

## 4 Practices of Endogenous Development in Barroso, Northern Portugal

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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 describe 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 the 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.<sup>1</sup> 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, particularly 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 notable difference: traditional meat production with high cattle density.

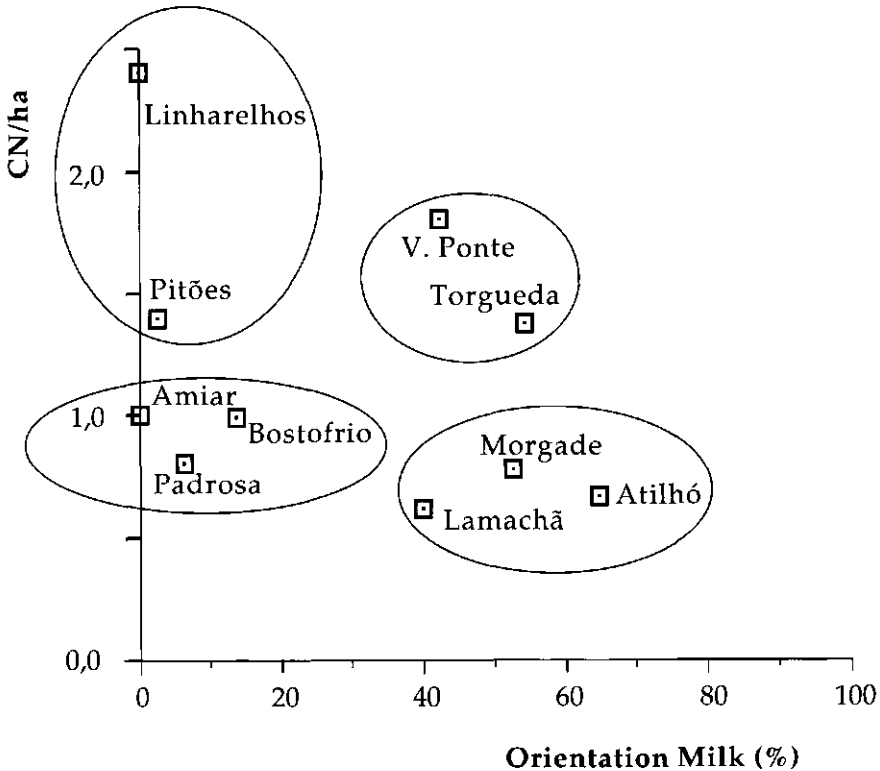
In contrast to these clusters we find villages where farming has been re-oriented to milk production. A strategic factor in the creation of this difference was the introduction of SCOM (Salas Colectivas de Ordenha Mecanica), or collective milking parlours at village level (Portela and Baptista 1991). 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 restructuring 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<sup>2</sup>

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
Owens 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 Barrosã, with its dry and hot summers, this required a thorough reorganization of irrigation practices.<sup>3</sup> 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.<sup>4</sup> 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.<sup>5</sup> 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 Barrosã 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.<sup>6</sup>

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 choosing 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<sup>7</sup>.

### 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.<sup>8</sup>

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<sup>9</sup>

	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 indebtedness. 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 utilizing 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 guaranteeing 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 rela-

tives 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.