

Kernkamp lecture: The future of the European pork chain

Gé Backus, Aalt Dijkhuizen
Wageningen University and Research Centre

Abstract

This paper focuses on current and future developments in the European pork supply chain. Developments in consumer characteristics and tastes as well as consumer concerns—i.e., food safety, environment, animal welfare—are described. An overview is given of the main Dutch pork quality programs. Cost prices of pig meat are analyzed based on actual farm data and expected policy requirements. We conclude that France, Denmark, and the Netherlands had approximately the same average cost price in 2000. Cost price positions shifted over time; in the 1980s the Netherlands was in the lead, followed by Denmark, which has now been replaced by Spain. Moreover, we conclude that the average cost price in the Netherlands will increase further in the years after 2005, as more and more farms will implement the new policy requirements. For the period 1992 to 1998, production costs of pig meat in the US were approximately 10% less than in the Netherlands. Competitiveness of the EU pork industry in relation to the US is also dependent on changes in the exchange rate. By a further liberalization of world trade and the existing WTO-agreements, the European pork producers will have to deal with North American competition to an increasing extent in the future, within as well as outside the European market.

Introduction

Agriculture in Northwest Europe functions under the influence of ecological, economic, and social forces; these act simultaneously as both opportunities and threats to the development of sustainable food chains. The aging population, the growing group of single-person households, and the increased participation of women in the employment market has led to the rise of the convenience-minded and cost-conscious consumer. Another development is that special interest groups increasingly want firms to take responsibility for their production methods. For the firms, these developments will demand a different way of working, with more attention given to building transparency in inter-firm relationships.

Responding to the above developments may weaken the competitiveness of pork chains in the international market. Interacting with these forces is the complex strategic

context in which governments now operate. There is globalization and regionalization at the same time, and there are different views on the extent to which social change can be affected by individual policies or, for that matter, government policy strategies to intended to facilitate this transformation. New concepts are needed: The challenge is to change perspectives so that the above-mentioned forces are seen not as threats, but opportunities.

The turning of animal production towards a larger market orientation and an improved embedding of animal production in society requires new networks. As the agri-system transforms itself from a simple "food supply" to one that offers choices to consumers, the organization of the system designed to meet the needs of the consumer becomes the most important factor.

The food system is undergoing structural change. There is a shift from broadly defined commodities to differentiated products with value-enhancing characteristics. Moreover, increased concentration and vertical coordination can be observed.

This paper aims at describing the developments in the European pork chain. Supply chains are a linked set of value-creating activities. They have to be consumer-driven, with an emphasis on quality. Focus should be on improving system-wide performance, rather than on the distribution of profits from those improvements. Other important attributes are transparency in inter-firm relationships, and a key role for the chain leader. However, we are not so far yet.

Kinsey described the big shift from a food supply to a food demand chain (1999). The forces that shape the supply chain of the food and agriculture industry are shifting dramatically. For decades, new agricultural techniques increased yields. Today, the food supply chain is being split up, moved quickly toward a variety of markets, pushed by new science and technology, and pulled by consumer demand. Several major factors have changed the face of the food supply industry during the past 20 years. Among them are changing consumer tastes and demographics, widespread use of the Uniform Product Code, company mergers, and the changing nature of wholesaler/retailer interactions.

These factors have led to a dramatic realignment of the food supply chain, to the point where we should probably now think of it as a food demand chain. Changes in production no longer drive the market. Most of the changes in this sector have been driven by new science and technology, new business management practices, and by people's evolving social and cultural attitudes. Some of these changes went largely unnoticed at first, but today have resulted in a fundamental change in the way the food industry does business (Kinsey, 1999).

Developments in consumer tastes and characteristics

Many changes in consumer behaviors and preferences are explained by demographics. Today, Western households are more heterogeneous than ever. They are smaller, richer, and more likely to have a female member in the labor force. Only one-fourth of the US households are made up of married couples who have children present in the home. These households have the highest percentage of women in the labor force and the highest median annual income.

One of the most important demographic trends relating to food consumption is that women have entered the labor force in large numbers, thereby increasing household income. The fact that these women have less time to shop and cook and more money to buy ready-to-eat food means that we are seeing more calls for convenience, more purchases of food on the go, and a decline in home cooking. The average woman seeks to reduce time spent shopping and preparing food. Studies show the time the typical woman spends at home preparing the evening meal decreased from two hours in 1967 to less than 45 minutes today. In addition, the typical woman today expects to devote only 15 minutes preparing a meal and spends over 20% of her food dollar on take-out food.

Pig meat is popular world wide. Over the past two decades, annual consumption has increased on average by 5%. Growth in pig meat consumption was especially manifest in Asia (Japan, China, South-Korea). Growing income and an associated change in consumption patterns was the main reason for that increase.

Per capita consumption of pig meat is still increasing in many countries, even in the EU, where consumption is already at a high level. Only in Germany is pig meat consumption decreasing. Average pig meat consumption in the EU is markedly higher compared to the US, 44 kg/person versus 30 kg/person (Van Berkum et al., 2002).

Consumer concerns

Among other factors, the already mentioned socio-demographic changes have led to the rise of consumer con-

cerns about the environment, animal welfare, and food safety.

Environment

In some European countries there is an environmental-intensive pig industry. Not only in the Netherlands, but also, for example, in parts of Germany, France, Belgium, and Spain very many animals are kept per hectare of cultivated land. The consequences are manure surplus and problems with odor and—particularly in the Netherlands—ammonia emissions. If European environmental legislation is to regulate ammonia emissions, nitrogen production, and phosphate production in livestock farming, such laws will have an important impact on the development of the pork industry.

Animal welfare

In June 2001 the European Ministers of Agriculture decided to pass European Directive 91-630-EEG. This directive comprises welfare prescriptions for the pig sector, among which are a ban on housing sows individually as of 2003, with an interim period to 2013. Furthermore, a minimum space of 0.65 m² per growing/fattening pig is prescribed. In the Netherlands the Pig Regulations already prescribed group housing for sows and a space of 1.0 m² per growing/fattening pig, with an interim period to 2008.

As yet the European consumer has not been very sensitive to more animal-friendly meat. Animal-friendly produced pork can only be found in large quantities in Denmark and the UK. The question is whether other consumers will also become sensitive to this, since price is an important purchase criterion, especially in the meat market.

Food safety

Most consumers have a strong preference for increased food safety. Over the next five years it will be important for the meat sector to produce zoonosis-free and residue-free products. The European consumer will clearly demand that the meat sector produce a reliable, safe product.

In the policy of food safety, the Codex Alimentarius plays an increasingly important role. The Codex is an intergovernmental instrument for the development of standards that food in international trade is to meet. The goal is to improve food safety and the fairness of trade. With the liberalization of world trade, the importance of the Codex is growing.

Dutch pork quality programs

Over the past few years, slaughterhouses have introduced quality programs. Besides meat for export to Japan, there are other programs with which the sector provides the domestic chain stores and those abroad. The large slaughterhouses are developing a program for biological pork

and all slaughterhouses use Integrated Quality Control (i.e., IKB) more or less at a basic level. There is not (or hardly) any difference among the slaughterhouses as to the extra requirements for participation in the different quality programs.

The retailers demand distraction material for the animals in the barns. Certain medications are no longer allowed. Besides these standards, there are demands regarding the transportation of the animals (e.g., courses for transporters and means for transport of diseased animals). The extra costs are partly paid by the chain stores.

The British bacon segment's main demands are that sows are housed in groups, that male piglets are not castrated, and that the feed is meat- and bonemeal-free. There is much interest among pig farmers to change to the bacon segment.

Moreover, there are firms that produce according to requirements linked to the Ecolabel. According to Ecolabel standards, manuring and acidification must not be more than 50% of the average and energy consumption not more than 75% of the average. Besides this, a maximum percentage of mortality is allowed and animals should have unlimited access to drinking water.

Reasons why pig farmers participate in the retail program range from purely economic to the desire to establish a relationship with the stages further in the chain. Some pig farmers do think, however, that the retail program should be kept up to date and innovated. Apparently there is a lag in maintenance. Moreover, there is little consultation, and more control is necessary as to the pigs that enter the program. The certification is not watertight.

Pig farmers who participate in the British bacon program consider the bacon bonus reasonable. They are satisfied with the control by the UK and the slaughterhouse. However, farm management has changed considerably. Pigs must not be too heavy at delivery, which means paying more attention to feeding and adjusting the feed composition. That castration is no longer necessary is considered positive. Furthermore, the adaptations in housing are practicable. The schedule is different and more control is needed. A fairly quiet type of pig is needed. The necessary investments depend on the firm. Pig farmers who already have spacious barns can make adaptations at low costs.

Industry structure

A useful conceptual framework for analyzing and discussing industry structure is provided by Porter (1980). Porter's five forces analysis of the food distribution industry include the following:

- barriers to entry

- bargaining power of suppliers
- bargaining power of customers
- industry rivalry
- threat of substitution

Barriers to entry in the food industry are determined by their capital intensity, accelerating consolidation, economies of scale, and the logistics learning curve. The bargaining power of suppliers is shaped by the many substitute suppliers, low switching costs, and little threat of forward integration. The bargaining power of customers is shaped by a fragmented customer base, low average purchase, little threat of backward integration, and a gradual concentration in chains. Industry rivalry is highly competitive, with low pricing power (slim margins) in mature markets, and with consolidating business in a race to scale. Finally, threats of substitution are determined by many local distributors, few national players, low-switching-cost customers, and little product differentiation (Figure 1).

Dutch and many other European pork supply chains are characterized by low margins. It is the poor market structure for pork that hampers a restructuring of the sector. It is clear that slaughterhouses are to play a prominent role in this restructuring. In the slaughterhouses too much emphasis is still being placed on slaughtering and processing, while this does not yield much money. Too little is done to develop and launch specialized products with additional value. Only through price reductions can the consumer be lured into the shop, which makes the retailers have no choice but to be opportunistic buyers. Changes as to co-operation among pig farmers, slaughterhouses, and chain stores are a prerequisite for improving the market structure.

Co-operation between stages within the chain

Below is a rough outline for co-operation within a chain. This co-operation should meet the following four conditions (Backus and Van der Schans, 2000):

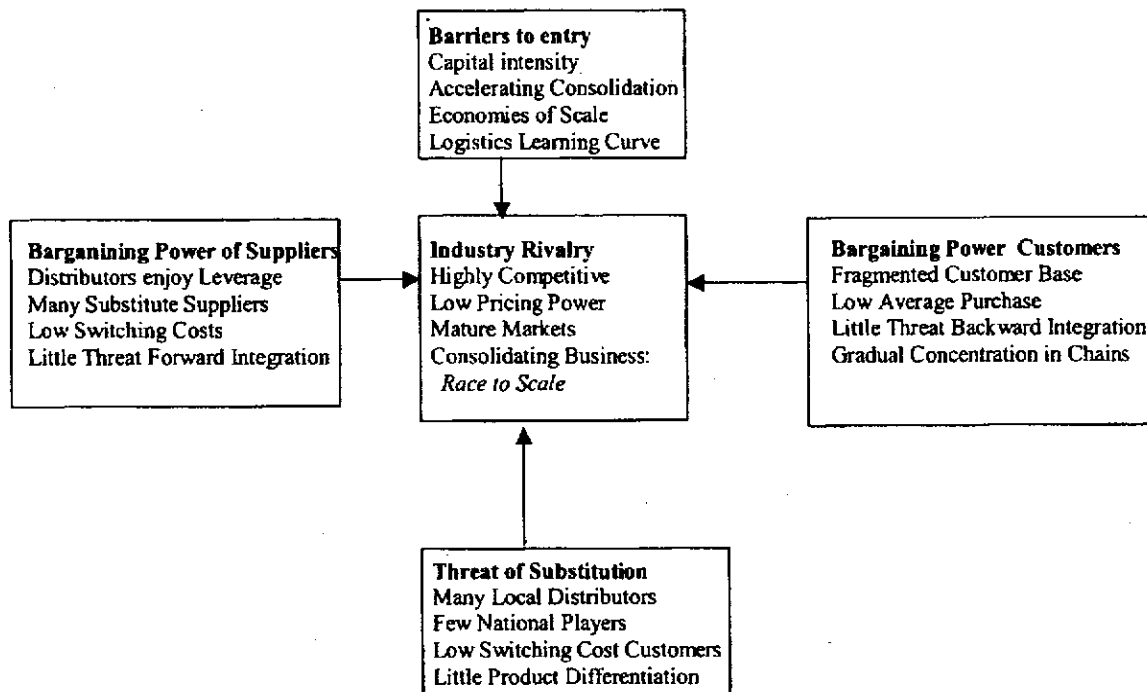
Parties must have a partnership-based approach

Co-operation assumes a "win-win" situation. Profits should be earned by all parties, including the stage between pig farmer and slaughterhouse, if co-operation is to be realized. Trying to remove margin from the retailer is not a goal. Economic power of the retailer is, by the way, so strong that this would not even be possible. The solution is providing more service to the retailer, which should lead to a "win-win" situation for the entire chain.

Parties must invest in quality

This will result in more profit to the producer, processor, and retailer. To this end, entrepreneurs should be willing to enter into a business relationship in which structural

Figure 1. Porter's five forces analysis of the food distribution industry



profits over the long term are more important than incidental profits over the short term.

Supply of slaughter pigs must be predictable

A predictable supply of slaughter pigs makes an optimum use of slaughter capacity and supply to the market possible. The slaughterhouse wants a fixed weekly supply on the basis of its slaughter capacity. Currently this is often not possible because pig farmers supply on the basis of market expectations: in a rising market they keep the pigs and deliver too few and in a downward market it is the opposite. The result is a lack of balance between slaughter capacity and supply pattern each week.

Payment schemes must be transparent

One condition for trust is that the mechanism for price forming is transparent. This means a consistent reward for extra efforts at farm level and not that pigs are bought at a price which depends on the production capacity in the slaughterhouse. The bonuses for the different quality programs of the slaughterhouse are usually well known, but how the base price is set at a certain moment raises questions. Moreover, the need for a more consistent base price is increasing for both slaughterhouses and pig farmers.

The role of the processor

The slaughterhouse is pre-eminently the central party in the chain, because it has contacts with the primary sector and can also start connections with retailers. In the Dutch

market, the slaughterhouses often have these direct relations with retailers, but abroad there are fewer contacts. If the slaughterhouse takes the initiative, it should be able to offer a benefit to the chain stores, the consumer, or both. It may, for example, take care of the shelves in the supermarkets. Then the slaughterhouse also markets its knowledge on meat. It can give a complete overview of the shelves, with product information, promotional activities and further extension of knowledge. The processor thus takes over the role of category manager from the chain stores. The latter will only give up if a structural improvement in the margin can be demonstrated. In this way, a broader realization of the meat balance is possible, by which more parts of the pig can be sold via the fresh meat channel. The slaughterhouse can direct the sales and at the same time obtain information on the buying behavior of the consumer. The "win-win" situation is realized by a reduction in transaction costs in the last part of the chain, a better realization of the meat balance of the carcass, and a higher turnover per square meter of shelves. Such a structure can also stimulate product development at slaughterhouse level, because there are direct contacts with the market; testing and introducing new products can take place much more easily (Backus and Van der Schans, 2000).

This "win-win" situation requires investments, though, in information technology and in a different way of working. The shelves scheme is to be adjusted daily on the basis of actual checkout information. The supermarkets should be willing to make this information available to

the processor. One condition is that there is good co-operation between the pig farmer and slaughterhouse to be able to utilize the logistic benefits of this chain concept.

Cost price of pig meat

Developments in the cost price of pig meat for selected European countries

Bondt et al. (2002) have analyzed the (expected) cost price development for Denmark, the Netherlands, France, Germany, and Spain for the period 1995-2005 (Figure 2). They concluded the following:

- cost prices have developed in roughly similar ways
- Denmark has now lost its cost price advantage
- the Netherlands' cost price advantage in relation to its competitor, France, has also been lost
- Spain is increasing its cost price advantage
- Germany continues to have a significantly higher cost price than other countries

In Spain only limited cost price increases are expected by 2005. However, as Spain increases the amount of pig meat it produces and exports, Spanish producers will increasingly be confronted with requirements imposed by foreign buyers in the field of animal welfare, the use of antibiotics, meat-meal, and the like. Production costs will, therefore, increase significantly.

The research also included a survey of the costs to be incurred in the countries studied over the five-year period of 2000-2005 in improving animal welfare, food safety, and environmental protection in primary production. In estimating the future cost price, the following factors were considered:

- animal welfare (space per animal, dung grid flooring, accommodation in groups)
- food safety (antibiotics, meat- and bonemeal, zoonoses)
- environmental protection (ammonia, manure, environmental taxes)

The political importance of each factor was considered as well as the economic importance of the measures to be taken and the degree to which improvements had already been carried out in 2000 or will have been carried out by 2005.

In estimating the cost price for 2005, attention was focused exclusively on the anticipated effect of various policy measures. No correction was made for developments in such factors as feed price, productivity, the cost of labor, interest, or the structure of the sector. No account was taken of possible cost increases in other stages in the production chain. The anticipated average cost increase in the Netherlands, at eight Eurocents per kilogram of live weight, is almost four Eurocents higher than in Germany, France, Denmark, and Spain (Figure 3). Given

Figure 2. (Estimated) cost price development of pig meat per kg of live weight from 1995 to 2005 (in Euros) for selected countries.

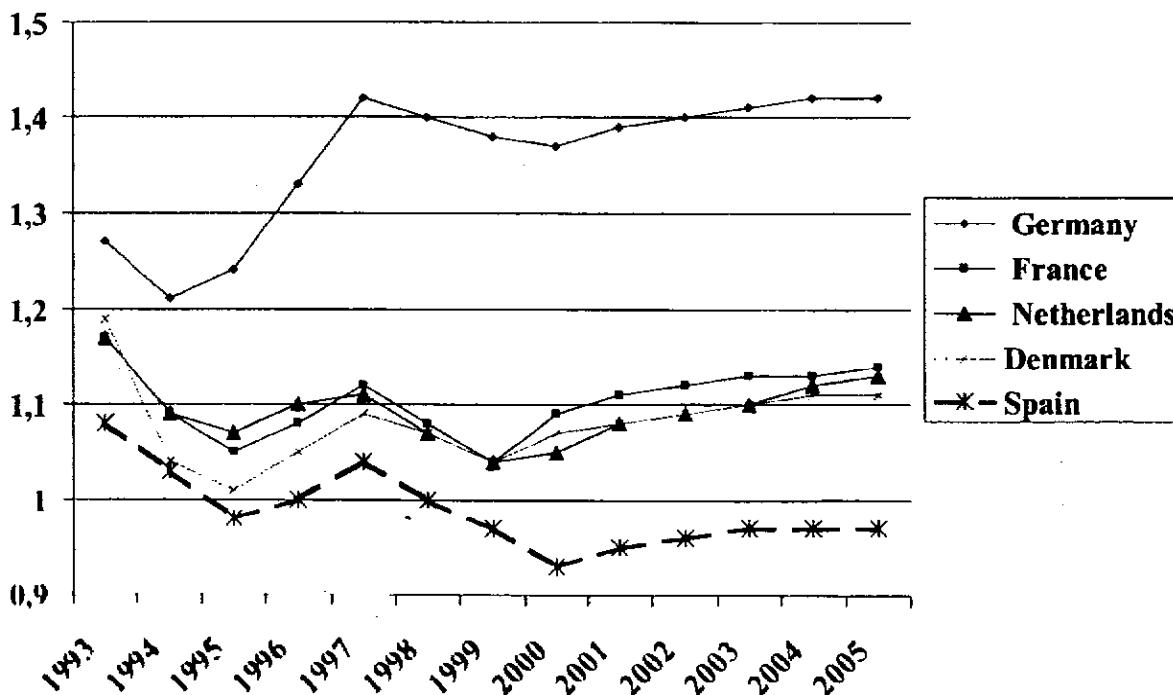
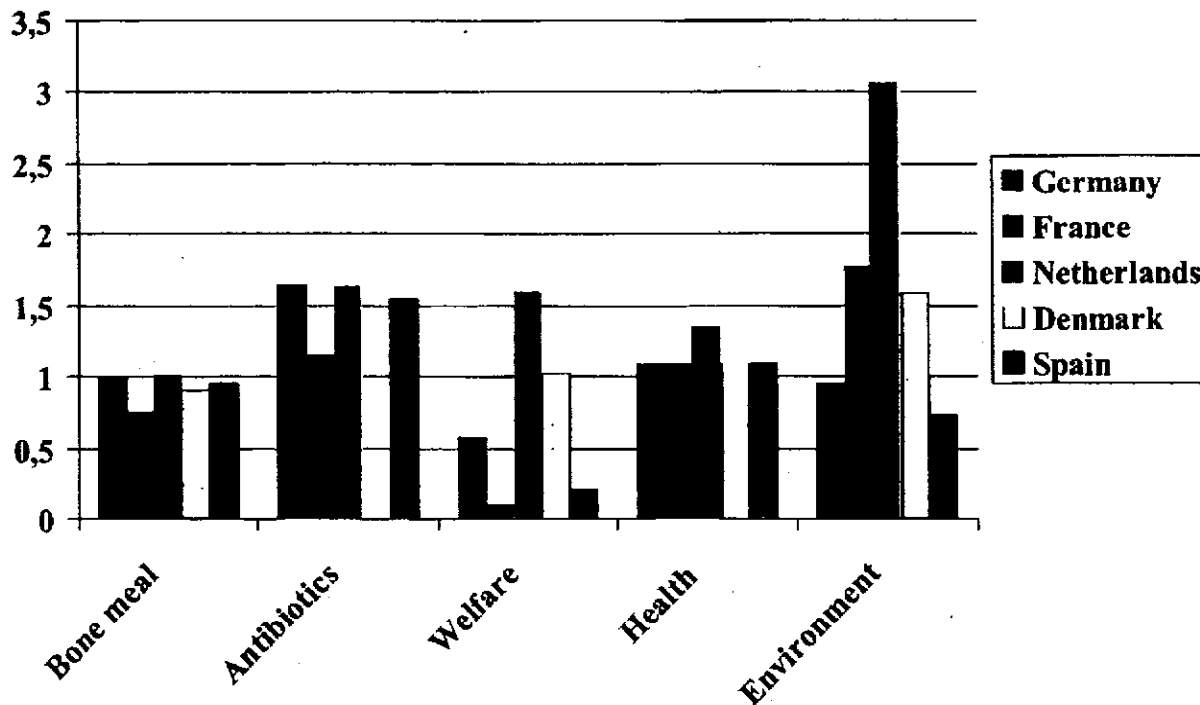


Figure 3. Impact of policy on the cost price of pig meat in Eurocents per kg of live weight 2000 - 2005



the policy developments, a substantial increase in costs is to be expected in the Netherlands. However, the average cost price for 2005 is not expected to rise much, particularly because it is anticipated that not all farms will have introduced the required changes by 2005.

Animal welfare

In the Netherlands, the largest cost increases are expected to be a consequence of the Decree on Pigs (*Varkensbesluit*). It is anticipated that in 2005, some 45% of Dutch pig farms will be in compliance with the requirements of the Decree. Cost increases are also expected in Germany and Denmark as a result of welfare measures, although to a lesser extent than in the Netherlands.

Food safety

A considerable increase in costs is to be expected in all countries as a result of the banning of antibiotics as feed additives. It is believed that some farmers mixing their own feed are already partly working without preventive antibiotics.

The expectation is that in Spain, meat- and bone-meal will not be prohibited in the near future. In the other countries, however, the chance of a prohibition is substantially greater. In France in particular, some production is already carried out with feed free of meat-meal.

The animal health levy will not result in any great cost increase in the Netherlands; a levy of 23 Eurocents per slaughtered pig is anticipated. It is expected that zoonoses

will be combated on a broader front in the Netherlands than in other countries. Nonetheless, all countries will be confronted with costs for combating these diseases.

Environmental protection

Manure disposal costs are set to increase in all countries. Future cost increases due to environmental policies are the largest in the Netherlands. However, the position is not greatly different in France or Denmark; in the Netherlands, however, it is a question of increasing already high environmental costs, whereas in the other countries costs for environmental protection have been low until now.

In Denmark, the increase in environmental costs is caused by a substantial increase in land prices. Rising land prices in the Netherlands are not directly relevant to the costs of pig farming.

Energy prices will increase due to the introduction of environmental levies. The possible consequences of the deregulation of the energy market have not been taken into account here. A less regulated energy market could be an advantage for the Netherlands. Part of the difference in costs due to environmental measures can be explained by the ammonia problem. It is estimated that by 2003 one-fifth of the pigs in the Netherlands will be housed in low-emission pens, which is considerably more than in the other countries.

In Germany and Denmark, where low-emission accommodation is used, the main aim will be to reduce odors in

intensive farming areas and urban areas, rather than to reduce ammonia emissions in acid-sensitive areas.

The Netherlands and the United States compared

In an earlier study, Bondt et al. (2000) have compared pork production costs in the Netherlands and the US for the period 1992-1998. A cost price comparison between the US and NL is difficult. Pig farming in the US is characterized by diversification within the industry. The economic potential of family farms on the one hand and the so-called mega-farms on the other is very different. That makes a comparison based on averages difficult. It should also be noted that certain differences in potential competitiveness are hardly or not at all expressed in the cost price. In particular, how much pressure there is on available space can make a big difference to how much opportunity there is to achieve advantages of scale.

A cost price comparison based on two different databases should always be carried out with the necessary caution. There may be important differences in accounting rules, data definitions, and the like. However, the database used for the US (source: USDA) has many similarities with the database of the European Farm Accountancy Data Network (FADN):

- it is based on a random sample representative of (almost) all farms

- the costs of farmers' own work and capital are included

- only closed farms are included

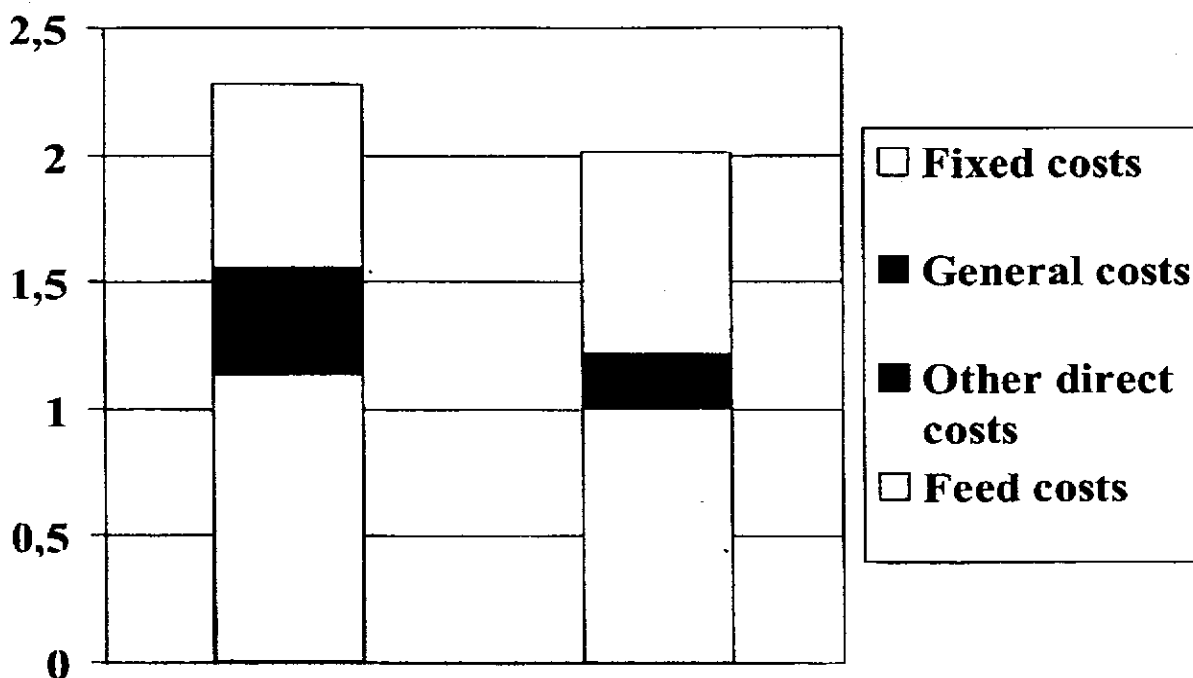
It is also possible to make corrections for certain differences. The American way of classifying costs was converted to the EU method, to allow more accurate comparison. For the period 1992 to 1998, production costs in the US were approximately 10% less than in the Netherlands (Figure 4).

By contrast, the American average included very small farms. The difference in cost price between small and large farms is much larger in the USA. The cost price for the large farms (> 1000 pigs) is 20% lower than for the average farm. In the Netherlands, the cost price for the larger farms is no more than 5% lower than for the average farm. This 15% difference, together with the 10% difference referred to above between the average American and Dutch farm, gave a 25% difference in cost price for the larger farms.

The study included figures from America over a number of years, due to the fact that feed prices in the USA fluctuate more than in the EU.

In addition to the large fluctuations in feed prices, exchange rates also play an important role. Until recently, competition was limited because the dollar exchange rate was unfavorable for US export to Europe. With the current change towards a more favorable situation for the

Figure 4. Cost price of pig meat per kg of live weight in the Netherlands and the US over the period 1992 to 1998.



dollar, the US supply of meat on the European market may increase considerably. North American production is much more flexible than European production, allowing supply and demand to be geared to one another much more easily.

Shifts in intensive pork production

While the world market of pork has increased by 16% the past five years, production increase in the EU-15 has been limited to slightly less than 9%. In the Netherlands production remained at the same level during this period. In a LEI study prepared for VIV 2001, (expected) trends in the European Suppliers Market for Pigs and Poultry have been studied for the period 1994-2005. It was concluded that markets increased in Spain, Germany, Poland, Hungary, Denmark, France, Italy, and Portugal, whereas they decreased in the Netherlands, Belgium, Sweden, and the Czech Republic (Figure 5).

By a further liberalization of world trade and the existing WTO-agreements, the European pork producers will have to deal with North American competition to an increasing extent in the future, within as well as outside the European market. Moreover, European export restitution will increasingly be reduced, thereby making trade with third

countries less attractive for suppliers. Dutch suppliers of pork will meet more and more competition from the East European ones and, depending on the exchange rate, also from the North American suppliers on the home and European markets. Including animal welfare demands in the import conditions could protect the European market somewhat from products from third countries.

Van Berkum et al. (2002) have studied global shifts in intensive animal production as a consequence of world trade liberalization for the period from 1997 to 2015. The highest growth figure is realized in East Asia, resulting in a share in world intensive animal production that increases from 21% in 1997 to 31% in 2015. North America increases annually by 2.5% resulting in a share of 15.5% of world animal production by the year 2015. South America is another strong grower with 3% per year. The European share in world animal production will decrease from 34% in 1997 to 29% in 2015 (Figure 6). The annual increase in intensive animal production in Europe is limited to 1%.

Discussion and conclusions

The study of the cost price in selected countries and the ways in which this may be expected to change leads to a number of conclusions:

Figure 5. Expected market shares in the European market of pig meat in 2005.

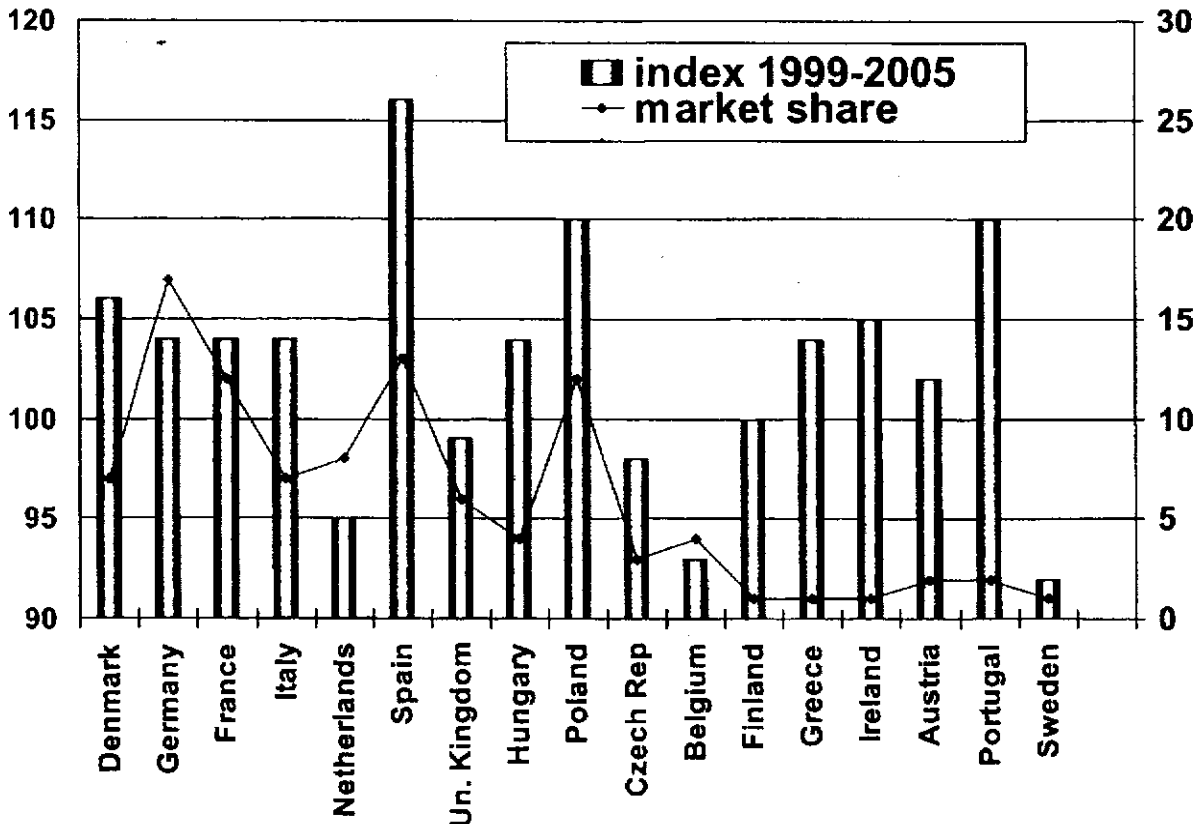
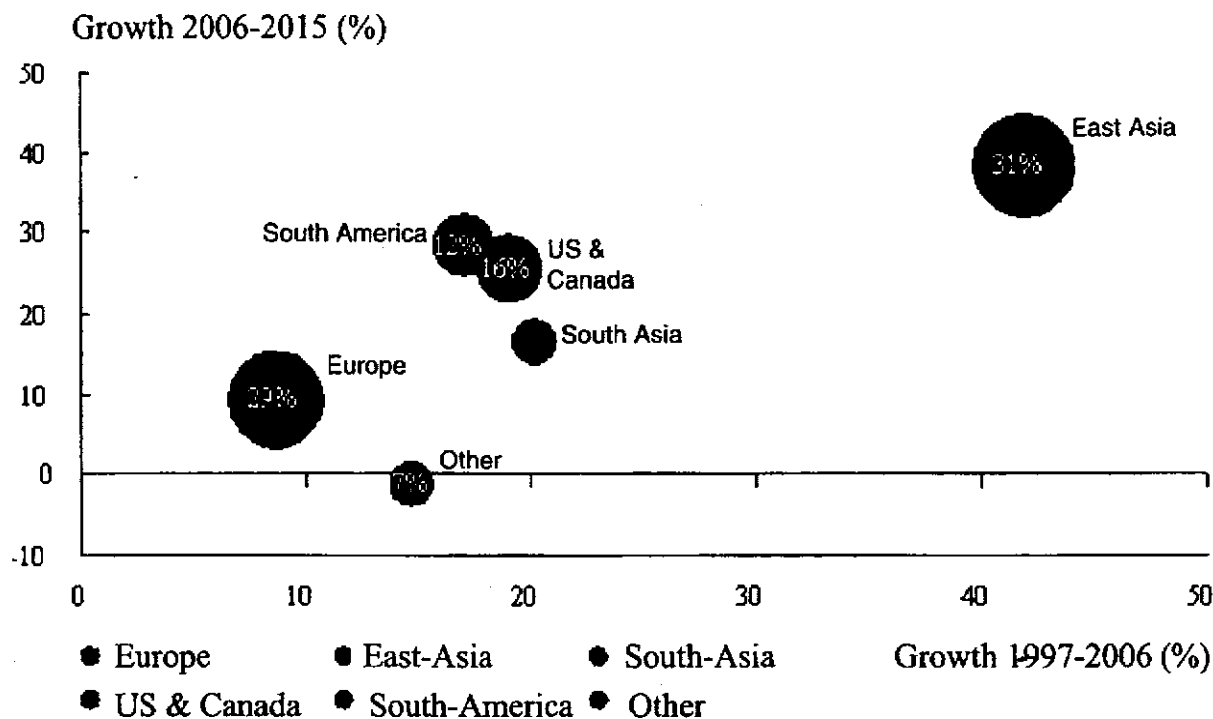


Figure 6. Estimated increase in animal production for the period from 1997 to 2015 and share in production in 2015 by region within a liberalization scenario.



- Cost price positions may be expected to shift over time; in the 1980s, the Netherlands was in the lead, followed by Denmark, which has now been replaced by Spain.
- The average cost price in the Netherlands is expected to increase further in the years after 2005, as more and more farms will implement the new policy requirements.
- France, Denmark, and the Netherlands had approximately the same average cost price in 2000.
- Competitiveness of the EU in relation to the US depends on movements in the exchange rate.

European slaughterhouses want to choose for long-lasting relationships with pig farmers. In practice, however, bulk production is still more important. Moreover, the prices slaughterhouses pay depend on their slaughter capacity more than on the product delivered and its background. Adjusting the culture and structure of the slaughterhouses is needed to be able to build lasting and professional relationships. On the other hand, pig farmers should also learn to operate in a co-operative context with slaughterhouses. The competition between stages should change to competition between chains.

Many things are being realized on the basis of mutual trust. If this is lacking, actions will take place on the basis

of opportunism. Building trust can be tackled and organized. By increasing the "social capital" in agriculture, long-lasting partnerships can be stimulated.

The perception of the consumer is a guiding force. Communication should not be on the product and the way it is produced, but should respond to the consumers' thoughts and notions about food. Research has shown that people associate to a large extent wholesome (and safe) food with, for example, the sun, green, and holiday. This has to do with associations, but also with judgements and prejudices. Product development and marketing should therefore respond to the consumers' needs. These needs include not only safe and wholesome food, but also the perception associated with buying, preparing (either preparing it oneself or ready-to-eat), and consuming pork. The question here is how to respond to this as a market-oriented producer. Product innovation is an important means to food chains to keep their market share or to increase it in a quantitatively saturated market. A significant share of the sales of food products is from products that had come on the market in recent years. An increase in turnover is to be realized by additional value, more nutritional value, better taste, and more convenience.

To respond actively to the market does not only mean thinking along with retailers about developing innovative formulas and concepts (e.g., eating meat is fun), but it also means developing formulas and concepts oneself

on the basis of the consumers' own expertise (food trends, changing kitchen design, etc.) in relation to the distinguishing potential of one's own food chain.

If a chain wants a particular product to appeal to the consumers, this product should have particular qualities, the so-called Unique Selling Propositions. For pork these include price, the sensory qualities (color, taste), and the intrinsic quality (cutting efficiency). If there are sufficient well-developed guarantee systems, investments can be done in consumer-oriented distinguishing concepts. Not that the level of guarantee will be the main issue in communication to the end-user (of course, this will be the case towards purchasers in business-to-business relationships), but consumers' ideas and opinions about food should be responded to intelligently.

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