

Quality management in the meatchain. A management approach

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Abstract

Due to several developments Dutch meatindustry is facing an increasing competition. To meet new demands the meat chain has to be restructured. This means a new approach of the concept of quality. This problem is considered as a managerial problem therefore a managementmodel is introduced to manage this process. The essence of this model is to adjust the organization to the product and its processingstages. Also is argued that a chain of organizations is to some extent similar to an individual organization, therefore the same managementtools can be used. The adjustment of the porkmeatchain in order to meet the new demands is described by using this model. Special attention is paid to Integrated Quality Control. Finally the model is used to analyze quality management in the porkmeatchain. Both the model and IQC are discussed.

Introduction

A lot of pressure is put on Dutch meat industry, due to several developments. They have a considerable impact on the organization and structure of meat-production in the Netherlands. Some examples of these developments are:

- An increasing self-supply within the EC,
- International treaties to cut down trade barriers like Gatt and MacSherry,
- More environmental and animal-welfare legislation puts restrictions to an increase of production on scale,
- Consumers are more critical and are demanding for a product of high quality, safe and easy to prepare.

The Dutch meat industry has always emphasized on bulk goods. Characterized by a few processingstages and minimization of costs. Less attention was paid to value adding, contrary to a country like Denmark. The Dutch meatindustry is now costleader. This was made possible due to other favourable productioncircumstances, like the availability of cheap compoundfeed, highly skilled farmers, a well developed extensionservice, specialized research institutes, etc.. The earlier mentioned developments however have brought Dutch meat-production into a position of reconsideration. Competition has in-

creased. Costs and production advantages are diminishing compared to other countries. In order to stay competitive it is necessary to restructure the meat chain. More emphasis has to be put on quality in a broad sense. A chain approach might contribute to obtain this objective. This has also been recognized by the product board for livestock and meat (PLM). They introduced the concept of Integrated Quality Control (IQC).

The restructuring of the meatchain is considered as a managerial problem, as quality is too. For this purpose a general managementmodel will be introduced. Next the concept of a chain is introduced and it will be argued that to some extent a chain of organizations is similar to an individual organization, followed by the introduction of the chainmanagementmodel (CM). The porkmeatchain will be described according to this model. Special attention is paid to the concept of IQC. Finally the IQC concept and the use of the CM will be discussed using the porkmeat chain as an example.

Quality management

The concept quality

The concept 'quality' has several meanings. Often it is translated as 'meeting the needs of specification' or as stated by Juran (1988) 'Quality is fitness for use'. A more proper definition of quality and more suitable for human foodstuffs is: 'quality is meeting the expectations of the consumer' (Van den Berg 1993, p22), because the consumer of human foodstuffs is taking more aspects into account than only those which are part of fitness for use. Cramwinckel cited by Van den Berg (1993, p23) distinguishes analytical and emotional quality. Analytical quality consists of production traits which contribute to the quality of the product. The appreciation of a product by its consumer is the so called emotional quality. Both are not completely the same. There are productdifferences which can not be noticed by consumers, on the other hand consumers recognize productdifferences which can not be analyzed.

Often consumers are prepared to pay more for products which are perceived as qualitative. In this sense quality means value. The foundation of the price of a product are its costs. Minimizing costs is very often an objective of producers. This means avoiding costs of products which can not meet the qualitystandards, but also producing efficient and effective. Actually quality has two meanings. First, quality related to the product with the main objective to add value. Second, quality related to the production with the main objective to produce efficient and effective and to avoid 'no-quality' products. A policy which emphasizes on productquality is successful. This can be illustrated by a research of Clifford and Cavanagh (1985) among 525 midsize businesses. They concluded that almost all of the winning businesses compete on the base of value, not price. They are superior in quality to the average. Also a policy which puts the emphasis on effective and efficient production is successful. This can be illustrated by a research of Ziggers (1993) among 39 potplant nurseries. An improvement of the level of management (which means a more structured planning and productioncontrol) by 1% leads to an improvement of annual turnover by 0.26%.

Quality, a management approach

The quality of human foodstuffs is actually a reflection of the producing organization. Decision-making processes precede the production of products and determine the quality

to a large extent. Not only at the operational level but throughout the whole organization. Now, managing the organization is conceived as initiating, directing and controlling goal-setted activities (Kampfraath and Marcelis, 1981:p20). It involves decision-making. In general: management is considered to be equal to decision-making.

Decision-issues can be divided into three special areas of attention. Decisions related to the production-process (A-level), decisions related to the production-resources (B-level) and decisions related to the management infrastructure (C-level). These three levels will be briefly explained.

A-level decisions

These decisions are related to purchasing, processing and selling. Decision-items are for example the acceptance of raw materials (Do raw materials meet quality standardlevel ?), the composition of a production programme (When and how should which activities take place?), the audit of work in progress (How much time is spent on activity ?, Does the product meet quality level ?), the provision of buyers with ordered products (Is the order meeting the demands of buyer ?), etc. The production of products, with a certain quality performance, against certain costs and a certain supplying reliability, reflects the operation of these decisions. A good productquality is a balance between quality, quantity and costs. This balance depends on the objective of the organization (Van der Berg, 1993:p202).

B-level decisions

These decisions are about productionresources. Resources include people, capital, raw materials, processing equipment, etc. given form into terms of numbers of vacancies, investmentbudgets, marketingbudgets, purchase deals etc.. Decision-items are for example the weigh up of objectives and resources (What resources are necessary to realize the objectives?; Which objectives can be realized regarding the given resources?), the evaluation of available resources (Do existing resources still meet the required quality levels regarding the objectives?), the evaluation and acceptance of suppliers (How reliable are my suppliers?; What quality can they deliver?), etc.. These decision-items can only be answered properly if objectives are described in terms of marketshare, productionlevels, qualitylevels, research and development activities, etc.. Actually this means that decision-items about objectives should be solved first, however they interact with decision-items about productionresources. Analyzing markets, evaluating products, recruiting and educating labour, contracting suppliers, installing, maintaining and innovating processing equipment, etc.. reflects the operation of these decisions.

C-level decisions

These decisions affect the performance of the organization. An organization can be described in terms of people, information, organizational arrangements and management means. So called management conditions. Together they form a 'management infrastructure', which determines the solvation and operation of A- and B-level decisionitems. In other words it determines the performance of the organization. C-level decision-items are actually about organizing the organization. Decision-items are for example the provision with management-conditions (What management conditions are necessary to solve A- and B-level decision-items properly?), the consideration of how decision-items should be

solved (Should the production-programme problem be solved in a different way?), etc.. Operating these decisions means a provision with managementconditions and a creation of a certain managementinfrastructure. In general: these decisions will affect the performance of the organization. In other words: 'organizing the organization'.

Four types of management conditions have been distinguished:

1. people; the competency of people who are involved with decision-making, like education, age, experience, skills, etc.,
2. availability of information and knowledge,
3. organizational arrangements; tasks, responsibilities, authorities, procedures, etc.,
4. management means; decision support systems, information systems, databanks, etc..

A-level decisions are considered as operational decisions, while B-level decisions as strategic decisions. Decision-making itself is a process of reducing the number of alternatives. At the board level there are often a lot of alternatives. Their decisions will reduce the number of alternatives. The next layer of the organization, f.e. the manager, has to make decisions within the scope of the left alternatives. This is an ongoing process until the final decision is made. If there is a discrepancy there should be feedback as far as necessary. In reality several decision-problems have to be solved at the same time. These are often related to and/or affecting each other. This is illustrated with *figure 1*.

The decisionmaking process itself can be evaluated by testing the decisionmaking process on:

- *systematics*, are similar decisionmaking problems solved in a similar way?,
- *foresight*, are effects of a decision taken into account during the time period covered by that decision?,
- *feedback*, are previous related decisions evaluated?,
- *integration*, has the decision problem been placed in a broader context?

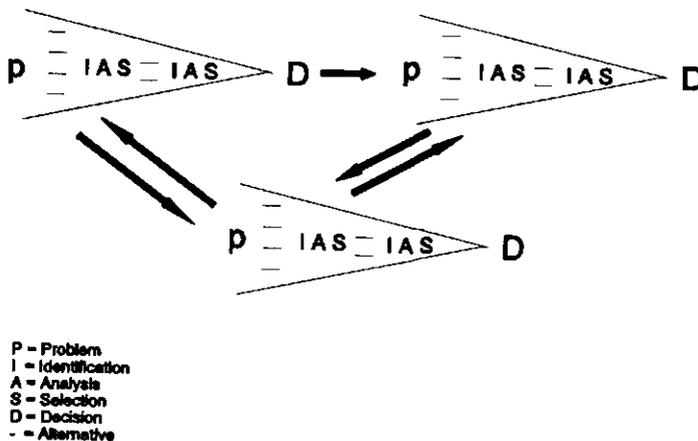


Figure 1. The decisionmaking proces

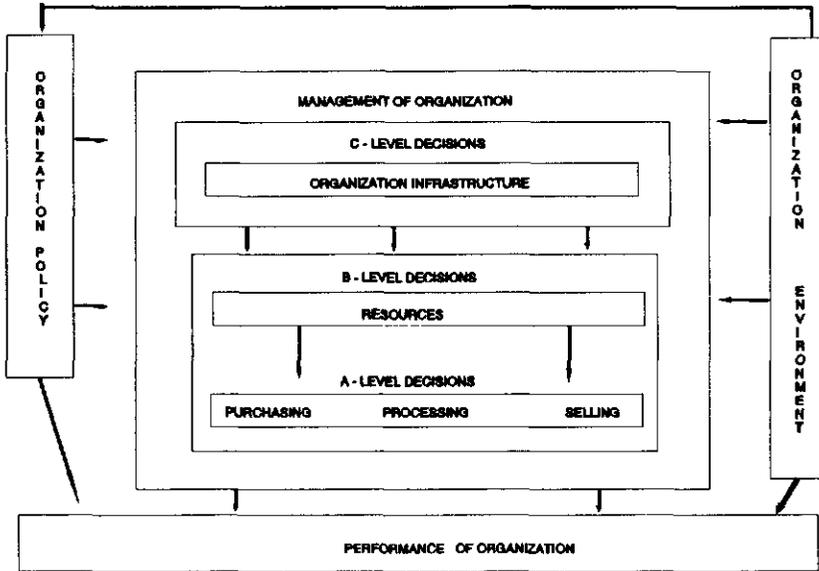


Figure 2. The managementmodel

The effectiveness of a organization is the outcome of a certain organizational environment, its policy and its management. It can only be affected by either changing the policy or the management or both. This is illustrated with *figure 2*. Apart from this one should be aware that the performance of a organization is not only the organization as described in terms of people, information, organizational arrangements and management means, but this performance is also affected by the behaviour of people and their interrelations. These relations depend on power, values, attitudes, etc., of an individual or groups of people and might have a considerable effect. This is the so called informal organization.

Often several special areas of attention are distinguished, like quality, processing, environment, financing, marketing, logistics, research and development, etc.. These areas have in common that they are all related to a product one way or another, but they are also related to each other. All these special areas of attention are part of the management of an organization and should be considered together. Quality as a special area of attention is just a part of the total management. Therefore quality will be conceived as 'the performance of the organization', which takes the total management into account.

The essence of this model is to adjust the organization to production not to adjust production to the organization. Therefore the starting point of the analysis should be the product and its processingstages, not the organization.

The chain managementmodel

The chain

Nowadays agribusiness is confronted with all kinds of developments. They have a considerable impact on the structure and organization of agribusiness. It is a challenge for agri-

business to meet these new demands. In general it means to adapt the product and processing stages, which is considered as a managerial problem. Nevertheless the solution of this problem is more complex. Often a solution goes beyond an individual firm. Therefore firms are forced to adjust their production to each other. Even worse, often an optimal solution goes beyond at least two firms. A web of cooperating firms arises. Adjusting their production to each other either forced to be able to meet the demands of the market or to create new markets or both.

Several organizational forms can evolve. Zuurbier (1993:p97-98), citing several authors, distinguishes three main organizational forms, free market, network and vertical integration. Vertical integration is characterized by single ownership. Its main advantages are reduction of transaction costs, technological economies, enhanced ability to innovate and differentiate products, stable relationships, economics of information and creation of entry and exit barriers. Disadvantages are high exit barriers, reduced flexibility, less incentives and more bureaucracy. Also horizontal integration has to be mentioned. Its main advantages are the exclusion of competitors and economics of scale. Its counterpart is the free market. Markets promote high-powered incentives and restrict bureaucratic costs. Networks can be considered as an intermediate form. The involved firms are autonomous, but have committed to cooperate together to gain mutual benefits. Using the advantages and avoiding the disadvantages of a vertical integration.

In general the problem dealing with is a processing problem within the chain which can not be solved by two successively autonomous firms (or firmunits) within that chain. There is a high interdependency among firms (or firmunits) in meeting the demands of the market or creating new markets.

The chain management model

As earlier mentioned the effectiveness of an organization is a result of the interrelations between its business environment, its policy and how its management. This principle can also be used to describe the effectiveness of a chain. Again A-, B- and C-level decisions can be distinguished. This idea is supported by Godfroij (1981, p105-115) by saying that organizations and networks show only gradual differences along dimensions that measure the degree of organization and therefore can be analyzed with the same concepts and theories as organizations. Instead of optimizing the production process within one single organization it has to be optimized throughout the chain.

A model to describe the effectiveness of a chain is therefore deduced from the management model to manage organizations. The effectiveness of a chain can now be defined as the outcome of a certain chain environment, its policy and its management. It can only be affected by either changing the policy or the management or both. As a result of this the effect can be a non-optimal situation for a certain individual partner within the chain but optimal to the chain. The CM-model is illustrated with figure 3.

Theoretically it might be quite obvious to establish an effective functioning production chain, but practically there are a lot of obstacles. These obstacles refer to the production chain environment. This can be elucidated by using the network approach. A production chain often consists of many firms. They are considered to be interdependent and are engaged in bargaining, transactions and/or cooperative action and develop structural forms to coordinate and/or regulate these actions (Godfroij, 1993:p80-81). The participation of firms in a network depends on the differences and similarities between their individual

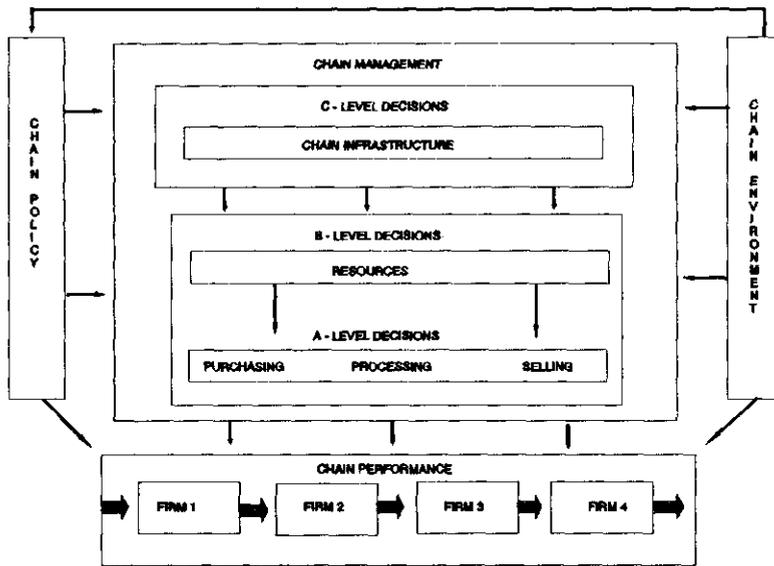


Figure 3. The chain management model

goals and strategies and those of the network. It also depends on the nature of their interdependency. Especially where interdependency has competitive elements, the gains of one actor can be to some extent the losses of others (Godfroij, 1993:p81). This means that a production-chain can not only be considered as a collective, but also the position of an individual actor within the production chain should be considered. The actual performance of a production-chain is similar to the performance of an organization and will depend on the variety of interests individual firms will have. The actual structure and performance of a production chain might depend more on power and mutual interdependency of firms than on production chain efficiency (see also Godfreij,1993;p82), which can be considered as similar to the informal organization mentioned earlier.

The dutch porkmeat chain

The porkmeat chain environment

In 1992 the pork chain produced 1.5 million tons of porkmeat. Of this meat 0.6 million ton was disposed at the internal market (24%) and 0.9 millions ton was exported (76%). The EC is the main export market with a volume of 85%. Dutch porkmeat export products are characterized by less addition of value. The export value stands for 6.3 billion dutch guilder (DFL). This is 9% of the total Dutch agricultural export value. This was accomplished by a high degree of specialization of dutch pigfarming, low compound feed prices accomplished by import of raw materials against world market prices and a favourable geographical situation, a well established knowledge-infrastructure and a technical equipped and highly skilled processing industry.

However due to several developments the porkmeat chain has to reconsider its position, like:

- An oversupply of porkmeat of approximately 3% within the EC
- Treaties to liberate international trade, like MacSherry and GATT, reduces the advantage of cheap compoundfeed,
- European legislation on cattle transports,
- The development of a high competitive skilled porkmeat production in other competing countries, especially Denmark,
- A market demanding for a meatproduct which is easy to prepare and which has a high quality standard, especially in the Northern European countries,
- Less favourable production circumstances, due to high wages, animal welfare - and environmental legislation, oppose a further increase of production and therefore oppose a decrease of costs per productunit,
- The bad reputation of porkmeat, consumers do relate porkmeat to abuse of hormones and mistreatment of pigs.

The Dutch porkmeat industry is also a vulnerable one. It is depending heavily on exports and it is very concentrated, which makes it susceptible to contagious pig diseases with a large impact on exports. In addition the processing industry faces an overcapacity which causes mutual competition. As a result this chain is dominated by retailers and pigdealers. Besides this, processing has always focused on minimization of costs and less on maximization of value. Emphasis is put on 'how' to produce instead of 'what' to produce, neglecting the market. This holds as long as there is a shortage and one can compete on price. This chain structure and environment does not contribute to a powerful chain in financial terms

On the short term only meatprocessors seem to be affected, but on the long term also pigproducers, pigdealers (a reduction of exports of living pigs and piglets), etc., will be affected. Therefore all actors within the porkmeat-chain need and will benefit of a strong competitive chain, because sales can only be assured by exports. As a result the porkmeat chain has to adapt to the earlier mentioned developments.

The meatchain policy

The PLM has recognised that the porkmeat chain can only survive if it remains competitive. They together with actors of the porkmeat chain developed and introduced a framework to guarantee quality. This is known as Integrated Quality Control (IQC)(PLM, 1992). The aim of this framework is to guarantee origin, hygiene, use of compoundfeed, use of animal medicines and the absence of residuals in the meat throughout the porkmeat chain.

Management of IQC

IQC is an assurance system to guarantee and to control meatproduction throughout the chain. The system includes the processing stages reproduction, fattening and slaughtering. Within these stages guarantee is given (not in a juridical sense) to origin, treatment, hygiene, use of animal compoundfeed, use of medicines and absence of residuals within the meat.

The system depends on the exchange of information related to the individual registration and identification number of an animal. Exchange of information towards two directions. The slaughterhouse receives information of the pigfarmer (reproduction and fattening) about origin and healthstatus of the animals. In return the pigfarmer receives information about the slaughtering- and inspection results.

The slaughterhouse is responsible for the operation of the system. They have to control the firms that take part of the system at least two times a year. On the other hand the slaughterhouse is controlled by an independent board, nominated by the PLM. Also veterinarians and animal compoundfeed suppliers do have obligations, concerning the use of medicines and the composition of animal food, if they deal with an IQC-farmer. If a pigdealer is involved then he has to be juridically owner of the pigs and has to make an agreement with both the pigfarmer and the slaughterhouse. To get the IQC-certificate the slaughterhouse has to make a contract with the PLM and will be tested on:

- the manual concerning IQC,
- the use of IQC in practice.

To take part in IQC is free, but with commitment to the obligations of the PLM. IQC is illustrated with figure 4.

IQC: The financial aspects

The costs for a slaughterhouse to receive the IQC-certificate can be as high as DFL 40.000,-. Additional and permanent costs are the annual controls and some extra labour. There is no direct benefit, but an indirect preventive benefit can be gained by an improve-

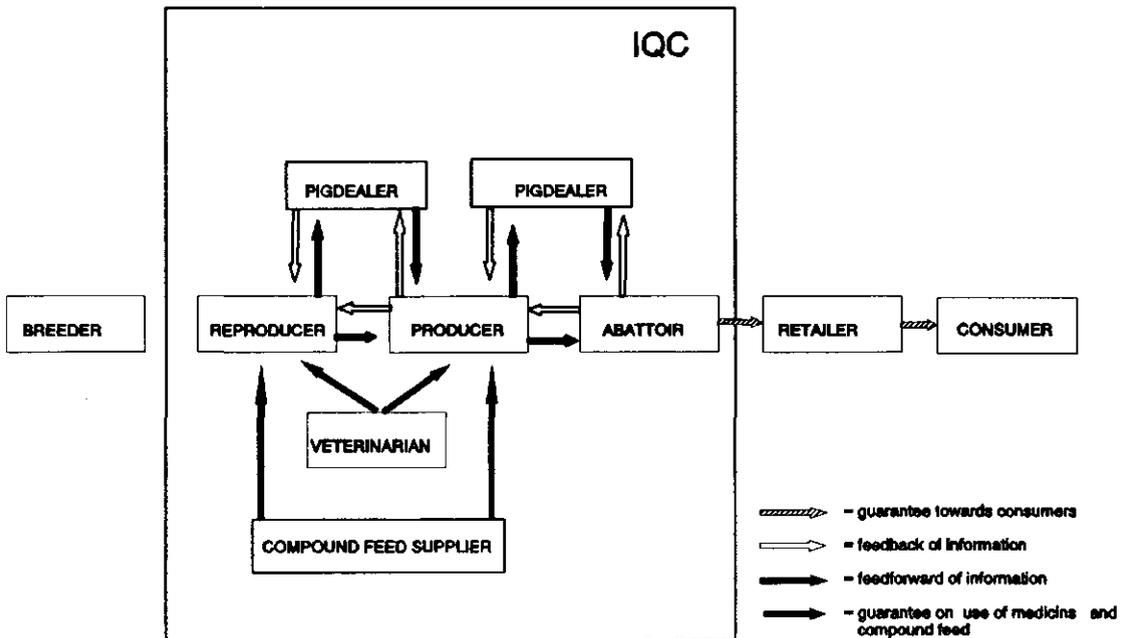


Figure 4. IQC in Dutch pork production

ment of management, less use of medicines and less slaughterlosses. A PLM experiment indicated that the Dutch meatchain could earn about 100 millions DFL by improving healthstatus. So far about 12.4% of all Dutch pigs come into IQC. Pigfarmers are stimulated to take part in IQC and can receive a bonus of DFL 3,- per pig and DFL 1,- per piglet. On the other hand slaughterhouses are confronted with retailers demanding for IQC-meatproducts. Due to oversupply retailers are not very willing to pay extra. Another problem is the fact that IQC-pork can only be sold partly as a IQC-pig to the fresh-meat segment. Other segments so far do not recognise the presumed extra value of IQC-meat.

Other quality-assurance systems

According to some meat processors IQC is not enough. They developed special quality programmes based on IQC. These programmes are not only focusing on processes but also on the product. Special demands are requested for food composition, housing, breed and slaughter classifications in order to produce a special kind of meat. This meat is sold under special brandnames like farmers-best, top, etc..

Nowadays special attention is paid to ISO-9000 standards. Many organizations consider ISO-certification as an assurance of the relation between supplier and customer, but also as a competitive advantage. ISO-certification has become for many businesses an objective on itself. Besides this ISO is an organization approach rather than a chain approach.

Discussion

A managementmodel has been introduced and used to describe quality management in the porkmeat chain. Next this model will be used to analyze quality management in this chain. As already said the effectiveness of an organization or chain is conceived as the interrelation between environment, policy and management. Analyzing the Dutch porkmeat environment the conclusion can be drawn that to much emphasis is put on bulk production against low costs and little addition of value. This concept worked for many years but due to the mentioned developments it is obvious that a new market concept is necessary.

The PLM concept of IQC is still a policy of the traditional production-model, although it contributes to the idea of 'quality' thinking. It mainly focuses on the production processes to ensure safety and origin. This is just a small part of the total product quality itself. So called programme meat suits better with the concept of product quality. Analyzing the environment further the policy should be at least one which is taking into account the production structure of the Dutch porkmeat-chain: less addition of value, increasing costs and a poor image. The production-model has to be translated into a market-model. The policy should enclose ideas and concepts which meet the environment. This policy has to be translated into product and processing specifications. Next the organization or chain should be adjusted to meet the product and processing specifications. This is also the essence of our model. To put it in another way: emphasis has to be put on 'what' instead of 'how' to produce.

According to our managementmodel IQC is pointing at C-level decisions and is merely going beyond A and B level decisions. From the existing chain procedures and responsibilities have been introduced to assure safety and origin of porkmeat. The exchange of information between actors is crucial in this assurance system. Besides the same counts for the implementation of ISO-standards, especially when ISO has become an objective on it-

self. The possibility exists to create a bureaucratic system which does not take into account the effects on the organization. One should first analyze the product and its processes in order to determine necessary changes, then adapt and/or provide with production resources to meet the new situation and finally assurances should be implemented (is equal to C-level decision-problems).

An example. To meet the demands and developments of the market it might be necessary to refine the product. Nowadays much emphasis is put on sustainable production, environmental and animal welfare issues. This might affect the complete chain. The meat processor might have to increase his number of manufacturing processes and products (diversification), the pigproducer might have to change his housing system, the pigproducer might have to change his breed and housing system, the animal-foodstuff supplier might have to produce special animal foodstuffs, etc. Next the critical points in this chain have to be determined, then an assurance system can be developed meeting these critical points. This should also be the base of certification. Only then certification makes sense. This also counts for brandmeat. It has only a chance if it represents what it pretends to be. This can only be achieved by a market approach, because quality is: 'meeting the expectations of the consumer' and is propagated by the organization or chain.

This example includes an enlargement of the chain. All actors within the chain have to communicate and do depend on each other. Contrary to nowadays situation retailers have to be involved more. To communicate and explicate their demands. Especially in an over-supplied market retailers do possess a powerful position. In this situation it is questionable if pigfarmers should receive a bonus by taking part of IQC. One could argue that prices should be cut down if they can not meet the market-demands.

Theoretically it seems quite obvious what should happen, but practically there are many barriers. One of the main problems are individual interests. What might be optimal for the chain might be not optimal for an individual. Another problem by introducing chain production is the question of the division of costs and benefits. Also can existing structures impede new ideas and concepts, because parties fear the lost of gained positions. To get over these kind of barriers might be the hardest task after all.

The main challenges the Dutch porkmeat chain is facing next decade, are:

1. the restructuring of the chain into a market-orientated chain where quality and sustainable production are key words,
2. the development of a production chain focusing on profit maximization, by means of maximization of value and minimization of costs.

In general three strategies are possible, 1) to be marketleader, 2) to be costleader and 3) to be niche-marketeer. The second strategy seems to be the most reasonable one, because:

- The first strategy demands a high marketshare, which is not the case at this moment. The marketshare of Dutch pork within the EC is approximately 12%. To increase marketshare (international) mergers, take-overs, etc. are necessary, which is capital demanding. Capital which is not available.
- The third strategy is focusing on special segments. It is not realistic to start to the assumption that the total production of Dutch pork can be disposed at this kind of mar-

For example pigmeat industry leaders in Denmark pointed to quality considerations as a growing part of the reason for their share of the UK market. Also the fact that controlling pigmeat quality not only ensures that products meet defined and constant standards but also provides an effective way of meeting consumer demand and obtaining a price premium for doing so successfully, has been recognised. In an effort to achieve this position the Irish Meat Board have devised a Pigmeat Quality Assurance scheme.

Therefore since the function of markets cannot be assessed validly without taking account of quality it is necessary to know what product attributes consumers regard as desirable, and how they relate them to the complete product seems basic to successful marketing. This paper attempts to examine some of these issues in relation to the pigmeat market.

Defining Quality in general terms

In the vernacular quality often seems to express general approval (Holbrook and Corfman 1985). It appears that in everyday marketing language 'quality' or 'high in quality' means 'good'. However these promotional uses convey approval in an extremely imprecise way. Definitions of quality in general, and more precisely meat quality vary widely so a framework for analysing quality will be briefly discussed.

One dimension of quality is whether it is *implicit* or *explicit*. A further dimension is whether quality is characterised as *mechanistic* (viewing quality as an objective aspect of a thing or an event) or *humanistic* which sees quality as a subjective response of people to objects and therefore a highly relativistic phenomenon that differs between judges.

Using the above dimensions one can make four categories of definitions but most marketers advocate a definition of quality assessment which typically regards quality as a *subjective response* to variously explicitly recognised properties of an object (Holbrook and Corfman 1985). Conversely production led or engineering based definitions tend to approach quality from a mechanistic viewpoint, and look mainly at implicit (tangible) attributes of a product.

Some definitions of quality

Examples of definitions used by marketers include, 'the relation between the real and desired properties of a product, or as a measure of satisfaction to the customer', (Lavenka 1989) 'Consumers judgments about a products overall excellence and superiority', and Van Schothorst (1989) argues 'quality means that the customer gets what the customer wants'.

Researchers suggest that the focus be set on the consumers subjective judgement of an attribute (Callingham 1988) since unbiased objective quality does not exist at all (Maynes 1976). Lavenka (1989) points out that it appears objective measures are restricted to intrinsic palpable attributes. But Honikel (1989) suggests that subjective preference of attributes cannot be the basis of scientific discussion.

It seems that because it is subjective and personal 'product quality is at a higher level of abstraction than the composite of specific attributes' (Zeithaml 1988).

Prost (1986) mentions that 'the importance of particular quality traits as seen by individual consumers and also their ability to perceive them, result in highly differentiated and even quite different ideas about quality itself'. Juran (1962) found as many as 13 definitions, depending on the point of view of the person evaluating quality. Hence it was

necessary for the ISO (International Standards Organization) and the EOQC (European Organization for Quality Control) to agree on a precise definition of quality from a technical viewpoint as 'A composite of characteristics, which affect the ability of foods to satisfy certain requirements and determine fitness for consumption'.

Williams (1985) points out that 'A producer should know his potential customers likes and dislikes and attitudes to his products, and understand various economic and social factors that may influence purchase'. And 'It is desirable that such information is expressed not in vague terms, as is often the case, but **where possible** is related to the chemical or physical properties of the food in a way that the food technologist can understand. It is only by doing this that he can build quality into his product and give it the same weight as he does the availability of raw material, processing capability and energy requirements at present'. However Williams (1985) goes on to admit 'overall acceptability (by the consumer) results from an integration of many factors, some of which like sensory properties, are primarily intrinsic to the food, whereas others depend on the needs or attitudes of the customers'¹.

Folkers (1985) argues that to establish the potential effect of information one must ensure that information refers to the quality indicators that consumers find relevant, although it may be argued Folkers would have been more precise if he had said 'a segment of consumers' instead of merely 'consumers'.

Meat Quality

Consumer perceptions of quality are therefore all important but one must consider that there are many aspects involved in the quality of pigmeat. These aspects are summarized under the headings, Animal Quality, Carcase Quality, Hygienic Quality, Utilization Quality, and Meat Quality in *Figure 1*.

Figure 2 outlines the make-up of pigmeat quality according to Ingr (1989). A number of quality features go to make up a single quality characteristic. The features comprising the characteristic 'sensory properties' are also illustrated in *Figure 2*. Ten quality characteristics then go to make up overall quality.

These 'quality characteristics' in pigmeat quality include, morphological structure, chemical composition, physical properties, biochemical condition, and microbiological contamination as fundamental properties. They also embrace sensory properties, technological properties, hygienic condition, nutritional value and culinary properties as necessary properties to satisfy markets, inspectors etc. Different weights are given by different parties along the marketing chain to the quality characteristics in relation to their ideal overall quality. Therefore pigmeat quality is hard to define although the components involved are not.

Some of the important quality considerations in the context of the pigmeat chain will be discussed in the following sections.

¹ From a later discussion we will find that definitions of meat quality must also include economic aspects and any other factors relating to health, nutritional, sensory, functional, and culinary properties, that players in the marketing chain for that product find important.

Quality Type:	Components:
Animal Quality:	Health, Genetic make-up, Stress susceptibility, Conformation, # Quality of life. ##
Carcase Quality:	Composition, Mass distribution, Geometry of carcass, # Yield of saleable meat. ###
Hygienic Aspects:	Safety aspects, Shelf-life, Residues, Pathogenic organisms and/or their toxins. ####
Utilization Quality:	Traits determining usefulness, Products ability to satisfy definite needs or wants. ####
Meat Quality:	Organoleptic (sensory), Technological (functional), Nutritional, # Hygienic aspects. #####
Sources	# Soerensen et al (1989) ## Barton-gade (1989) ### Ingr (1989) #### Prost (1986) ##### Honikel (1989)

Figure 1. Aspects of meat quality

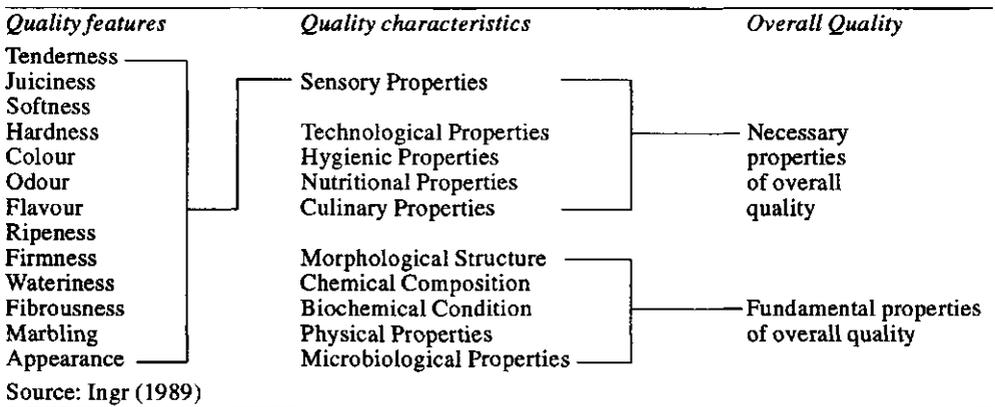


Figure 2. Make-up of pigmeat quality

Quality in relation to the pigmeat marketing chain

Romans and Norton (1989) state that much of the research work done on the quality of pork was accomplished in the 70's but that in the late 80's the subject surfaced again. This study will attempt to complement work from both periods in so far as is possible.

Sebranek (1982), and Boccard (1986) state that everybody has his conception of quality, but the detailed description of this general concept, offers different aspects owing to the position or function of the speaker along the meat marketing chain.

Quality is seen differently by the consumer, the producer, the retailer and the food inspector, each concentrating on different aspects of the product (see Appendix 1).

At the **production** level of the pigmeat chain the quality traits of most concern would include live weights, dressing percentage, degree of muscling, absence of fat, general appearance (Sebranek 1982), and more recently parameters such as intramuscular fat level, stress susceptibility, animal welfare factors, and incidence of boar taint in whole male pigs.

The **processing** segment will generally concur with these but also add additional concerns such as muscle firmness, meat colour and yields or weights of cuts produced (Sebranek 1982).

The **retailer** further imposes requirements for leanness, appearance, storage stability, and drip losses in packages. Wood (1990) pointed out that retailers in the UK have recognized the demand for easy to prepare low fat cuts, and have increasingly purchased primal cuts, which are boneless, well trimmed and vac-packed to specification.

Consumers the final link in the chain conventionally evaluate pork quality in two separate instances, the first being selection from the retail display (Sebranek 1982). This is where extrinsic quality cues are important in that 'consumers first eat with their eyes'. The retail selection criteria involve colour, freshness, firmness, leanness, amount of bone, and amount of surface wateriness. Final satisfaction attributes at the consumption stage include such intrinsic attributes as tenderness, juiciness, flavour, ease of preparation and shrinkage.

However there is also an additional feature of quality at the consumer level ie. the perceived relationship to good health (Sebranek 1982).

Consumer preferences in relation to pork.

Preference and acceptability studies in the literature have indicated that consumers in the **United States and Canada**

- prefer pork with little or no fat (Davis et al 1978; Birmingham et al 1954; Gaarder and Kline 1956).
- are uncertain about quality when purchasing pork cuts and seek assurance of the government grade mark like they find in beef (Maybee 1955).
- indiscriminately select among pork cuts irrespective of size, quality or price (Gaarder et al 1960; Trotter and Engelman 1959).
- criticize some pork for unsatisfactory flavour, juiciness, and tenderness (Hendrix et al 1963).
- consider leanness and size of cut the most important factors when purchasing pork (Emerson et al 1963).

More recently Florkowski et al (1989) from a consumer study in Atlanta, US, revealed that consumers would increase purchases of pork if it were lean and would pay a premium price. The study predicted that the initial impact of a shift in preference towards pork would be an upward trend in price and eventually an increase in production and consumption. Romans and Norton (1989) concluded that leanness was the most important reason with US consumers for purchasing pork, with price of secondary concern, and colour mentioned but of lesser importance. Thus more recent US studies would suggest that leanness is the most important factor influencing consumer purchasing decisions.

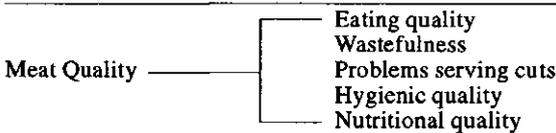
It may be concluded that quality is looked on differently by the many players in the marketing chain. Ultimately consumers select pork on the basis of extrinsic cues, intrinsic

cues, and its perceived relationship with good health also plays an important role. However views of different consumer samples tend to vary quite a bit depending on the country and the date at which the survey was carried out. Nonetheless although opinions differ, extrinsic cues such as colour, leanness, firmness, and amount of waste are obviously important. Intrinsic cues that were mentioned include flavour, juiciness, tenderness, aroma, and overall digestibility, of which, flavour tenderness and juiciness are most important. Safety, versatility and value for money are other perceived factors in the consumers decision making process.

Relating pigmeat quality from a technical point of view to how consumers perceive it
Hughes (1976) classifies meat quality into eating quality, wastefulness, problems serving cuts, hygienic quality, and nutritional quality (as shown in *Figure 3*). These are good consumer descriptives of the necessary quality characteristics depicted in *Figure 2* above.

Moreover the consumer selection process closely resembles the quality control process for individual parameters of quality (*Figure 4*). Therefore if one determines the parameters of quality used in the consumer selection processes one can organise the quality control subsystems into an overall integrated quality control system (eg *Appendix 1*) finely tuned to the consumer needs.

But Ungern-Sternberg (1981) points out that consumers, 'instead of applying the real indicators of quality which matter to them, will, when purchasing a product, search for observable shopping criteria (indicators of quality) which they think are related to desirable aspects in the consumption experience'. These 'shopping criteria' may then be applied in the context of a model for consumer demand based on subjective characteristics



Source: Hughes (1976)

Figure 3. Consumer classifications of pigmeat qualities

A Stages in the buying process (Kotler 1976).

Need arousal-> Information search-> Evaluation (behaviour)-> Purchase decision-> Post-purchase feelings (feedback)

Basic quality control flowchart (Steiner 1968).

Inputs-> Process² -> Comparison to desired -> Acceptance/Rejection decision -> Review Process (feedback).

Figure 4. Consumer selection process and quality control process

² The process must be defined by an interdisciplinary quality team. Quality characteristics to study must be selected and prioritized in order of their contribution to competitiveness or cost and the ability to measure a particular quality attribute must be assessed (O' Connor 1990).

such as was forwarded by Thompson and Mc Ewan (1985). This is referred to in Appendix 2. Whether these 'shopping criteria' are objective or subjective, they are subjectively evaluated by each individual consumer.

Jul (1985) notes that whether one is an agronomist or a food scientist, it is obvious that the final decision with regard to food quality, whether the scientists like it or not, will rest with the ultimate consumer. There is no way of getting away from having the final decision made by the consumer. That is not to suggest that objective or sensory tests are useless. What is important is that these are guide-posts, hopefully intelligently placed, but that they are not the final goal.

Prost (1986) describes three important types of criteria in assessing the necessary properties of meat, these being; sensory criteria such as colour, appearance, packaging, tenderness, juiciness, taste, odour, texture etc., easily perceptible by consumers in their judgments; nutritive criteria such as, content of essential nutrients, energy, dietary value, and digestibility making up the true nutritive value preferred by dietitians and consumers conscious of these properties; and technological criteria that characterise the distribution and functionalism of the food product ie. efficiency, durability, ease of storage and transport, dimensions, functionalism and attractiveness of the package.

Although many of the qualities mentioned are general to all meat it is essential to have an understanding of them, and how they relate to quality along the pigmeat marketing chain. In the first three headings in Figure 1 (Animal Quality, Carcass Quality and Hygienic Quality) quality can for the most part be determined objectively. However subjective methods of determining quality become more important for utilisation quality and meat quality.

If consumers are to be given priority in relation to the criteria important in the necessary properties of meat which were outlined by Prost (1986), then it is imperative that the *focus of quality control* is to match those areas that consumers are shown to lay emphasis on in market research studies.

The following section discusses consumer aspects of pigmeat quality in relation to the Irish market and considers areas in the pigmeat chain where these may be controlled to consumer specifications.

Application to the Irish market

Background

A potential customer takes an immense number of factors into account when deciding whether or not to buy pigmeat, but it is thought that eating satisfaction is a major consideration for the customer when deciding *how often* to buy pigmeat. There is evidence to suggest that shopping criteria and eating quality attributes may be related directly or even inversely to quality decisions taken at different stages in the marketing chain. For example much of the recent work in the UK has been on intrinsic factors, and tenderness and flavour are shown to be the most important factors to consumers. The reason for this work was that there was a fear in the trade and particularly among butchers that pigs that are too lean would have inferior eating qualities as much of the literature shows positive correlations between fat content of pork products and their eating qualities.

Work was also carried out in Ireland and due consideration was given to fat factors and intrinsic qualities. These are discussed in the context of this paper below.

Results, discussion and conclusion

The previously mentioned study consisted of a survey on consumers attitudes to pork, their actual purchase behaviour and a product test where selected respondents compared two pork products with different levels of marbling.

It was found that leanness was considered by far the most important quality factor for Irish consumers when purchasing pork (see *Figure 5*). This is consistent with the emphasis on leanness found in the literature (Birmingham et al 1954; Gaarder and Kline 1956; Davis et al 1978; Florkowski et al 1989; Romans and Norton 1989; and CBF 1990).

Leanness is a factor which can be controlled to meet consumer requirements. Advances in methods of *production* together with the low slaughter weight of the Irish pigs have reduced the fatness levels in pigs for slaughter. Similarly the *processor* can trim the pork products to the specifications of the retailer, and the *retailer* has a further opportunity to trim some fat before displaying the product. We can conclude from the marketing research that there is every justification of a payment system based on lean meat to Irish pig producers.

The question that the industry must address from integrated chain management point of view is what weight of pig gives lowest processing costs. If processing costs would be lower per unit of output when heavier pigs are slaughtered, and these generally have more fat which may be trimmed at a cost, would the chain as a whole be more efficient.

Findings also showed that consumers wanted pork chops that are well cut and prepared, and these factors can also be controlled to meet consumer requirements. But the features may be controlled at a number of stages of the pigmeat chain, the most obvious being the processing and retailing sectors. Other findings suggest poor presentational features such as fat splitting on pigmeat products from pigs too lean at slaughter.

Consumers indicated that although pork had a relatively good quality image compared with other meats, they thought it could still be improved (*Figure 6*). Most were of the view that pork chops were tender but considered them dry.

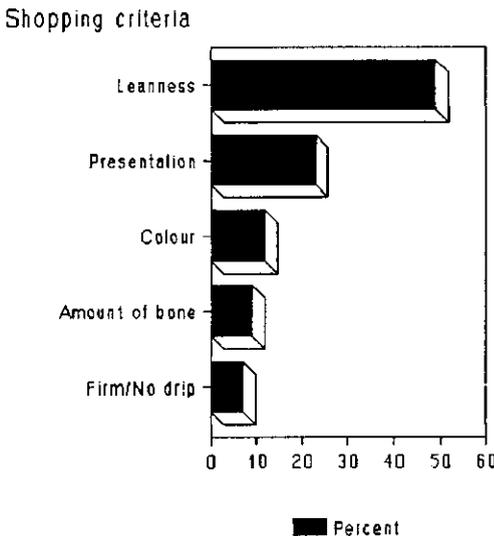


Figure 5. Influence of different factors when buying pork chops

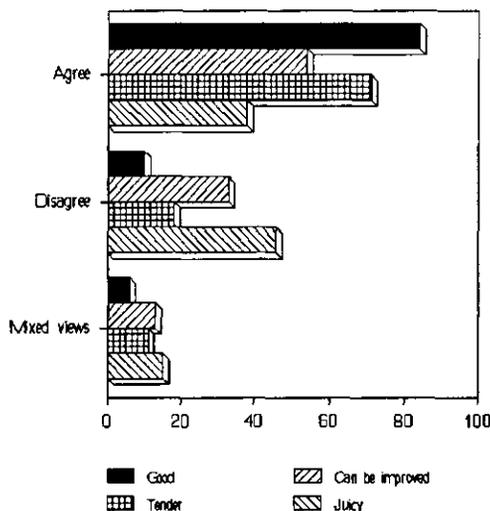
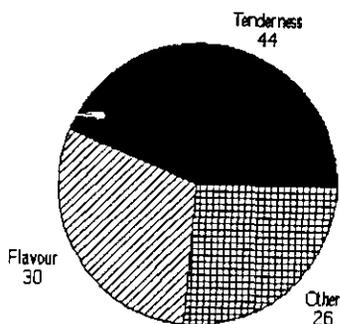


Figure 6. Attitudes of consumers to the quality of pork chops available

Those involved in the chain must evaluate their options on how to address the issue of juiciness and how important it is to consumers. It may be the case that consumers trade off eating quality attributes such as juiciness for the purpose of a leaner product for example. It must also be noted that juiciness may be influenced by the cooking practices of consumers in which case promotional information at the point of purchase can be used to affect such cooking practices.

For eating quality (Figure 7), tenderness and flavour were identified as the most important attributes by consumers with juiciness being the third most important.



Other includes juiciness, aroma etc.

Figure 7. Attribute ranked most important in terms of eating quality

There is conflicting evidence in the literature as to whether fatness level or marbling will influence eating quality attributes such as tenderness and flavour. For example Danish work (Begerholm 1984) found definite positive relationships between marbling and these eating quality attributes while in the UK (Wood et al 1986) concluded that there was neither evidence to suggest that leanness lead to inferior eating quality or that marbling affected eating quality.

Consumers generally found marbling undesirable in pork chops and choose pork chops with least marbling (Figure 8).

Results from a product test (O'Mahony et al 1993) showed that differences in marbling (fat which cannot be removed by physical trimming) did not lead to differences in consumer perceptions of eating quality attributes. The results are shown in tables 1 and 2 below. Marbling is a quality feature that can be influenced at the production stage of the marketing chain.

Table 1. How the flavour(n=114) and tenderness (n=112) of the chops sampled were rated by consumers.

Score for flavour/tenderness	Flavour Chop type		Tenderness Chop type	
	Low	High	Low	High
			Percentages	
Very good	17	13	27	26
Good	24	22	20	25
Slightly good	25	21	23	19
Neither good nor poor	16	21	12	13
Slightly poor	9	13	12	10
Poor	6	4	5	7
Very Poor	3	5	2	1
Mean rank	35.5	33.8	36.4	34.5

NS for both flavour and tenderness.

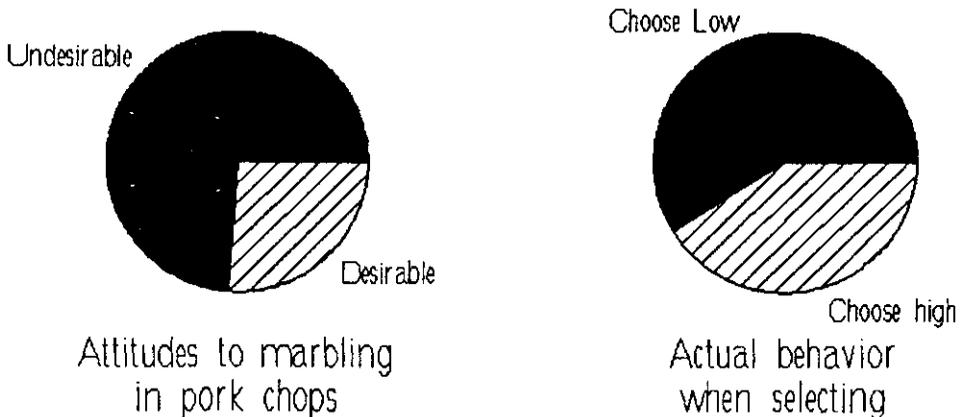


Figure 8. Comparison of attitudes to and behavior of consumers to marbling

Table 2. How the juiciness (n=113) and overall acceptability (n=118) of the chops sampled were rated by consumers.

Score for juiciness\overall	Juiciness Chop type		Overall Chop type	
	Low	High	Low	High
	Percentages			
Very	14	16	18	20
Good	18	12	31	23
Slightly good	24	25	23	18
Neither good nor poor	20	20	13	16
Slightly poor	16	12	11	13
Poor	5	9	3	7
Very Poor	3	5	2	4
Mean rank	34.0	36.7	32.2	39.0

NS for both juiciness and overall eating quality.

However this study concluded since no benefits would accrue to consumers if levels of marbling were increased to the upper limits available on the Irish market, no price premium could be exacted from consumers, therefore there is no justification for payment to producers on the basis of this attribute.

Factors such as leanness and intramuscular fat are examples of quality attribute that are measurable by consumers and other players in the pigmeat chain. And while marbling is technically believed to affect eating quality attributes (Smith and Carpenter 1976) Irish consumers do not detect these.

In this case marbling is a quality parameter that need not be built into the pigmeat chain in so far as it extends to the Irish market. Quality parameters such as leanness should be built into the chain in the most efficient way, at least cost to consumers and with the appropriate signals/incentives for their implementation. Pricing systems sensitive to consumer demand provide a communication link that ultimately determines the nature and consistency of the quality management regimes to be used at various stages of the pigmeat chain.

Bibliography

- Barton-Gade, P.A. (1989). Preslaughter treatment and transport research in Denmark. 1989 Proc. of the Meat Res. Workers (Copenhagen):140-145.
- Begerholm, C. (1984). Experience in taste testing fresh pork at the Danish Meat Research Institute. Proceedings of the 30th Meet. of the Meat Res. Workers, Bristol:196-197.
- Birmingham, E.D. et al (1954). Fatness of Pork in relation to consumer preference. Univ. of Missouri Agr. Exp. Sta. Res. Bull. No. 549.
- Boccard, P. (1986). From meat characteristics to 'integrated quality, position and function of the meat research workers'. 1986 Proc. of the Meat Res. Workers. Ghent: 419-423.
- Callingham, M. (1988). The Psychology of product testing and its relationship to objective scientific measures. Journal of Market Research Society 30 (3):247-266.
- CBF (1989). The Pigmeat Marketing Plan: The Role of CBF in the Marketing of Irish Pigmeat 1989-1992. April 1989.
- Curry and Faulds (1985). The measurement of quality competition in strategic groups. In Perceived Quality. Jacoby and Olson (Eds). Lexington, MA: Lexington Books:270, 272, 273 and 284.
- Davis G.W., Smith G.C., Carpenter Z.L., Freund. R.J (1978). Segmentation of fresh pork loins into quality groups. J. Anim. Sci., 46 (6):1618-1625.

- Emerson J.A., et al (1963). The effect of slaughter weight upon the processing characteristics, quality, and consumer acceptability of pork carcasses and cuts.
- Farris P.W., and Reibstein D.J. (1979). "Low Prices, Ad Expenditures and Profits are Linked". *Harvard Business Review*, (Nov-Dec): 173-184 (p177).
- Florkowski W.J., C.L Huang, and B. Goggin (1989). Attitudes towards porcine somatotropin: A consumer survey of the Atlanta Metropolitan Area. The Georgia Agricultural Experiment station, College of Agriculture, The Univ. of Georgia, Res. Rep. No. 570.
- Folkers, D. (1985). Food Quality, Food Prices, and Consumer Information. Study 15. Consumer Behaviour Research and the Marketing of Agricultural Products. Proceedings of the Agro-food workshop organised by the Commission of the European Communities.
- Gaarder R.O., Stoud N.V., and Maki W.R. (1960). Consumers Preferences for Pork. *Iowa State Agr. Exp. Sta. Res. Bull. No. 447*.
- Gaarder R.O., and Kline E.A. (1956). What Do Consumers Want From Pork? *Iowa Farm Service*, 10:8.
- Hagdrup C. (1989). A computer integrated manufacture concept for the slaughter industry. Proc. of the 35th conference of the meat res. workers (Copenhagen):89-92.
- Hendrix et al (1963). Consumer Acceptance of Pork Chops. *Univ. of Missouri Agr. Exp. Sta. Res. Bull. No. 834*.
- Holbrook and Corfman (1985). Quality and value in the consumption experience: Phaedrus rides again. In *Perceived Quality*. Jacoby and Olson (Eds). Lexington, MA: Lexington Books: 33-57.
- Honikel, H.O. (1989). Post mortem processes and meat quality, 1989 Proc. of the An. Meet. of the Meat. Sci. and Tech.:181-189.
- Hughes, D.R. (1976). Consumer Attitudes to Meat Cuts A Further Study. Department of Agricultural Marketing, University of Newcastle Upon Tyne. Rep. No. 21.
- Jul, M. (1985). Science Versus Marketing. Consumer Behaviour Research and the Marketing of Agricultural Products. Proceedings of the Agro-food Workshop, organised by the Com. of the EC.
- Juran, J.M. (1962). *Quality Control Handbook*. McGraw-Hill, New York-Toronto-London.
- Kotler, P. (1980). *Marketing Management: Analysis, Planning and Control*. 4th Edition. Prentice Hall International Editions:87.
- Reddy, J. (1980). 'Incorporating Quality in competitive strategies,' *Sloan Management Review* 21 (Spring): 53-60.
- Lavenka, N.M. (1989). The measurement of intrinsic and extrinsic product quality. A magnitude estimation approach. *JMRS Vol 31 (2):213-224*.
- Maybee, H.J. (1955). Hog Grading in Canada. *Canadian Dept. of Agr. Bull. No. 961*.
- Maynes, E.S. (1976). "The concept and measurement of product quality", in *Household Production and Consumption*, 40, 5, (ed. Nestor E. Terleckyj, New York: Nat. Bur. of Econ. Res.): 529-560.
- O' Connor, B. (1990). 'Quality assurance through Quality control'. In *Food Ireland*. Dec.:41-43.
- O' Mahony R.E., Cowan C., and Keane M. (1991/2). Consumer Preferences for pork chops with different levels of intramuscular fat. *Food Quality and Preference*, Vol. 3, No. 4:229-234.
- Pacheco (1989). Satisfaction Guaranteed. A Marketing research Approach to measuring consumer satisfaction and identifying competitive opportunities. *Journal of Business and Industrial Marketing*. Vol. 4 (2).
- Porter, M.E (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Macmillan New York: The Free Press:249.
- Prost, E.K. (1986). Food Quality Criteria. *Fleischwirtsch.* 66 (7): 1131-1132.
- Romans, J.R and H.W Norton (1989). Consumer Evaluation of Fresh Pork Quality. Proceedings from the 1989 Meeting of Meat Research Workers:614-618.
- Sebranak, J.G. (1982). Pork quality; A research review. *World Review of Animal Production*. Vol XVIII No. 3 (1982):7-24.
- Soerensen S.E., Stoeier S., and Rud Andersen J., (1989). Utilization of on-line methods for measuring quality parameters in Carcasses. The 35th International Congress of Meat Science and Technology, Copenhagen, Denmark.: Danish Meat Research Institute, 23 June 1989, Manuscript No. 842. E

- Smith, G.C. and Carpenter, Z.L. (1976). Eating quality of animal products and their fat content. Proceedings of the Symposium on Fat Content and Composition of Animal Products, National Academy of Sciences, Washington DC:147-182.
- Thompson and Mc Ewan (1985). Predictive Modelling and Evaluation of food acceptability. Study 15: Consumer Behaviour Research and the Marketing of Agricultural Products. Proc. of the Agro-Food Workshop organized by the Commission of the European Communities. Ed. J.E.R. Frigter.
- Trotter, C. and G. Engleman (1959). Consumer Responses to Graded Pork. Penn. State Univ. Agr. Exp. Bull. No. 650.
- Ungern-Sternberg T. von, and Weizsacker, C.C. von (1981). Marktstruktur und Marktverhalten bei Qualitätsunsicherheit@ Zeitschrift Fur Wirtschafts.-und Sozialwissenschaften 101:609-626.
- Van Schothorst, M. (1989). Safeguarding quality in the food industry. Fleischwirtsch. 69 (7):1132-1135
- Williams, A.A.(1985). The use of perceptual space approaches for determining the influence of intrinsic and extrinsic factors on food choice. Study 15. Consumer behaviour research and the Marketing of Agricultural Products. Proceedings of the Agro-food workshop organised by the commission of the European Communities.
- Wood, J.D. (1990). Developments in pigmeat. In 'Food quality in the 1990's Animal Products. A symposium organized by the Agricultural Group of the SCI. Nov. 1990.
- Wood, J.D. et al (1986). The effects of fat thickness and sex on pigmeat quality with special reference to the problems associated with overleanness. 2:Laboratory and trained tasted panel results. Anim. Prod. 43:533-544.
- Zeithaml, V.A. (1988). Consumer Perception of Price, Quality and Value: a means-end model and synthesis of evidence. Journal of Marketing 52:2-22.

Appendix 2

Thompson and McEwan (1985) illustrate the following model to detail demand based factors that may influence an individual consumers subjective evaluation of a food/food situation.

- 1 Anticipated or actual appreciation of the sensory characteristics of the food and packaging.
- 2 Anticipated or actual appreciation of the food purchase or consumption situation.
- 3 Anticipation of the nutritional properties and health beliefs.
- 4 Anticipation of hygienic and toxicological status
- 5 Evaluation of the functionality of the food (anticipated or actual).
- 6 Evaluation of the cost of acquisition (monetary or actual).
- 7 Appeal of the presentation, either at the point of purchase or consumption.
- 8 Familiarity
- 9 Food/Product/Brand image

Source: Thompson and Mc Ewan (1985), in Predictive Modelling and Evaluation of Food Acceptability. University of Reading. U.K.