouraging the marketing of regional specialities and assisting local organisations to overcome the often difficult problems of local monopolies and traditional habits. There is also the general point that development, as a dynamic process, deserves an analytic technique that pays due attention to behaviour over time, especially technical change, than is normally incorporated. However, even if carried out at a simple level, input-output analysis may offer a practical and semi-standardised technique for carrying out some of the quantitative economic analysis involved.

17 Sustainable Agriculture and Endogenous Development: a Socio-Political Perspective

Jonathan Murdoch, Neil Ward and Philip Lowe

It is generally recognised that 'sustainability' is a vague and ambiguous term, but one with the potential to bridge the divide between developers and environmentalists. By acknowledging that development and economic growth can be sustained, the term allows developers and production interests to feel that environmental concerns can be assimilated into business practices. At the same time, it signals to environmentalists that they have a role to play in determining what counts as sustainable practice.

However, sustainability has a broader meaning encompassing the viability of localities and communities on which the maintenance of both the environment and economic activity ultimately depends. For those concerned with the economic and social development of rural communities, this is obviously crucial, but it has been neglected in contemporary debates about sustainability.

In addressing issues of *rural* sustainability, one vague term meets another. Finding a precise definition of rurality has been a long and largely fruitless enterprise (Newby 1986), and we may have to be satisfied with a use of the term which is purely descriptive. However, we may address the general processes that have given rise to contemporary changes in rural areas. Rural social change has been experiencing bifurcatory processes. On the one hand, industrial agriculture is being increasingly *vertically* integrated into the modern agro-food system. On the other hand, there has been a *horizontal* disintegration and recombination of the spatial structure of society induced by the changing geography of capital accumulation. It has been argued that 'under the centrifugal pull of these two diverging tendencies conventional rural categories are being deconstructed' (Marsden *et al.* 1990: 11).

Rural areas in the advanced capitalist societies are currently experiencing diverse fortunes. Nevertheless, there are common experiences. Two major forces can be identified: the reorganization of the international food system and the social and economic restructuring of rural regions under the pressure of capitalist accumulation. It is within this overall framework that we must address the issue of rural sustainability. In the latter part of this paper, we will focus specifically on sustainable agriculture, agriculture being the most important land use as well as being the most important economic activity creating and recreating the rural environment. We attempt to situate agriculture within a sustainable rural economy and indicate how sustainability might be achieved.

Sustainable Development: The Concept

The concept of 'sustainability' derives from the view that human beings are 'using up' the environment at a rate which will result in a seriously depleted level of resources. This, in turn, may have environmental consequences which are at present unforeseeable or, as in the case of the greenhouse effect or ozone depletion, which are threatening to human life or welfare.

Sustainable development has been promoted as a panacea to these problems. It was first publicised in the World Conservation Strategy in 1981 and was subsequently adopted in the Bruntland Report (1987). The concept was given further impetus in the recently published 'Caring for the Earth' document produced jointly by the International Union for Conservation, the World-wide Fund for Nature and the United Nations' Environment Programme (succeeding the earlier World Conservation Strategy). This latter publication states that:

> *'Living sustainably depends on accepting a duty to seek harmony with other people and with nature. The guiding rules are that people must share with each other and care for the Earth. Humanity must take no more from nature than nature can replenish. This in turn means adopting life-styles and development paths that respect and work within nature's limits'* (IUCN, WWF and UNEP 1992: 18).

The idea is beginning to achieve widespread acceptance. It has been incorporated into official policies at both the international level – with, for example, the establishment of a Sustainable Development Commission at the Rio Conference – and in national government strategies.

The key value of the sustainability concept has been seen as its ability to overcome the old dichotomy which insisted that people had to be in favour of either economic progress or environmental protection. That dichotomy, it has been argued, 'hurt the environmental movement by keeping out of it exactly those people needed to solve the 'environmental problems': economists, the business community, trade unions, the majority of government officials and many hundreds of millions of poor people.' (Holmberg *et al.* 1991: 6). To accommodate such diverse interests is unlikely to be easy. Tough choices will still have to be made.

So far, however, the ready acceptance of the term sustainable development rests on its imprecision, which allows for difficulties and differences to be glossed over. As O'Riordan (1988) argues, it is its ambiguity which makes it so attractive to both sides, for developers 'now realise that under the guise of sustainability almost any environmentally sensitive programmes can be justified', while 'environmentalists abuse sustainability by demanding safeguards and compensating investments that are not always economically efficient or socially just' (p.29). So while sustainability is a concept with the potential to build a bridge between environmentalism and development, it may also serve as a 'cover' for traditional practices. There is, therefore, a need to define sustainability more closely in order to make clear what might count as sustainable practice.

Redclift (1991) sees sustainable development as referring to 'meeting human needs, or maintaining economic growth or conserving natural capital, or about all three' (p.37). But how compatible are these aims and what is required to meet them? For instance, does 'conserving natural capital' imply an end to economic growth?

This latter question has been considered in much of the environmental literature. One of the most careful analyses is provided by Jacobs (1991) who examines the claim, made by many environmentalists, that economic growth is to blame for environmental degradation and what is required is 'zero growth'. He argues that it is not growth *per se*, but 'environmentally unconstrained growth (p.26) that is the problem. It is possible for economic growth to continue while using fewer resources and generating less pollution, providing the 'content' of growth shifts away from environmentally damaging activities.

According to Jacobs, it is the impact upon environmental resource levels or natural assets which should be the yardstick for economic activities. Natural resources can be divided into three categories: first, non-renewables, such as fossil fuels and minerals, which cannot be regenerated within human time spans; secondly, renewable resources, including plants and animals, air and fresh water, which can remain indefinitely, providing their supply is not disrupted by external threats; and thirdly, continuing resources such as wind, tidal and solar energy. Wherever possible, the pattern of growth needs to be shifted away from the use of scarce non-renewables towards renewable and continuing resources.

Further limits are imposed on the use of resources than simply their availability and utilisation. All resource use results in waste and this waste has to be assimilated into the natural environment. Clearly there are limits to the environment's capacity to assimilate waste products and, beyond this capacity, pollution occurs, which may, in turn, damage natural resources, threaten life support functions (such as the atmosphere and the climate), and compromise human appreciation of nature (through loss of habitats, biodiversity etc.).

Such considerations define the outer limits of sustainable development. Within these boundaries, there is scope for growth and further resource use. As Jacobs points out, *'There can be no doubt that the consumption of some resources will have to be limited. But these resources are specific and nameable. It does not mean that somehow there is a figure for 'total resource consumption' which must be kept static'* (1991: 58).

The Social and Political Dimensions of Sustainable Development

Although environmental catastrophe is now recognised as a tangible possibility – via the greenhouse effect or ozone depletion – there are complex choices to be made within sustainability's outer limits. How, in practice, will the concept of sustainability allow us to make these choices? What kinds of calculations does sustainability entail *within* the development process?

Two components are involved. First, sustainability implies the need to integrate environmental considerations and economic policy making, in recognition of the fact that environmental quality is a key component of human welfare. But this in turn raises the question of the social priorities of economic development. In other words, sustainability for whom?

The second component, therefore, is to do with the distributional consequences of development. At present economic growth for some may be achieved at the expense of the environmental well-being of others. This may arise through external appropriation of non-renewable resources or through the externalisation of wastes and pollutants. Equally, the depletion of natural capital may shift the burden onto future generations. Conflicts over the control of natural resources are a major source of social tensions which, if allowed to escalate, can themselves be massively destructive of natural resources, as the Gulf War illustrated. On the other hand, threats of environmental catastrophe emphasise that 'we are all in it together', and they call for human solidarity based on the recognition of humanity's common need for environmental security. Sustainability thus implies a commitment to a fair distribution of wealth and resources within the present generation (*intra*-generational equity) and the conservation of resources for the use of future generations (*inter*-generational equity).

The requirements of the first component – the integration of environmental considerations into economic policy making – have stimulated enquiry into new institutional structures, regulatory procedures, and economic measures. The main axis of debate is between advocates of market-type solutions and advocates of institutional and procedural reform. The former involve the financial valuation of environmental costs and benefits, and their incorporation into development appraisals, the measurement of economic performance and the formulation of economic incentives. The latter refer to the development of 'enabling' institutions which are concerned with decentralisation and local control as opposed to hierarchical bureaucratic structures.

The second component – equity – has always been at the heart of environmental conflicts. But the debate on sustainability has given it a new complexion. In the 1960s and 1970s, for example, a common charge was that environmentalism was the preserve of the well-off who did not want to see their standard of living diluted or threatened by others seeking the 'good life'. Such considerations of *intra*-generational equity have to some extent been displaced by more recent concerns about *inter*-generational equity. The Bruntland Report, for example, sets out the principle that future generations are entitled to experience a level of environmental resources at least equivalent to that in existence today.

This would seem to be a laudable principle. Indeed, in many respects, it is a modern variant of an ancient concern, particularly of rural people, to pass on to one's children the essential means for their livelihood. Such issues as global warming and the depletion of fossil fuels, however, do raise the prospect that the present intensity of resource consumption may so impair life support systems and natural capital as to diminish the welfare of future generations.

To squander the birthright of the unborn is something responsible people and societies would wish to avoid. But its emotive overtones should not be allowed to distract attention from the grossly unequal access to resources in the present. There is the risk that arguments concerning the welfare of future generations may be used to ration access to resources in such a way that existing inequalities are compounded.

The key point to recognise is that a legitimate concern for the welfare of future societies does not foreclose debate on the existing distribution of resource use. On the contrary, it should pose rather starkly the trade-offs between intra- and inter-generational equity. In other words, if resource constraints have to be introduced for this purpose now, how should the sacrifice involved be fairly distributed amongst the present generation?

Another and more practical way of approaching these same issues is through addressing the long term effectiveness of existing social structures and institutions on which the maintenance of environmental and economic well-being depend. In the context of rural development this raises the question of the sustainability of rural communities and the resources upon which they depend. As the British Government's White Paper on the environment makes clear:

> '*Maintaining a healthy rural economy is one of the best ways of protecting and improving the countryside because so much depends on the availability of people and resources to invest in, and carry out, the work*' (Department of Environment, 1990: 96).

Traditionally, rural areas have been net exporters of natural resources (food, timber, fibre and minerals) to urban areas. This historic pattern of resource dependency has altered somewhat during the twentieth century as urban areas have intensified their demands on rural resources. At the same time they have exported their ever expanding volumes of wastes and pollutants, mainly to rural areas. Increasingly, also, urban people have sought in the countryside a retreat from the congestion, and the social and environmental problems of the cities. This has placed increased pressure on rural resources *in situ*. At the same time, modern rural living and primary industries have become heavily dependent on inputs of non-renewable resources. The ready availability of cheap fossil fuels, in particular, has encouraged dispersed settlement, the expansion of local labour markets and a high-input, intensive agriculture.

A move towards a more resource conserving future might begin to redress the rural-urban imbalance in farming methods on the one hand and in commuting patterns on the other. At the same time, the role of rural areas as sites for the supply, use and replenishment of continuing and renewable resources will be given much greater emphasis. This may involve new types of primary production such as biomass, energy crops and wind farms.

More generally, it will emphasise the vital functions that rural areas perform as environmental reservoirs, maintaining and renewing the quality of natural resources; and as a living space, providing human refreshment and recreation through the cultural, aesthetic, and amenity qualities. So what are the implications of these understandings for current economic and social practices in rural areas? We explore this question in the context of (un)sustainable agriculture in the next section.

Unsustainable Agriculture

It is now widely believed that the current crisis in agriculture, with its economic, political, social and ecological dimensions, has arisen because of the pursuit of a productivist technology/policy model (although 'high-tech' agriculture has been differentially achieved across commodity sectors and different European regions). The broad policy of agricultural 'modernisation' and development through the application of agricultural science and technology has shaped the direction of technological change in agriculture and the evolution of a complex agro-industrial food system (Goodman and Redclift 1991). The increasing linkages between the agricultural sector and industrial sectors in the modern food system are such that agriculture now obtains inputs from ever more distant sources, both spatially and sectorally, derives a large proportion of its energy supplies from non-renewable sources, depends upon a narrow genetic base, and has a detrimental impact on the environment. Although these processes all contribute to an erosion of the 'sustainablity' of agriculture, the crisis of over-production ought to provide the opportunity for a reappraisal of the direction of agricultural development and the introduction of more sustainable practices. First, however, we need to address the issue of just what a 'sustainable agriculture' might be.

Sustainable agriculture is coming to mean all things to all people (Clunies-Ross and Hildyard, 1992). There does seem, however, to be a prevalence of ecological considerations in the current definitions. Conway (1987), for example, defines sustainability as the ability of an agro-ecosystem to maintain productivity when subject to a major disturbing force. This represents the *resilience* of the system. Altieri (1989), on the other hand, defines sustainable agriculture as a system which should aim to maintain production in the long-run without degrading the resource base, by using low-input technologies that improve soil fertility, by maximising recycling, enhancing biological pest control, diversifying production, and so on. There is a tendency to assume that as long as the proposed systems benefit the environment and are profitable, sustainability will be achieved and the whole of society will benefit. However, what is produced, how, and for whom, are important questions that must also be considered if a socially sustainable agriculture is to emerge.

According to Riley (1992) the level of analysis chosen can be a significant influence on sustainability. At the field level, particular soil management, grazing and cropping practices will be the most important determinants of sustainability. At the farm level, sustainable resource use practices need to support a sustainable farm business and family household. At the national level, there may be broader pressures on the use of agricultural land from non-farming sectors, and at the global level, climatic stability, international terms of trade and distribution of resources also become important determinants.

The sustainability of contemporary agriculture is challenged in four main respects which will be discussed briefly in relation to the United Kingdom. These refer to:

a the destruction of wildlife habitats and valued rural landscapes;
b the pollution of water and air;
c the social and economic costs borne by the farming population; and
d the rate of energy use.

a Habitat and Landscape Damage: Agricultural support policies which have sought to stimulate production have accelerated the damage to wildlife habitats and valued landscapes in rural areas. Reduction in the diversity of wildlife habitats results from a range of farming practices adopted in the 1950s, '60s and '70s. The most damaging practices have been the removal of hedgerows and the ploughing up of un-cultivated field margins, together with the reclamation of scrub and woodlands; the reduction in rotations and fallows; the replacement of permanent pasture by leys and arable cropping; land drainage and the elimination of standing water and farm ponds; and the treatment of grassland and arable land with selective herbicides and insecticides. In the UK, for example, the Countryside

Commission (1977) estimated that the rate of hedgerow removal rose to a peak in the 1960s of about 10,000 miles of hedgerow removed each year. Although the rate of loss has decreased since then, the landscape of large tracts of eastern and lowland Britain have been significantly altered. Field boundaries alone provide important wildlife habitats for at least 20 species of mammals, 37 species of birds and 17 species of butterflies (Nature Conservancy Council 1977). The combined impact of the removal of hedgerows with other aspects of the intensification of agricultural production has been the loss of many habitats and the increasing threat to some species.

b Water and Air Pollution: The impact of agricultural production on the water environment has only begun to become apparent during the 1970s and '80s. The main pollutants are agrochemicals, nitrates from fertilizers and farm livestock wastes. If we again take the case of the UK experience, the number of reported farm pollution incidents more than doubled during the 1980s, with the most important pollutants being cow slurry (55 percent) and silage effluent (20 percent) (National Rivers Authority 1992: 11). Such pollution incidents occur when organic wastes are allowed to enter water courses, usually because of inadequate storage facilities or poor management, and have arisen primarily because the cost-price squeeze has forced a diminishing number of farms to carry ever larger cattle herds, making safe disposal of wastes more difficult. The problem has been exacerbated by the switch from straw-based to slurry-based livestock housing systems. Also, the increasing use of manufactured nitrogen fertilizers in farming is thought to have been at least partly responsible for the increasing levels of nitrates detected in ground and surface waters. Levels have increased to the extent that the EC's limit of 50mg/l $N0_3$ is often exceeded in numerous water catchments (Croll and Hayes 1988; NRA 1992). Similarly, evidence has been produced to show that 298 water sources or supplies in Britain exceed the EC Drinking Water Directive Maximum Admissible Concentration (MAC) for single pesticides (0.1µg/l) and 76 breached the MAC for total pesticides (0.5µg/l). The most commonly detected agricultural pesticides were general and pre-emergent cereal herbicides (British Medical Association 1990; NRA 1992).

Pesticides can also be one of the most important sources of air pollution from agriculture, particularly in the form of spray drift. Agriculture's contribution to air pollution is now being seen as increasingly global in scale. It contributes between 40 percent and 60 percent of methane and 10 percent to 25 percent of nitrous oxide, both 'greenhouse' gases, and 80 percent to 90 percent of ammonia which contributes to acid rain (Pretty and Conway, 1989).

c Social and Economic Costs for the Farming Population: The third set of issues which render contemporary agriculture unsustainable involve the social and economic costs which have been borne by the farming community itself. Most notably, there has been a marked decline in agricultural employment. While the shedding of labour from farms has been going on for over a hundred years in Britain, between 1950 and 1990, the numbers employed in agriculture fell from almost 1 million to under 300,000 (Body 1991: 114). At the same time, agriculture's contribution to rural employment and regional economies more generally has steadily diminished. Alongside these trends, farming receives a decreasing share of value added in the food chain, with the increasing relative costs of farm inputs, and the trend towards the greater processing of foodstuffs by downstream food companies. Harvey (1987) estimates the proportion of total value added that goes to farmers to be less than 15 percent.

Another important indicator of farming's declining social and economic fortunes has been the level of indebtedness. In Britain, for example, total liabilities have risen from £3.8 billion in 1979 to £10.7 billion in 1991, and total liabilities as a proportion of total assets has risen from 8.5 percent to 18.5 percent over the same period (Johnson 1986; MAFF 1992). As more investment is coming from borrowed finance capital rather than re-invested profits, the volatility of investment in agriculture has also increased. It is quite possible that the economic squeeze on agriculture will impact upon the intentions of farm children to succeed to their parents' farm businesses. Evidence is beginning to emerge in the UK which seems to be reflecting a decline in the proportion of farms currently being managed with a succession to the next generation planned for. Whilst this proportion was around 75 percent in the late 1960s (Harrison 1975), a national survey of 26,000 farm businesses in 1991 found that only 52 percent had a nominated successor for their farm (National Westminster Bank 1992).

Alongside the social and economic costs of these problems for farmers is that of the distribution of agricultural incomes and farm support payments. In the EC under the Common Agricultural Policy, for example, 80 percent of support goes to 20 percent of farmers, usually on the largest and most productive farms (House of Lords 1991: 19).

d The Rate of Energy Use: Agriculture in the advanced industrial economies has also been criticised as unsustainable in terms of its energy use. Post-war agriculture has depended on cheap supplies of non-renewable energy sources, with a major factor being the substitution of machines for manual labour. Total energy consumption per agricultural land unit increased by 39 percent between 1970 and 1988 in the OECD countries, with the trend being most pronounced in Japan (167 percent) and European OECD countries (54 percent) (Rae 1991). However, it is worth considering energy consumption in the wider context of the modern agro-food system as a whole. In producing a 1kg loaf of bread in a country like the UK, growing the wheat takes 19.4 percent of the energy used, whilst milling, baking and distribution account for the other 80 percent. In the UK, farm based production uses about two percent of the *primary* energy from oil, gas and electricity. However, the FAO estimated in 1972 that if every country in the world had a food system like that of the UK, then the quantity of primary energy used in producing food would amount to 40 percent of global consumption (quoted in Barber 1991: 12-13). This level of energy consumption is, therefore, no longer viable in the long run, chiefly because of the pollution caused, and the likely increased scarcity (and costs) of energy.

Each of these four sets of problems is currently being challenged, and these challenges arise as a result of social, economic and political processes of change that go far beyond the agricultural or rural spheres. Four broad shifts can be identified which intensify the questioning of agriculture's sustainability. These are: a) as people come to value the countryside as a consumption space; b) the greater concern for global pollution and the role of rural areas as reservoirs of natural resources; c) as the collapse of post-war economic growth models no longer provides an increasing number of urban jobs to mop up rural decline; and d) the end of the cheap energy era.

Towards a Sustainable Agriculture

From the above critique, it can be seen that rural sustainability is undermined by agriculture, particularly as agriculture is the dominant user of rural land. However, in discussing sustainable agriculture, the ecological dimension has tended to be privileged while the social dimension has been neglected. This is despite the fact that one of the central objectives of agricultural policy in the EC and much of the advanced industrial world has been to maintain farm incomes and keep farmers on the land (i.e. a socially sustainable agriculture). The current economic and ecological crisis for agriculture has, therefore, opened up the space for a discussion of what sustainable agriculture might be, and how it might be operationalised.

Current responses to the crisis in agriculture have three broad strands. First, steps are taken to encourage the removal of some resources such as land and people from agricultural production, but on some land only. Secondly, some areas of particular environmental priority are delimited and payments are made to farmers as environmental managers. This is a very site-specific response. Thirdly, on the rest of the land, a productivist agriculture is allowed to carry on.

In this context, the recently agreed reforms to the Common Agricultural Policy can be seen to be a continuation of the agro-centricity of agricultural and rural policy. Social sustainability in much of rural Europe is still to be sought through a productivist agriculture. Thus, there continues to be a trade-off between ecological priority areas and the productivist pressures of the agricultural treadmill. In the UK, for example, rural areas are designated as Less Favoured Areas, Environmentally Sensitive Areas, Nitrate Sensitive Areas, National Parks or Sites of Special Scientific Interest, reflecting a geographical differentiation in agro-environmental relations as well as a differentiation in regulatory mechanisms. In this emerging mosaic of ecological priority areas, agriculture's relations with the local natural environment become critical.

This increasing differentiation of land uses within the agricultural sphere, along with the current interest in developing a sustainable agriculture, is leading to a renewed concern with local contexts. Indeed, one response to the growing globalisation of the food system has been to stress the need for a local focus to any discussion of sustainability. As van der Ploeg puts it:

> '*the re-linking of agriculture to natural (instead of artificial) growth factors requires a 're-localisation' .... Hence, sustainability in agriculture will require again 'art de la localité'; the 'art of farming' will, as it were, be re-invented and re-assessed*' (van der Ploeg 1992: 37).

According to van der Ploeg (1992) heterogeneity and 'localness' are continuing features of contemporary agriculture but must be assessed in relation to the dominant tendencies towards 'standardisation'. Agriculture, he argues, is becoming disconnected from local features such as nature, labour skills (through appropriation from external agencies), the labour process (now increasingly governed by external technologies) and end products (now often merely the raw material for processed foods). This 'disconnection' is leading to new forms of local knowledge.

> '*These not only concern, in different situations, the application of general rules, procedures and artifacts, they also entail specific responses on how to resolve the particular problems that emerge from such an application*' (van der Ploeg, 1992: 26).

Van der Ploeg focuses on the labour process as the arena in which the different 'domains' of farming, such as economic and technological linkages, family reproduction, etc., are co-ordinated. In this formulation, farming is seen as a 'social construction' with culture centrally placed between 'internal and external relations, between experience and perspective, between past, present and future' (1992: 35). It is culture which ultimately reproduces the heterogeneous pattern of farming and the meaning and shape of locality.

We can see how the outline of local autonomy in the face of powerful forces seeking to obliterate difference provides a resource which might be mobilised in the pursuit of sustainable agricultural reforms. This is clearly the view of Kloppenburg (1991; 1992) who argues that 'scientific knowledge has attained virtually undisputed intellectual hegemony, while local knowledge,' which he sees as 'finely tuned to the concrete exigencies, needs and requirements of local conditions' has been pushed to the periphery, 'its utility so poorly recognised that we have difficulty in even labelling it' (1991: 528-29). Like van der Ploeg, Kloppenburg sees local knowledge as 'derived from the direct experiences of the labour process which is itself shaped and delimited by the distinctive characterisations of a particular place with a unique social and physical environment' (1991: 528). This local knowledge is, he argues, finely tuned to the requirements of local conditions. It should, therefore, be upheld and utilised, not overridden by centrally produced technological packages.

Such sentiments are echoed by Flora (1992) who believes an alternative agriculture will need to include 'much more emphasis on the particular and exceedingly complex realities of time and place that require specific rather than general technology, technology that is constantly in process as the farming system itself evolves and changes' (1992: 96). The process here is akin to van der Ploeg's view of the labour process, where the farm family, the farm and the external relationships are all co-ordinated.

This focus upon a locally situated labour process is clearly useful in beginning to think about how sustainability might be contextualised. However, a note of caution has been sounded here. Molnar *et al.* (1992), in a response to Kloppenburg from the agricultural science community, argue against any romantic reification of local knowledge. They believe Kloppenburg distorts the importance of local knowledge and neglects the limits of the local. They believe it is naive to blindly promote farmers as a category to a superior status as knowledge producers without first giving consideration to the differences between farmers and scientists:

> '*Farmers and scientists operate in different worlds. Scientists have instruments to extend their senses through microscopic landscapes and across diverse locations. Farmers have continuity of experience and personal involvement in one environment; thus they can generate craft knowledge and insight into the workings of the natural world at a particular place and time. The perspectives of farmers and scientists are complementary and supplemented to one another and not in conflict*' (Molnar *et al.* 1992: 86).

In the view of these commentators, local knowledge may be useful but only in adapting general solutions. 'Basic science must be the starting point and market signals cannot be ignored' (1992: 87). Here again the emphasis is on the promotion of spatially indifferent solutions. But this ignores, or at best plays down, how basic science has tended to derive the specific from the general, squeezing local differences into more standardised forms. This has diminished the differences between agro-ecosystems. The mismatch between farming practices and local environments has emerged precisely because of the diffusion of basic science. This makes the achievement of sustainability problematic at the local level as local agro-ecosystems have become integrated into unsustainable systems at the international level.

Fostering Sustainable Development: Local Institutional Integration

This emphasis on local and regional frameworks for the implementation of sustainable agricultural practices within this global system of scientific productivism inevitably raises questions associated with the most appropriate institutions and instruments of regulation. At present, regulatory institutions are often severely compromised by the power of policy institutions promoting productivity and restructuring. This has led to considerable interest in the benefits of an integrated approach. According to the Organisation for Economic Co-operation and Development (OECD 1989), such an approach would ensure that environmental considerations are taken fully into account at an early stage in the development of agricultural policy, while environmental policy would take account of its potential impact on agricultural production, incomes and prices. Moreover,

> *'successful integration requires policy-makers to give full consideration to, and accept responsibility for, the effects of their policies on the objectives of all other sectors. This is true for the effects of environmental policies on agricultural policies as it is for the effects of agricultural policies on the environment'* (OECD 1989: 8).

This notion of 'responsibility' is central to the development of an integrated policy but it is clear that this kind of accountability can only be conveyed in certain types of institutions. Large, centralised bureaucracies, distant from their areas of governance, are difficult to bring to account. Localised institutions, on the other hand, can be closely tied to the policy outcomes and their effects. Indeed, the OECD recognises that the 'opportunities for integration are often greater at the regional level' (1989: 8).

This becomes clearer when we examine the opportunities identified by the OECD for a better integration of agricultural and environmental policies. These include: (i) the development of research and advisory programmes promoting environmental objectives; (ii) encouragement of farm management plans to include environmental considerations; (iii) management agreements for the improvement of landscape amenity and nature conservation value; (iv) promotion of environmentally favourable practices such as integrated pest management schemes; (v) charges on inputs such as fertilizers and pesticides; (vi) making income, capital and land taxation policies neutral with regard to agricultural and environmental objectives.

The majority of these approaches would benefit from local implementation and administration. Local conditions, both environmental and economic, can more readily be incorporated into research and advisory programmes and management agreements are, by definition, localised. These policies need to be sensitive to local circumstances and rely on local farming knowledge for their detailed implementation. This marks a move away from centralised, homogeneous agricultural policies which seek to obliterate diversity. Policy institutions themselves must also reflect this diversity.

This type of approach also allows us to link social sustainability (rural livelihoods) to ecological sustainability. The policy instruments – research and advice, sanctions on pollution, incentives and taxes – need to be geared to the social reproduction of farming systems. Integrated policies may make this easier to achieve. One way of approaching this issue is through the concept of 'sustainable livelihoods', developed most notably by Robert Chambers (1983;1992). Concerned mainly with the rural poor in Third World countries, Chambers has proposed an approach to sustainable development which puts at its heart the question of how 'people can be enabled to gain adequate, secure, decent and sustainable livelihoods in rural areas' (1992: 215). The first priority is not the environment or production but rural livelihoods, stressing both the satisfaction of basic needs and long-term security. The essence of this approach is to reverse 'top down' thinking by empowering people and giving them the resources to manage their own livelihoods. These resources include: equitable and secure rights and access to resources; access to basic services; and safety nets of support (1992: 227). This approach of 'putting people first' means that development agencies must strengthen their training methods, spend time in the field learning with rural people, direct expertise to neglected gaps in local knowledge bases, and sponsor new initiatives (1992: 228).

The strengths of the sustainable livelihoods concept are three-fold. First, it ensures that sustainability contains a *social* as well as an environmental dimension. Secondly, the concept has a strong bottom-up democratic thrust. Thirdly, the concept acknowledges that people be treated as a *resource*, not just as consumers, or as producers concerned solely with profit, and that human capital, including skills and knowledge and resource-conserving practices, needs also to be conserved.

In our view, the labour process as an 'arena of co-ordination' is a useful starting point in thinking about how the social and ecological components of sustainability might be seen to be interrelated at the local level. The labour process, as van der Ploeg intimates, is where the desire to fulfil 'needs' comes into contact with the external (ecological and social) environment. In order to make the labour process sustainable, in both social and ecological terms, we need to ensure that resources are used in an environmentally sensitive fashion. As we discussed above, policy instruments can be used to foster this shift. However, there is also a need to ensure the economic activities themselves are sustainable and this brings us to the area of market participation. If agricultural production systems are to play to local strengths, then the issue of developing sustainable markets becomes crucial.

Green Markets

The objective of sustainable economic output within a market framework might, at first, seem to be a 'mirage'. Markets are, by their very nature, fluid and ever-changing. Patterns of demand are often unstable and new forms of production and new products often disrupt established sources of supply. However, it is useful to begin to think about how sustainable economies might be more strongly linked with sustainable environments.

It is our contention here that regional or local control of their production processes by primary producers does allow them to both 'police' the ecological aspects of production and capture a market advantage through the 'greening' of their practices. Farms and other rural businesses need to be aware of their environmental responsibilities, for a number of reasons. Greater efficiency in the use of resources and the development of recycling may help reduce raw material, pollution control and waste disposal costs. Rural businesses that do not clean up their production practices may fall foul of anti-pollution, public health or safety legislation. They may face opposition or hostilities from local residents or planners or environmental campaigners. Conversely a green image may be a positive boost to business.

Environmental auditing has been developed by leading businesses as an important corporate management tool, to assess internal performance and to identify means of improving arrangements for environmental management. Guidelines have been issued by a number of business organisations (International Chamber of Commerce 1990; Confederation of British Industry 1990) and the European Commission has proposed a directive which would lay down standardised procedures for the conduct of environmental audits, their external verification and public reporting requirements. The accountancy profession has also begun to consider how accounting practices and companies' information systems could be developed to help sensitise managers to the environment and monitor the performance of business (Chartered Association of Certified Accountants 1990).

Most of this advice and information has been directed to large, corporate companies. Little has been targeted at farms and small firms and their distinct needs. With green credentials becoming a source of competitive differentiation, they could be placed at a disadvantage. In principle, though, environmentally responsible farms and small firms in rural areas have potential advantages which may simply need the right advice and promotion to be realised.

Many producers have begun to realise that a green image may be good for business. Green Consumerism has emerged as a powerful force amongst well-off and concerned consumers, and is now being paralled by the contemporary debate in Europe over eco-labelling. An initial focus of green consumerism was retailing and, particularly the food sector. However, the concerns of major retailers coupled with the activities of environmental campaigners have pushed the pressures down the production chain, encouraging manufacturers, processors and producers to adopt a 'cradle to the grave' perspective in evaluating the environmental implications of their products and processes. Increasingly, it is incumbent on firms in high value consumer industries and the food sector to demonstrate that their products have been responsibly produced.

A growing feature of most EC member states is pressure from consumers for greater information about food products, their contents and their provenance, and greater discrimination concerning healthy eating and life-styles. These concerns increasingly focus on issues to do with food purity. A parallel development is that of responsible consumption, where people seek to pursue ethical principles in the consumer choices they make. These principles may embrace, for example, animal welfare concerns, the environment and social justice in the labour process. At the same time, there is growing demand for localised and crafted products of high quality and identifiable origin. There seems growing scope, particularly through effective marketing and product development for these two trends to converge in demands for high class niche products carrying a 'passport' indicating their provenance and responsible production.

Effective 'place marketing' would be the key to link the promotion of such niche products with rural sustainability. In this way, production could be tied to the assertion of positive environmental images of place thus assisting local produce to carve out niche markets. This could be further facilitated by the promotion of co-operation between local producers so that a single image of community and place is promoted, thereby tying together the protection of rural livelihoods with the protection of the rural environment.

The 'greening' of production processes and the capture of 'sustainable markets' by farmers and other rural businesses is a potential that cannot simply be left to those businesses themselves. Strengthening regional co-operatives and their control over local production could be valuable in terms of control over both inputs and output. On the input side, strong co-operatives can efficiently police farming and environmental practices in the locality, whilst on the output side, there is the enhanced opportunity to capture the value-added generated by producing environmentally responsible products (Osti 1992). As the OECD indicated, there should be integrated policies at the regional level, providing support, advice and guidance to businesses as they try to move towards this system of sustainable production. The local and regional institutions with this responsibility could be modelled on the existing rural development agencies. These agencies should have a clear industrial strategy based on sound ecological principles. They should aim for local economic development strategies based upon the need to get a self-re-enforcing network of local companies that benefit from one another's success. Such agencies should probably not be sector-specific. As agriculture goes through a transition towards sustainability, many farmers may need to diversify into other economic activities. Agriculture's (horizontal) links with the local economy should be incorporated into economic strategies. Similarly, its international (vertical) links with the food system and the consequences of this need to be recognised. These local development agencies must, therefore, carry a responsibility for local environmental and human resources. They should concern themselves with both sustainable ecosystems and livelihoods.

In conclusion, however, it is worth noting the limits to this strategy. While we have emphasised the localised nature of sustainable rural development, this is only part of the picture. As Norgaard, a notable exponent of the strategy outlined here, reminds us:

> '*while institutions have to be locally tailored to support ecosystem-specific technologies, local institutions, none the less, will still have to mesh with regional and global institutions designed to capture the gains of ecosystem management on a larger scale and to prevent untoward broader consequences of local decisions*' (Norgaard 1992: 85).

We have stressed the necessary requirements for sustainable development to be initiated locally. But on its own this is clearly insufficient. It must be part of a broader strategic framework concerned with sustainability at all levels of governance.

Conclusions

We have argued here that sustainability is about more than the maintenance of ecological resource levels and biodiversity. We have emphasised that the concept has a social dimension that must be placed at the centre of any discussion of how sustainability is to be made practicable, and have proposed that the link between the social and the ecological components of sustainability can be most readily combined within local settings. Implicit in our argument is the belief that a rupture has taken place, through the use of particular technologies driven by basic science and the market, which has broken the link between social systems and their *immediate* environments. Thus, 'art de la localité' has been submerged under a barrage of technological transformations. This has not, however, freed these social systems from *ultimate* environmental constraints. We believe that a return to a concern with immediate, local environments provides at least a starting point for the promotion of a sustainable agriculture. We further proposed the labour process as a unifying object of analysis, for it is here that the social meets the ecological. From an examination of sustainable labour processes we can begin to challenge the sustainability of agriculture's dependence on external forms of credit and technology.

Our analysis here follows closely that presented by Norgaard (1992). In pressing for a 'co-evolutionary' approach to sustainable development, he says:

> '*sustainability does not imply that everything stays the same. It implies that the overall level of diversity and overall productivity of components and relations in systems are maintained or enhanced .... The shift towards sustainable development entails adopting policies and strategies that sequentially reduce the likelihood that especially valuable traits will disappear prematurely. It also entails the fostering of diversity per se*' (Norgaard 1992: 81-82).

This diversity applies not just to ecological systems, but to social, cultural and organisational systems. The sustainability of social and ecological systems at the local and regional levels needs institutional support and regulation, and this entails the development of political institutions for this end. It also implies increased accountability and democratic sanction within these new regulatory institutions.

In this way we believe rural localities might be able to 'play to their strengths'. The production of 'green' commodities may enhance the status of those localities which are able to most successfully link product and place, so leading to a regeneration of areas which are, at present, viewed as peripheral within global systems of production. In this way, rural livelihoods could be strengthened locally rather than weakened globally.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References

Chapter 2

BENEDICTIS, M. De and V. COSENTINO (1979), *Economia dell'azienda agraria, teoria e metodi* (Bologna: Il Mulino)

BENNETT, J. (1981), *Of Time and the Enterprise, North American family farm management in a context of resource marginality* (Minneapolis: University of Minnesota Press)

BENVENUTI, B. (1990), *Geschriften over landbouw, technologie en agrarische structuur* (Wageningen: PUDOC)

BENVENUTI, B. (1991) Towards the formalization of professional knowledge in farming, growing problems for agricultural extension, in: *Proceedings of the International Workshop, Agricultural Knowledge Systems and the Role of Extension,* Hohenheim, pp. 34-50

BENVENUTI, B. *et al.* (1989), *Produttore agricolo e potere; modernizzazione delle relazioni sociali ed economiche e fattori determinanti dell'imprenditorialita agricola* (Rome: CNR/IPRA)

BIELEMAN, J. (1987), *Boeren op het Drentse zand 1600-1900. Een nieuwe visie op de 'oude' landbouw* (Utrecht)

BRUIN, R. de et al. (1991), *Maat houden, bedrijfsstijlen in de Friese Wouden en het Zuidelijk Westerkwartier* (Leeuwarden and Wageningen)

BRUIN, R. de (1991), *Niet klein te krijgen, bedrijfsstijlen in de Gelderse vallei* (Wageningen)

DARRÉ, J.P. (1985), *La parole et la technique, l'univers de pensée des éleveurs du Ternois* (Paris: L'Harmattan)

GLASER, B.G. and A.L. STRAUSS (1967), *The discovery of grounded theory. Strategies for qualitative research* (Chicago)

HOFSTEE, E.W. (1985), *Groningen, van grasland naar bouwland, 1750-1930,* (Wageningen: PUDOC)

IRFATA (1990), *Analisi dei fattori condizionanti l'adozione da parte dei sesinari dei provvedimenti di politica economica* (Bologna)

KESSEL, J. van (1990), Produktieritueel en technisch betoog bij de Andesvolken, *Derde Wereld* (1/2)

LACROIX, A. (1981), *Transformations du procès de travail agricole, incidenced de l'industrialisation sur les conditions de travail paysannes* (Grenoble)

LONG, N. (1984), *Creating space for change: a perspective on the sociology of development* (Wageningen: Agricultural University)

LONG, N. et al. (1986), *The commoditization debate: labour process, strategy and social network* (Wageningen: Agricultural University)

LONG, N. and J.D. van der PLOEG (1990), Demythologizing planned intervention: an actor perspective, *Sociologia Ruralis* XXIX (3/4), pp. 226-249

LONG, N. and A. LONG, eds. (1992), *Battlefields of Knowledge* (London: Routledge)

MARSDEN, T. and J. MURDOCH (1990), *Restructuring rurality: key areas for development in assessing rural change* (ESRC paper London)

MEEUS, J., J.D. van der PLOEG and M. WIJERMANS (1988), *Changing agricultural landscapes in Europe: continuity, deterioration or rupture* (Rotterdam: IFLA)

MESSORI, F. (1983), *L'efficienza dell'impresa produttrice di latte per il Parmigiano Reggiano* (Reggio Emilia: CRPA)

PERNET, F. (1982) *Resistances Paysannes* (Grenoble)

PLOEG, J.D. van der (1985), Patterns of farming logic: structuration of labour and the impact of externalization, *Sociologia Ruralis* XXV (1)

PLOEG, J.D. van der (1986), *La ristrutturazione del lavoro agricolo* (Rome: La Reda)

PLOEG, J.D. van der (1990a), *Labour, markets and agricultural production* (Boulder, Colorado: Westview Press)

PLOEG, J.D. van der (1990b), Modelli differenziali di crescita aziendale agricola, ossia il legame fra 'senso' e 'strutturazione', *Rivista di Economia Agraria* (2), pp. 171-200

PLOEG, J.D. van der (1990c), L'azienda familiare nella tutela dell'ambiente' in A. Lobianco, ed., *L'agricoltura per l'ambiente, strategie e servizi della coldiretti* (Roma), pp. 109-118

PLOEG, J.D. van der, et al. (1992), *Boer bliuwe, blinder...bedrijfsstijlen op de Friese klei* (Leeuwarden en Wageningen: CCLB/LUW)

PLOEG, J.D. van der, V. SACCOMANDI and D. ROEP (1990), Differentiële groeipatronen in de landbouw: het verband tussen zingeving en structurering, in *Tijdschrift voor Sociaalwetenschappelijk Onderzoek van de Landbouw* 5 (2), pp 108-132

ROEP, D. et al. (1991), *Zicht op duurzaamheid en kontinuïteit; bedrijfsstijlen in de Achterhoek* (Wageningen)

ROEST, K. de (1990), Een voorbeeld van kwaliteit: de produktie van Parmezaanse kaas in J.D. van der Ploeg and M. Ettema, eds., *Tussen bulk en kwaliteit, landbouw, voedselproduktieketens en gezondheid* Van (Assen: Gorcum)

SACCOMANDI, V. (1991), *Istituzioni di Economia del Mercato dei prodotti agricoli* (Roma: La Reda)

SCOTT, J.C. (1985) *Weapons of the Weak, Everyday Forms of Peasant Resistence* (New Haven and London: Yale University Press)

SLICHER VAN BATH, B.H. (1960), *De agrarische geschiedenis van West Europa 500-1850*, Utrecht

SOLDAAT, B., F. VENTURA & H. VAN DER MEULEN (1990), *Risultati preliminari della ricerca carne*, CESAR, Assisi

VINCENT, J. (1977), Agrarian society as organized flow: processes of development, past and present, *Peasant Studies* VI (2), pp 56-65

WIT, C.T. de (1975), Substitution of labour and energy in agriculture and options for growth, *Netherlands Journal of Agricultural Science* 23, pp 145-162

ZANDEN J.L. van (1985), *De Economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914*, A.A.G. Bijdragen, Landbouwuniversiteit Wageningen

Chapter 3

BECKER H. (1945), Interpretative Sociology and the Constructive Typology, In: Gurvitch G. and W. Moore (eds), *Twentieth Century Sociology*: 70-95. The Philosophical Library, New York

GHORAYSHI P. (1986), The Identification of Capitalist Farms: Theoretical and Methodological Considerations. *Sociologia Ruralis* xxvi/2: 146-59

GIDDENS A. (1984), *The constitution of society.* Polty, Cambridge

GOSS K., *et al.* (1980), The Political Economy of Class Structure in US Agricuture: a Theoretical Outline. In Buttel F. and H. Newby (eds), *The Rural Sociology of Advanced Industrial Societies: Critical Perspectives.* Allenheld, Osmun, Montclair, New Jersey

HARRÉ R. (1981), Philosophical Aspects of the Macro-micro Problem. In Knorr-Cetina K. and A. Cicourel (eds), *Advances in Social Theory and Methodology*: 139-60. RKP, Henley

KNORR-CETINA K. and A. CICOUREL (eds) (1981), *Advances in Social Theory and Methodology.* RKP, Henley

MARSDEN T. *et al.* (1992), Incorporating Social Trajectories into Uneven Agrarian Development. *Sociologia Ruralis,* xxxii/4: 408-30

NEWBY H., *et al.* (1978), *Property, Paternalism and Power.* Hutchinson, London

PLOEG J.D. VAN DER (1990), *Labour, Markets and Agricultural Production.* Westview press, Boulder, Colorado

PLOEG J.D. VAN DER (1992), The Reconstitution of Locality: Technology and Labour in Modern Agriculture, In: Marsden T., P. Lowe and S. Whatmore (eds), Labour and locality. *Uneven Development and the Rural Labour Process*: 19-43. David Fulton Publishers, London

SAYER A. (1992), *Method in Social Science.* A realist approach. (second edition). Routledge, London

STINCHCOMBE A. (1961), Agricultural Enterprise and Rural Class Relations. *American Journal of Sociology,* 67: 165-77

VOLKER K. (1992), Adapted Farming Systems for a Rural Landscape. A social Typology of Dutch Farmers. *Sociologia Ruralis,* xxxii/1: 146-62

WHATMORE S. *et al.* (1987a), Towards a Typology of Farm Businesses in Contemporary British Agriculture. *Sociologia Ruralis,* xxvii/2: 103-22

WHATMORE S. *et al.* (1987b), Interpreting a Relational Typology of Farm Businesses in Southern England. *Sociologia Ruralis,* xxvii/3-4: 235-45

WHATMORE S. (1991), *Farming Women: Gender, Work and Family Enterprise.* Macmillan, London

Chapter 4

BENTLEY, J. (1992) *Today there is no misery, the ethnogaphy of farming in northwest Portugal.* Tucson & London, University of Arizona

BLACK, R. (1992), *Crisis and change in rural Europe, agricultural development in the Portuguese mountains.* Avebury Ashgate

BROUWER, R. (1992), *Common goods and private profits: traditional and modern communal land management in Portugal,* unpublished

CRISTÓVÃO, A. and M. TIBERIO (1992), *Valorizacao dos Recursos naturais de qualidade; elementos para uma estrategia de desenvolvimento endogeno*. Communication presented at 'as Jornadas de Desenvolvimento do Barroso, Montalegre

INSTITUTO NACIONAL DE ESTATISTICA (INE) (1989), *Recenseamento Geral Agricola*, resultados preliminares, Lisboa

ISOLINA, M.J.C. & Q. DINIS POETA (1990), *Os fundos estruturais comunitarios e a sua aplicacao a agricultura portuguesa*. UTAD, Vila Real

JESUS FERREIRA ALVES, J. DE (1989) *Portugal e a politica agricola comum*. Coimbra

LIMA SANTOS, J. (1992) Mercado Economias e Ecosistemas no Alto Barro. Camara Municipal de Montalegre

LEMA, P. (1978), *Tourem uma aldeia do Barroso*, Lisboa

O'NEILL, B. (1978), *Proprietarios, Lavradores e Jornaleiros*. Publicacoes Dom Quixote, Lisboa

PIRES, B. (1970), *Economia e sociologia da montanha, o Conselho de Montalegre*, Universidade Técnica de Lisboa, Instituto Superior de Agronomia, Lisboa

PORTELA, J. & A. BAPTISTA (1986), *Utilizacao das salas colectivas de ordenha mecanica na zona NW de Trás-os-Montes*, UTAD, Vila Real

PORTELA, J. & A. BAPTISTA (1991), *Relatorio Final de Avaliação*, O PDRITM e o Desenvolvimento da Produçao Leitera, UTAD, Vila Real

PROGRAMMA DE DESENVOLVIMENTO AGRICOLA REGIONAL DO BARROSO (PDAR) (1992), *Caracterizacao da Zona de Incidencia do PDAR*. Montalegre

Chapter 5

AGROCONSULTORES-COBA (1991), Carta de Solos, Carta de Utilização Actual da Terra e Carta de Aptidão da Terra do Nordeste de Portugal. Universidade de Trás-os-Montes e Alto Douro. Projecto de Desenvolvimento Rural Integrado de Trás-osMontes

AMBERGER, A. (1991), Ammonia emissions during and after land spreading of slurry. In: *Odor and Ammonia Emissions from Livestock Farming*. V.C. Nielson, J.H. Voorburg e P. L'Hermité (eds.). pp.126-131. Elsevier Applied Science, London

BERNARDO, A.A.S. (1988), Caracterização Geral da Zona Agrária do Barroso sob o Ponto de Vista Económico, Demográfico e Social. Relatório final de estágio. Universidade de Trás-os-Montes e Alto Douro, Vila Real

COUTINHO, J.F.M. (1989), Acidez do Solo e Toxicidade do Alumínio. Calibração de Métodos de Avaliação da Necessidade em Cal. Universidade de Trás-os-Montes e Alto Douro, Vila Real

CRISTÓVÃO, A., H. OOSTINDIE, and F. PEREIRA (1992), *Differentiated agricultural development patterns in Barroso: searching for alternative intervention strategies*. Strengthening endogenous development patterns in European Agriculture CERES-CAMAR seminar, Chania, Crete. 20-22 October 1992

DÖHLER, H. (1991), Laboratory and field experiments for estimating ammonia losses from pig and cattle slurry following application. In: *Odor and Ammonia Emissions from Livestock Farming*. V.C. Nielson, J.H. Voorburg e P. L'Hermité (eds.). pp.132-140. Elsevier Applied Science, London

JANSEN, B.H. (1984), A simple method for calculating decomposition and accumulation of 'young' soil organic matter. *Plant and Soil* 76:297-304

KIRCHMAN, H. (1985), Losses, plant uptake and utilization of manure nitrogen during a production cycle. *Acta Agric.* Scand. Suppl. 24: 8-71

KLARENBEEK, J. V. and BRUINS, M.A. (1991), Ammonia emissions after land spreading of animal slurries. In: *Odor and Ammonia Emissions from Livestock Farming*. V.C. Nielson, J.H. Voorburg e P. L'Hermité (eds.). pp.107-115. Elsevier Applied Science, London

LIMA SANTOS, J.M.L. (1992), Mercado, Economias e Ecossistemas no Alto Barroso. Um estudo de sistemas de aproveitamento de recursos naturais. Câmara Municipal de Montalegre

NEETESON, J.J. and W.P. WADMAN (1990), Ammonia volatilization and nitrate leaching after animal manure application to agricultural crops. In: *Agricultural and Food Processing Wastes*. Proceedings of the Sixth International Symposium on Agricultural and Food Processing Wastes. American Society of Agricultural Engineers, USA. pp. 148-159

OOSTHOEK, J., W. KROODSMA, and P. HOEKSMA (1991), Ammonia emission from dairy and pig housing systems. In: *Odor and Ammonia Emissions from Livestock Farming*. V. C. Nielson, J.H. Voorburg e P. L'Hermité (eds.).pp.31-41. Elsevier Applied Science, London

PIRES, C.S.S.B. (1970), Economia e Sociologia da Montanha. O Concelho de Montalegre. Relatório final de estágio. Universidade Técnica de Lisboa. Instituto Superior de Agronomia. Lisboa

PORTELA, J.F., J.F. COUTINHO and E.A.C. PORTELA, (1986), Introdução de Inovações no Cultivo de Cereais em Trás-osMontes: Experimentação Recorrente e sua Avaliação Técnica, Económica e Social. Universidade de Trás-os-Montes e Alto Douro. Vila Real

PORTELA, J.F. (1991), The Terra Fria farming system: elements, practices and neglected research domains. In: *Endogenous Regional Development in Europe*. Theory. Method and Practice. H. de Haan and J.D. van der Ploeg (eds.). pp.263-286. European Commission DG VI, Brussels

PRINS, E. (1991), Corva. Tradicional Agriculture and Irrigation. Agricultural University of Wageningen

REDDY, K.R., T.C. FEIJETEL and W.H. PATRICK Jr. (1986), Effect of redox conditions on microbial oxidation of organic matter. In: *The Role of Organic Matter in Modern Agriculture*. Y. Chen and Y. Avnimelech (eds.). pp.117-156. Martinus Nijhoff Publishers, Dordrecht

RGA (1989), Recenceamento Geral Agrícola (Resultados preliminares). Instituto Nacional de Estatística, Lisboa

SILVA, J.M.V. (1980), Ocorrência de vermiculite-Al e gibsite em solos de granito do Noroeste de Portugal. Génese destes minerais. Serviços Geológicos de Portugal 66: 71-77

SILVA, J.M.V. (1983), Estudo mineralógico da argila e do limo de solos derivados de granitos e rochas básicas da região de Trás-os-Montes. *Garcia de Orta* (Estudos Agronómicos) 10: 27-36

VLASSAK, K., H. BOMANS and K.U. VAN DEN ABBEEL (1991), Ammonia emission and control after land spreading of livestock waste. In: *Odor and Ammonia Emissions from Livestock Farming*. V.C. Nielson, J.H. Voorburg e P. L'Hermité (eds.). pp.116-125. Elsevier Applied Science, London

Chapter 6

BAPTISTA, A. (1989), *Do aumento de area das explorações agrícolas nos vales submontanos-O caso de Cimo de Vila de Castanheira.* UA/DES-UTAD Estudos

BAPTISTA, A. AND J. PORTELA (1990), O PDRITM/ Vales Submontanos e o Funcionamento das Explorações Leiteiras; Que sistema Forrageiro para Que tipo de Exploração. UA/DES/UTAD

BLEUMINK, H. and M. KUIK (1992), Aguas Mil, *Towards a typology of traditional irrigation schemes in Northeast Portugal.* UTAD/DES

BROUWER, R. (1992), *Common goods and private profits: traditional and modern communal land management in Portugal.* Department of Agrarian Law, Wageningen Agricultural University

COWARD, E.W. (1985), State and locality in Asian irrigation development: the Property factor. In *K.C. Nobe and R.K. Sampath, Irrigation Management in Developing Countries: Current issues and approaches*

CRISTÓVÃO, A., H. OOSTINDIE, AND F. PEREIRA (1992). Differentiated agricultural development patterns in Barroso: Searching for alternative intervention strategies, published as chapter 3 in this book

DAVIDSE, I. (1991), The French connection-Agriculture and Irrigation in Pereira, North Portugal. Unpublished Msc. these, Department of irrigation and soil and water conservation, WAU, The Netherlands

DIRECÇÃO-GERAL DOS RECURSOS E APROVEITAMENTOS HIDRÁULICOS (DGRAH), (1987), Inventário dos Regadios Existentes no Continente

DRIES, A. VAN DEN (1992), Effects of Intervention on Water Use in Traditional Irrigation Systems of Northeast Portugal. Unpublished paper. UTAD/DES

FRAGATA, A. (1989), *Diversidade e Racionalidades dos Agricultores do vale do Sousa; As freguesias de Nespereira e Aveleda do Conselho de Lousada.* Instituto Nacional de Investigação Agrária

MARTIN, M., R. Yoder, AND D. GROENFELDT (1987), Farmer-Managed Irrigation: Research Issues. ODI-IIMI paper 86/3c, ODI, Londen

MATOS FERREIRA, M. (1989), *Aspectos institucionais e jurídicos na gestão das aguas subterrâneos. Seminário sobre Aguas Subterrâneos e Meio Ambiente.* Coimbra.

MORGADO, P. (1992). Case Study of Village de Sezelhe, preliminary date

PORTELA, J. M. RIBEIRO, AND A. BAPTISTA (1985), PDRITM/ Melhoria de Regadios Tradicionais: Metas a atingir: Questões de Execução ou Planeamento? UA/ DES/ UTAD

PORTELA, J. (1990), Relatório Final de Avaliação: PDRITM, Melhoria dos Regadios Tradicionais. Unidade de Avaliação, UTAD/DES

PORTELA, J. AND A. BAPTISTA (1985), PDRITM-Melhoria dos Regadios Tradicionais-Efeitos Imediatos. Unidade de Avaliação (UA), UTAD/DES

PORTELA, J., A. MELO AND A. BAPTISTA (1987), PDRITM-Melhoria dos Regadios Tradicionais-Efeitos Intermédios. UA, UTAD/DES

PORTELA, J. 1987. PDRITM/ Melhoria de Regadios Tradicionais: Metas, Realizações e Perspectivas (Relatório de Avaliação Intermédio). UA, DES/UTAD

PORTELA, J. AND A. VAN DEN DRIES (1992), Intervention in Farmer-Managed Irrigation in Northeast Portugal: Results of an Inventory study. Draft paper to the Asian Regional Workshop on the Inventory of FMIS and Management Information Systems, October 1992, Manila, Philippines

REGO, Z. DE CASTRO AND L. SANTOS PEREIRA (1990), PDRITM/ Componente de Investigação Agrícola Aplicada-Métodos de Rega: Relatório Final. UTAD

SCHULTINK, F.(1992), Preliminary report of Research in Sesmil (MSc these). Department of Irrigation and Soil and Water Conservation, Wageningen Agricultural University

Chapter 7

ALMENDRAS ALHAMBRA (1991), *Información sobre nuestra O.P.A. 'Crisol de Frutos Secos' y los Planes de mejora de los almendros*, Extracto de la normativa que el socio productor de almendra debe conocer para acceder a las ayudas del mercado común. Folleto de divulgación (Durcal: Almendras Alhambras)

ASOCIACIÓN COMARCAL DE COSECHEROS-PRODUCTORES DE VINO DE LA TIERRA DE LA COMARCA CONTRAVIESA-ALPUJARRA (1987), Reestructuración del viñedo en el marco de operaciones colectivas. Not published

BENVENUTI, B. (1982), De technologisch-administratieve taakomgeving (TATE) van landbouwbedrijven, *Marquetalia* (5), pp. 111-136

CALATRAVA REQUENA, J. (1982), Los regadíos del litoral mediterráneo andaluz, realidad problemática de una agricultura de vanguardia, *Información Comercial Española* (582), pp. 67-87

CALATRAVA REQUENA, J. (1985), La horticultura litoral de primor en el contexto de la agricultura andaluz, *Información Comercial Española* (619), pp. 81-88

CALATRAVA REQUENA, J. and J. MOLERO RAMIS (1983), Consideraciones sobre la aplicabilidad de las directrices socioestructurales agrarias de la CEE a la depresión penibética de Las Alpujaras, *Anales INIA. Serie Economía y Sociología Agraria* (7), pp. 119-165

CRAE (1990), *Reglamento y normas técnicas. Consejo Regulador de la Agricultura Ecológica*. Servicio de Extensión Agraria (Madrid: Ministerio de Agricultura, Pesca y Alimentación)

CONTRALP (1987), Propuesta de Reglamento. Documento interno. Not published

GARCIA MANRIQUE, E. (1973), El viñedo en la costa alpujarreña, *Estudios Geográficos* (132-133), pp. 501-538

GASTÓ, J. (1980), *Ecología: el hombre y la transformación de la naturaleza* (Santiago, Chile: Editorial Universitaria)

ISEC (1992), Ecological agriculture in Andalucia, Spain: preliminary results of four case studies, in *Proceedings of the CAMAR seminar Farm household strategies and styles of farming: typologies for designing sustainable agriculture*. Vila Real, Portugal, 4-5 November 1991

JUNTA DE ANDALUCIA (1991), *Plan de Actuación de la Alpujara. Documento de Síntesis*

MAPA (1979), *Catastro vitícola y vinícola*. No. 18, Granada (Madrid: Ministerio de Agricultura, Pesca y Alimentación, Instituto Nacional de Denominaciones de Origen)

MAPA (1983), Analisis espacial de la depresion socioeconomica en España en base de las comarcas agrarias. Comunicaciones INIA, no. 14. Serie: *Economia y Sociología Agrarias*

NAVARRO ALCALÁ-ZAMORA, P. (1979), Mecina: la cambiante estructura social de un pueblo de la Alpujarra. *Colección 'Monografías'* no. *19*. (Centro de Investigaciones Sociológicas. Madrid) pp. 371

NAVARRO ALCALÁ-ZAMORA, P. (1981), *Tratadillo de agricultura popular: el medio, las técnicas y los personajes en la Alpujarra* (Barcelona: Editorial Ariel. Barcelona)

PLOEG, J.D. van der (1987), *De verwetenschappelijking van de landbouwbeoefening* (Wageningen: Agricultural University)

REMMERS, G.G.A. (1992), Agricultura Ecológica y Agricultura Tradicional: Vecinos Distantes, *Agricultura y Sociedad* (in press)

Chapter 8

CESAR (1991), *Identificazione, differenciazione ed analisi dei livelli di qualità delle carni bovine ed ovine*

GIORGETTI, A. and B.M. POLI (1990), *Alimentazione animale e qualità della carne*, lecture held at the Academia dei Georgofili 16 Nov. 1990, vol. XXXVII, series VII

MARCHINI, A. and F.M. SANTUCCI, Economia dell'allevamento da carne in Umbria e Marche; c'è un futuro per le razze Chianina e Marchigiana? (Perugia: INEA), Osservatorio di Economia Agraria per l'Umbria e le Marche

PLOEG, J.D. van der (1985), Patterns of farming logic: The structuration of labour and the impact of externalization, *Sociologia Ruralis* XXV (1), pp. 5-25

POLI, B.M. (1991), Caratteristiche chimiche e qualità della carne di vitelloni di razza Chianina, *MESE* (2)

STEENKAMP, J.E.B.M. (1986), *Kwaliteitsbeoordeling van vleeswaren* (Wageningen: Agricultural University)

Chapter 9

BARROW, J.D. (1990), 'Theories of everything; Oxford University Press

BARROW, J.D. (1990), Why is the Universe Mathematical? In: 'La Nuova Civiltà delle Macchine, Anno VIII, N.4(32) 1990

BENSTON, M.L. (1989), Feminism and System Design: questions of control. In: 'Winnie Tomm (ed.) 'The Effects of Feminist Approaches on Research Methodologies; CIH, the Calgary Institute for the Humanities, Calgary

BENVENUTI, B. (1984), Il tecnico consulente - i problemi di formazione e scientificizzazione dell'agricoltura. In: 'L'Italia Agricola, Aprile-Giugno 1984

BENVENUTI, B. (1987), Gli effetti inattesi della scientificizzazione del patrimonio conoscitivo professionale del produttore agricolo; 'La Questione Agraria, 25, 1987

BENVENUTI, B. (1989), The Autonomy issue in Commercial Western Farming and the emerging of TATE. In: E. Poutsma and A. Walravens (eds.) 'Technology and Small Enterprises – technology, autonomy and industrial organization, Delft University Press, Delft

BENVENUTI, B. (1991), Towards the formalization of professional knowledge in farming: growing problems for Agricultural Extension? Proceedings of the International Workshop 'Agricultural Knowledge Systems and the role of Extension', Bad Boll, 21-24 May 1991, University of Hohenheim

BENVENUTI, B. (1992), Evoluzione o Rivoluzione Tecnica oppure Evoluzione e Rivoluzione Tecnica? Convegno Internazionale 'Biotecnologie e Agricoltura: evoluzione o rivoluzione tecnica? Roma 28-29 /05/1992

BENVENUTI, B. et al. (1992), Produttore Agricolo e Potere; CNR/IPRA, Roma

BENVENUTI, B. en H. MOMMAAS (1981), De Technologisch-Administratieve Taakomgeving van Landbouwbedrijven – een onderzoeksprogramma op het gebied van de economische sociologie van de landbouw; Afdelingen voor Sociologie van de LH; Wageningen

BUNGE, M. (1991), Una caricatura de la ciencia: la novisima sociologia de la ciencia; 'INTERCIENCIA, Mar-Apr. 1991, Vol 16, n.2

GRANGER, G.G. (1967), 'La Raison Presses Universitaires de France

KLOPPENBURG Jr., J. (1991), Social theory and the de/reconstruction of agricultural science; 'Rural 'Sociology, 1991, 57: 519-48

KLOPPENBURG Jr., J. (1992), Science in Agriculture: A reply to Molnar, Duffy, Cummings,and Van Santen and to Flora; 'Rural Sociology, Spring, 1992

MARGLIN, S.A. (1991), Two essays on agriculture and knowledge. Essay I, High-tech agriculture: a system of knowledge perspective; Essay II, Alternative agriculture: a system of knowledge approach; Harvard University and World Institute of Development Economics Research

MOLNAR, J., P.A. DUFFY, K.A. CUMMINGS and E. VAN SANTEN (1992), Agricultural science and agricultural counterculture: paradigms in search of a future. 'Rural 'Sociology 1992, 57

PLOEG, J.D. VAN DER (1990), 'Labor, Markets and Agricultural Production; Westview Special Studies in Agriculture Science and Policy; Westview Press Inc. Boulder Colorado

PLOEG, J.D. VAN DER et al. (1990), 'Bedrijfsstijlen in de Zuidhollandse Veenweidegebieden. LUW Wageningen

PLOEG, J.D. VAN DER et al. (1991a), 'Maat Houden. LUW, Wageningen

PLOEG, J.D. VAN DER et al. (1991b), 'Zicht op Duurzaamheid en Kontinuïteit. LUW, Wageningen

PLOEG, J.D. VAN DER et al. (1991c), 'Niet Klein te Krijgen. LUW, Wageningen

PLOEG, J.D. VAN DER et al. (1992a), 'Toppers en Tuinders. LUW, Wageningen

PLOEG, J.D. VAN DER et al. (1992b), 'Boer Bliuwe, Blinder. LUW, Wageningen

RUIVENKAMP, G. (1992), Taylor made biotechnology: the possibilities for a farmer centered development; Convegno Internazionale 'Biotecnologie e Agricoltura: evoluzione o rivoluzione tecnica?, Roma, 28-29/05/1992

SODANO, V. (1992), Incentivi all'integrazione verticale in agricoltura e forme di organizzazione del sistema alimentare; Studi di Economia e Diritto, Cagliari, 1992/2

Chapter 10

ALLEN, J. and MASSEY, D. (1988), *Restructuring Britain: the Economy in Question* Sage: London

BARAN, P. (1973), *The Political Economy of Growth* Penguin: Harmondsworth

BATIE, S. (1989), Sustainable Development: Challenges to the Profession of Agricultural Economics *American Journal Agricultural Economics* pp. 1083-1101

CARTER, I. (1975), A Socialist Strategy for the Highlands pp 247-253. In, G. Brown Ed, *The Red Paper on Scotland* Edinburgh University Student Books: Edinburgh

CARTER, I. (1979), *Farm Life in North East Scotland 1840-1914: The Poor Man's Country*, John Donald: Edinburgh

CHAMBERS, R. (1983), Rural Development: Putting the Last First Longman, Harlow

COHEN, A. P. Ed. (1982), *Belonging* Manchester University Press: Manchester

COHEN, A. P. (1987), *Whalsay: Symbol Segment and Boundary in a Shetland Island Community* Manchester University Press: Manchester

DOWER, N. (1990), What is Development A Philosopher's Answer *C.D.S. Occasional Paper*, No 3 University of Aberdeen

FIRN, J. (1975), Branch Plants and Regional Development pp 153-169. In, G. Brown Ed. *The Red Paper on Scotland* Edinburgh University Student Books: Edinburgh

FORSYTHE, D. (1982), Urban-Rural Migration, Change and Conflict on an Orkney Island, *North Sea Oil Panel Occasional Paper*, No 14, Social Science Research Council: London

FRANK, A. G. (1969), *Capitalism and Underdevelopment in Latin America* Penguin: Harmondsworth

FRIEDMANN, H. (1986), Family Enterprises in Agriculture: Structural Limits and Practical Possibilities: Ch 3 of G. Cox et al. Eds. *Agriculture: People and Policies* Allen & Unwin: London

GHATAK, S. and INGERSENT, K. (1984), *Agriculture and Economic Development* Wheatsheaf: Brighton

LONG, N. (1984), Creating Space for Change: a perspective on development sociology. *Sociologia Ruralis* Agricultural University Wageningen

LEFTWICH, A. (1991), Banking on Politics, Times Higher Education Supplement 4/10/91

PARKER, K. (1989), Integrated Rural Development in the Peak District: Summary and Provisional Conclusions

PEAK PARK PLANNING BOARD: Unpublished paper

SLEE, R. W. (1990), Agency Roles and the Development of Farm Diversification in the UK. Paper presented to the Congress of the European Society of Rural Sociology, Giessen

SNELL, H. G. and SNELL, T. (1975), Samish Responses to Processes of National Integration. In, J. Boissevain, Ed, *Beyond the Community: Social Process in Europe* Department of Education and Science, The Hague

STERN, E. (1989, Institutional Structures to Support Rural Enterprise, Unpublished paper OECD, Paris

STRATHERN, M. (1984), The Social Meanings of Localism pp 181-197 of *Locality and Rurality*, Eds, Bradley, T. and Lowe, P. Geobooks: Norwich

URRY, J. (1984), Capitalist Restructuring, Recomposition and the Regions, 1145-64 of *Locality and Rurality*, Eds, Bradley, T. and Lowe, P. Geobooks: Norwich

WENGER, C. (1982), The Problem of Perspective in Development Policy, *Sociologia Ruralis*, *27*, 5-17

WILLIAMS, C.H. (1990), Political Expressions of Underdevelopment in the West European Periphery Ch 15 of Buller, H & Wright, S Eds. *Rural Development: Problems and Practices* Avebury: Aldershot

WINTER, M. (1984), Agrarian Class Structure & Family Farming pp 92-128. In, *Locality and Rurality*, T. Bradley, and P. Lowe, Eds Geobooks: Norwich

Chapter 11

ROEST, C. de (1989), *Messa a punto di strumenti metodologici per la valutazione dell'impatto delle innovazioni nel settore da latte*, CRPA, Reggio Emilia

Chapter 12

OECD PARIS (1986), *Rural Public Management*
OECD PARIS (1988), *New Trends in Rural Policy making*
OECD PARIS (1990), *Partnerships for Rural Development*
OECD PARIS (1991), *New Ways of Managing Services in Rural Areas*
OECD PARIS (to be published end of 1992), *Rural Development Policy*

Chapter 13

PLOEG, J.D. VAN DER and D. ROEP (1990), *Bedrijfsstijlen in de Zuid-Hollandse veenweidegebieden; nieuwe perspektieven voor beleid en belangenbehartiging.* LTB-Haarlem en LU-Wageningen. Wageningen
EDQVIST, O. and CH. EDQVIST (979), *Social carriers of techniques for development*, SAREC, Stockholm

Chapter 14

COMITATO PRODUTTORI PARMIGIANO-REGGIANO MONTECHIARUGOLO, Programma di ristrutturazione del comparto lattiero-caseario parmense, Monticelli (PR) September 1990
PRETOLANI, R. (1991), *I costi di produzione del latte in Italia* (Lombardia) Cremona

Chapter 15

ARNON, I. (1989), *Agricultural Research and Technology Transfer* (New York)
ASHBY, J.A., C.A. QUIROS and Y.M. RIVERA (1987), Farmer participation in on-farm variety trials, ODI Agricultural Administration (Research and Extension) Network (Discussion Paper No. 22)
BAKER, D and D. NORMAN (1990), The Farming Systems Research and Extension Approach to small farm development, in M. Altieri and S. Hecht, eds., *Agroecology and Small Farm Development* (Boca Raton, FL.: CRC Press)
BIGGS, S.D. (1980), Informal R and D, *Ceres* 13
BIGGS, S.D. (1990), A multiple source of innovation model of agricultural research and technology promotion, *World Development* 18 (11), pp. 1481-1499
BIGGS, S.D. and J. FARRINGTON (1990), Farming Systems Research and the rural poor. The historical, institutional, economic and political context, Paper presented at the 10th annual FSR/E symposium, Michigan State University

BERDEGUE, J. (1990), NGOs and farmers' organizations in research and extension in Chile, *Agricultural Administration (Research and Extension)* Network Paper No. 19

BUNCH, R. (1985), Two ears of corn: a guide to people centred agricultural improvement, *World Neighbours* (Oklahoma)

CHAMBERS, R. (1983), *Rural Development: Putting the Last First* (Longman)

CHAMBERS, R. and B.P. GILDHYAL (1985), Agricultural research for resource-poor farmers: the farmer first and last model, *Agricultural Administration and Extension* (20), pp. 1-30

CHAMBERS, R., A. PACEY and L.A. THRUPP (1989), *Farmer First: Farmer Innovation in Agricultural Research* (IT Publications)

CHAND, S. and D. GIBBON (1990), Samuhik Bhraman: a rapid and appropriate method of prioritising and replanning agricultural research in Nepal, *Journal for Farming Systems Research and Extension* 1 (1)

CHAND, S.P. and B.D. GURUNG (1991), Informal research in Nepal, *Journal for Farming Systems Research and Extension* 2 (2)

COLLINSON, M.P. (1981), A low cost approach to understanding small farmers, *Agricultural Administration and Extension* (8), pp. 433-450

CONWAY, G. (1985), Agroecosystem analysis, *Agricultural Administration and Extension* (20)

DAVIDSON, A.P. (1987), Does Farming Systems Research have a future? *Agricultural Administration and Extension* (24), pp. 69-77

DILLON, J.L., D.L. PLUCKNETT and G.L. VALLAEYS (1978), *Farming Systems Research in the International Agricultural Research Centres* (Rome: TAC of CGIAR)

FARRINGTON, J and S.D. BIGGS (1990), NGOs, agricultural research and the rural por, *Food policy* (16)

FARRINGTON, J and K. AMANOR (1990), NGOs, the state and agricultural technology: Preliminary evidence from a global review, Paper for the Asian FSR/E Symposium, Bangkok 19-22 November

FERNANDEZ, M. and H. SALVATIERRA (1988), Participatory technology validation in highland communities of Peru, in R.Chambers, A. Pacey and L.A. Thrupp (1989), *Farmer First: Farmer Innovation in Agricultural Research* (IT Publications)

FRANKENBURGER, T. *et al.* (1989), Identification of Farming Systems Research and extension activities: a synthesis, FSR/E symposium, Fayetteville, Arkansas

FRESCO, L. (1984), Comparing Anglophone and Francophone approaches to Farming Systems Research and extension, Networking Paper No. 1, FSSP University of Florida

GIBBON, D and M. SCHULTZ (1988), Agricultural systems in the eastern hills of Nepal: Present situation and opportunities for innovative research and extension, Paper for 8th annual symposium FSR/E, Fayetteville, Arkansas

GIBBON, D., H. THAPA and P. ROOD (1989), The development of FSR in Nepal: the working group as a focus of interdisciplinary activity, Paper for 9th annual symposium FSR/E Fayetteville, Arkansas. Oct. 1989

GILBERT, E. (1990), Non-governmental Organizations and agricultural research: the experience of the Gambia, *Agricultural Administration (Research and Extension)* Network Paper No. 12

GILBERT, E., D. NORMAN and F.E. WINCH (1980), *Farming Systems Research: a Critical Appraisal*, Rural Development Paper No. 6, Michigan State University

HART, R,D. (1982), An Ecological Systems Conceptual Framework for Agricultural Research and Development, in W.W. Shaner *et al.* eds., *Farming Systems Research and Development: Guidelines for Developing Countries* (Washington: World Bank)
HART, R.D. and M.W. SANDS (1990), Sustainable land use systems research and development, Paper for the International Workshop on Sustainable Land Use Systems Research, New Delhi
HAVERKORT, B., J. VAN DER KAMP and A. WATERS-BAYER (1991), *Joining Farmers Experiments* Intermediate Technology, London
HAVERKORT, B., D. GIBBON and W. BAYER (1991), *Research for the Future: an Overview of Existing Research in Sub-Saharan Africa for the Development of Low-External-Input and Sustainable Agriculture* (Leusden: SAREC-ILEIA)
HILDERBRAND, P. and R. PILAND (1988), *An Inventory of Short Courses and University Courses Related to Farming Systems* (Florida, Gainsville: Food Resources and Economics Department)
ILEIA (1990), *Participatory Technology Development* (Leusden: ILEIA)
KEAN, S and L.P. SIGONGO (1988), Zambia. *Organization and Management of ARPT Research Branch,* OFCOR case study No. 1 (The Hague: ISNAR)
KKU (1987), *Proceedings of an International Conference on Rapid Rural Appraisal* (Khon Kaen University, Thailand)
LIGHTFOOT, C. *et al.* (1989), Systems diagrams to help farmers decide on on-farm research. In, R.Chambers, A. Pacey and L.A. Thrupp (eds) (1989)
MACADAM, R. and N. SRISKANDARAJAH (1990), Systems agriculture: the Hawkesbury approach and its implications for Farming Systems Research and Extension, Asian Farming Systems Research and Extension Symposium, Bangkok, Thailand
MANSFIELD, G.B. (1950), *A short History of Agriculture in the British Colonies* (Oxford: Oxford University Press)
MARCOTTE, P. and L.E. SWANSON (1987), The disarticulation of Farming Systems Research with national agricultural systems: Bringing FSR back. In, *Agricultural Administration and Extension* (27), pp. 75-91
MATHEMA, S and D. GALT (1988), Samuhik Bhraman: A multidisciplinary group activity to approach farmers, Paper for training course on socio-economic survey methods, Kathmandu. Nepal
MAXWELL, S (1986), The social scientist in Farming Systems Research, *Journal of Agricultural Economics* 37 (1)
MERRILL-SANDS, D. *et al.* (1989), Issues in institutionalizing on-farm client oriented research: a review of experiences from nine national agricultural research systems, *Quarterly Journal of International Agriculture* 3 (4)
NORMAN, D. (1980), Farming systems approach: Relevance for the small farmer, Rural Development Paper 5, MSU, East Lansing
OASA, E.K. (1985), Farming Systems Research: a change in form but not in content, *Human Organization* 44, pp. 219-227
PILLOT, D (1990), Francophone and Anglophone Farming Systems Research: Similarities and differences, in *Farming Systems Research and Development in Thailand* (Prince of Songla University, Thailand)
POATS, S.V., M. SCHMINK and A. SPRING (1988), *Gender Issues in Farming Systems Research and Extension* (Boulder: Westview Press)
RHOADES, R.E. (1989), *Evolution of Agricultural Research and Development Since 1950: Towards an Integrated Approach* (IIED Gatekeeper Series. No. 12)

RHOADES, R.E. and R.H. BOOTH (1985), 'Farmer-back-to-farmer': a model for generating acceptable agricultural technology, *Agricultural Administration*, (11), pp. 127-37

RICHARDS, P. (1985), *Indigenous Agricultural Revolution* (London: Hutchinson)

SHANER, W.W., P.F. PHILIP and W.R. SCHMEL (1982), *Farming Systems Research and Development: Guidelines for Developing Countries* (Washington: World Bank)

SIMMONDS, N.W. (1984), *The State of the Art of Farming Systems Research* (Washington: World Bank)

SUMBERG, J. and C. OKALI (1988), Farmers, on-farm research and the development of new technology, *Expl. Agric.* 24, pp 333-342

THAPA, H., T. GREEN and D. GIBBON (1988), *Agricultural Extension in the Hills of Nepal: Ten Years of Experience from PAC* (London: ODI) AARE Network paper No. 4

TRIGO, E. (1986), *Agricultural Research Organization in the Developing World: Diversity and Evolution*, Working paper No. 4. (The Hague: ISNAR)

WELLAND, K, J. FARRINGTON and P. DAVIES (1990), *The State, Voluntary Agencies and Agricultural Technology Development in Marginal Areas*, AARE Network paper 15

Chapter 16

COMMISSION OF THE EUROPEAN COMMUNITIES (1988), *The Future of Rural Society*. Brussels

COMMISSION OF THE EUROPEAN COMMUNITIES (1992), *The Agricultural Situation in the Community: 1991 Report*. Brussels

COPUS, A.K. and LEAT, P.M.K. (1992), Farm Net Value Added in Scotland and the Designation of Areas for Rural Development Assistance, *Journal of Agricultural Economics* 43(2), 218-230

ISARD, W. (1951), Interregional and Regional Input-Output Analysis : a Model of a Space Economy, *Rev. Econ. & Stat.*, 33, 318-28

JENSEN, R.C., T.D. MANDEVILLE, and N.D. KARUNARATNE (1979), *Regional Economic Planning*. Croom Helm

LEONTIEF, W. (1966), *Input-Output Economics*. Oxford University Press

McGREGOR, P.G. and I.H. McNICOLL (1989), *The Impact of Forestry on Output and Employment in the UK and its Member Countries*. Fraser of Allander, University of Strathclyde, Glasgow

MIDMORE, P. (1991) (ed.) *Input-Output Models in the Agricultural Sector*. Avebury

O'CONNOR, R. and E.W. HENRY (1975), *Input-Output Analysis and its Applications*. Griffin

PSALTOPOULOS, D. and K.J. THOMSON (1992), *Input-Output Evaluation of Rural Development : a Forestry-Centred Application*, *J. Rural Studies* (in progress)

RICHARDSON, H.W. (1972), *Input-Output and Regional Economics*. Weidenfeld and Nicholson

Chapter 17

ALTIERI, M. (1989), Agroecology: A new research and development paradigm for world agriculture, *Agriculture, Ecosystems and Environment* 27, pp.37-46.

BARBER, D. (1991), *The State of Agriculture in the United Kingdom*, Stoneleigh: Royal Agricultural Society of England

BODY, R. (1991), *Our Food, Our Land: Why Contemporary Farming Practices Must Change*, London: Rider

BRITISH MEDICAL ASSOCIATION (1990), *Pesticides, Chemicals and Health*, London: British Medical Association

BRUNDTLAND COMMISSION (1987), (World Commission on Environment and Development) *Our Common Future*, Oxford University Press

CHAMBERS, R. (1983), *Rural Development: Putting the Last First*, Harlow: Longman

CHAMBERS, R. (1992) Sustainable livelihoods: The poor's reconciliation of environment and development, in Ekins, P. and Max-Neef, M. (eds.) *Real-Life Economics: Understanding Wealth Creation*, London: Routledge

CHARTERED ASSOCIATION OF CERTIFIED ACCOUNTANTS (1990) *The Greening of Accountancy*, London: Chartered Association of Certified Accountants

CLUNIES-ROSS, T. and HILDYARD, N. (1992) *The Politics of Industrial Agriculture*, London: Earthscan

CONFEDERATION OF BRITISH INDUSTRY (1990), *Narrowing the Gap: Environmental Auditing Guidelines for Business*, London: C.B.I.

CONWAY, G. (1987), The properties of agroecosystems, *Agricultural Systems* 24, pp.87-117

COUNTRYSIDE COMMISSION (1977), *New Agricultural Landscapes: Issues, Objectives and Action*, London: Countryside Commission

CROLL, B. and HAYES, C. (1988), Nitrate and water supplies in the United Kingdom, *Environmental Pollution* 50, pp.163-187

DEPARTMENT OF ENVIRONMENT (1990), *This Common Inheritance: Britain's Environmental Strategy*, Cm.1200, London: HMSO

DEPARTMENT OF THE ENVIRONMENT (1992), The Countryside and the Rural Economy, *Planning Policy Guidance Note 7*, London: Department of the Environment.

FLORA, C. (1992), Reconstructing agriculture: the case for local knowledge, *Rural Sociology* 57, pp.92-97

GOODMAN, D. and REDCLIFT, M. (1991), *Refashioning Nature: Food, Ecology and Culture*, London: Routledge

HARRISON, A. (1975), *Farmers and Farm Businesses in England*, University of Reading, Department of Agricultural Economics, Miscellaneous Study No 62

HARVEY, D. (1987), *The Future of the Agricultural and Food System*, EPARD Working Paper No. 1. University of Reading

HOLMBERG, J., S. BASS, and L. TIMBERLAKE, (1991) *Defending the Future: A guide to sustainable development*, London: IIED/Earthscan

HOUSE OF LORDS SELECT COMMITTEE ON EUROPEAN COMMUNITIES (1991), *The Development and Future of the Common Agricultural Policy*, Session 1990-91, 16th Report, HL Paper 79-I

INTERNATIONAL CHAMBER OF COMMERCE (1990), *Environmental Auditing*, London: International Chamber of Commerce

IUCN, UNEP, and WWF (1991), *Caring for the Earth: A Strategy for Sustainable Living*, Gland, Switzerland: IUCN, UNEP, WWF

JACOBS, M. (1991), *The Green Economy: Environment, Sustainable Development and the Politics of the Future*, London: Pluto

JOHNSON, C. (1986), The balance sheet of British agriculture, *Lloyds Bank Economic Bulletin*, London: Lloyds Bank

KLOPPENBURG, J. (1991), Social theory and the de/reconstruction of agricultural science: Local knowledge for an alternative agriculture, *Rural Sociology* 56, pp.519-548

KLOPPENBURG, J. (1992), Science in agriculture: A reply to Molnar, Duffy, Cummins and Van Santen and to Flora, *Rural Sociology* 57, pp.98-107

MAFF (1992), *Farm Incomes in the United Kingdom – 1992 Edition*, London: HMSO

MARSDEN, T., LOWE, P. and WHATMORE, S. (1990), Introduction: Questions of rurality, pp.1-20 in Marsden, T., Lowe, P. and Whatmore, S. (eds.) *Rural restructuring: Global processes and their Responses*, London: David Fulton

MOLNAR, J., P. DUFFY, K. Cummins, and E. Van Santen (1992), Agricultural science and agricultural counterculture: Paradigms in search of a future, *Rural Sociology* 57, pp.83-91

NATIONAL WESTMINSTER BANK (1992), *Nat West National Farm Survey: Summary Report and Tables*, Coventry: National Westminster Bank Agricultural Office

NATIONAL RIVERS AUTHORITY (1992), *The Influence of Agriculture on the Quality of Natural Waters in England and Wales*, Bristol: National Rivers Authority

NATURE CONSERVANCY COUNCIL (1977), *Nature Conservation and Agriculture*, London: Nature Conservancy Council

NEWBY, H. (1986), Locality and rurality: The restructuring of rural social relations, *Regional Studies* 20.3, pp.209-215

NORGAARD, R. (1992), Coevolution of economy, society and environment, in Ekins, P. and Max-Neef, M. (eds.) *Real-Life Economics: Understanding Wealth Creation*, London: Routledge

OECD (1989), *Agricultural and Environmental Policies: Opportunities for Integration*, Paris: OECD

O'RIORDAN, T. (1988), The politics of sustainability, in Turner, R. (ed.) *Sustainable Environmental Management: Principles and Practice*, London: ESRC/Belhaven/Westview

OSTI, G. (1992), Co-operative Regulation: Contrasting organisational models for the control of pesticides: The case of north-east Italian fruit-growing, *Sociologia Ruralis* 32, pp.163-177

PLOEG, J.D. VAN DER (1990), *Labor, Markets and Agricultural Production*, Boulder, Colorado: Westview Press

PLOEG, J.D. VAN DER (1992), The reconstruction of locality: Technology and labour in modern agriculture, in Marsden, T., Lowe, P. and Whatmore, S. (eds.) *Labour and Locality: Uneven Development and the Rural Labour Process*, London: David Fulton

PRETTY, J. and CONWAY, G. (1989), *Agriculture as a Global Polluter*, London: Institute for Environment and Development

RAE, J. (1991), Environment and agriculture: An OECD perspective, in Miller, F. (ed.) *Agricultural Policy and the Environment*, CAS Paper 24, Reading: Centre for Agricultural Strategy

REDCLIFT, M. (1991), The multiple dimensions of sustainable development, *Geography*, 76 (1), pp.36-42

RILEY, R. (1992), The challenge to science in food and agriculture, pp.13-15 in Royal Agricultural Society of England, *Towards Sustainable Crop Production Systems*, Monograph Series No. 11, Stoneleigh: Royal Agricultural Society of England

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