Against All Odds

Explaining the Exporting Success of the Danish Pork Co-operatives

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JILL E. HOBBS
DEPARTMENT OF AGRICULTURAL ECONOMICS
UNIVERSITY OF SASKATCHEWAN

Centre for the Study of Co-operatives
University of Saskatchewan

Centre for the Study of Co-operatives
University of Saskatchewan

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Centre for the Study of Co-operatives
Room 196, 101 Diefenbaker Place
University of Saskatchewan
Saskatoon SK Canada S7N 5B8
Phone: (306) 966–8509
Fax: (306) 966–8517
E-mail: coop.studies@usask.ca
Website: http://coop-studies.usask.ca

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Executive Summary

BASED ON ANY CONVENTIONAL COST MEASURES, THE Danish pork industry should be at a considerable competitive disadvantage relative to its major international competitors, particularly Canada and the US. In fact, Denmark is a major pork exporter. Why is the Danish pork industry so successful when the relative costs of production appear to be stacked against it? The answer lies in the organization of the industry. There is close co-ordination of activities along the supply chain from breeding and genetics, to production, slaughter, processing, further processing, and exporting. This enables the industry to tailor products to the needs of specific market segments.

This study seeks to answer a number of questions about the Danish pork industry. What has been the impact of recent merger activity within the Danish industry? What role does the industry's co-operative structure play in its exporting success? How have the industry's initiatives in quality assurance, traceability, food safety, and product differentiation affected its competitiveness? Finally, are there lessons for Canadian agri-food business and co-operatives?

While still increasing, hog production in Denmark has consolidated in recent years, although environmental regulations limit farm size. Around 90 percent of hog production is slaughtered through three producer-owned co-operatives. Following a recent merger, one co-operative alone—Danish Crown—accounts for 78 percent of the slaughter. The merger was the subject of an EU Commission competition investigation because it created dominant positions in the Danish market for the purchase of live slaughter hogs and in the domestic retail market for pork. The commission ruled in favour of the merger, subject to a number of conditions. It is not at all clear, however, whether these conditions will be effective in increasing competition among the remaining co-operatives.

Danske Slagterier (DS) is an umbrella organization encompassing all of the pork co-operatives. Historically, it has played a pivotal role in co-ordinating research and formulating strategies throughout the Danish pork industry, thereby reducing transaction costs for the industry players. The emergence of Danish Crown as the dominant co-operative changes the relationship between Danish Crown and DS. A reduced role for DS may mean that some of its research co-ordinating activities become internalized within the vertically integrated structure of Danish Crown.

Danske Slagterier has also been pivotal in co-ordinating a number of horizontal and vertical initiatives to enhance the quality of Danish pork and the competitiveness of the industry. These initiatives include R&D in genetics and meat quality, traceability systems, on-farm quality assurance, "Special Pigs" for the UK market, an initiative to eradicate salmonella from the Danish pig herd, and initiatives that respond to consumer concerns over the use of artificial growth promoters in livestock production. These initiatives have credibility in the marketplace because they were developed by a recognized and representative industry-wide body. This reduces the need for export market customers to undertake their own monitoring activities.

The Danish pork industry represents an interesting contrast. While it remains an almost wholly farmer-owned and -controlled supply chain, the slaughtering and processing sector is highly concentrated, giving farmers little alternative to membership in one of two dominant co-ops. Value is returned to farmer members partly through the end-of-year dividend based on the profits earned by the co-operative, and partly through the market access and returns for the hogs that filter down from the co-op's success in international markets.

In conclusion, despite its apparent production-cost disadvantages, the Danish industry is extremely competitive in global pork markets primarily because of its structure. Through close vertical and horizontal co-ordination, the industry is able to reduce transaction costs, increase efficiency, and enhance the quality of its products. It is able to tailor products to specific market needs and to respond to the evolving demands of a range of different markets. The industry's co-operative structure helps in achieving these goals by putting in place the vertical supply chain relationships necessary to facilitate the flow of information among various stages of breeding, production, slaughter, and processing.

In the past, the Danish industry has excelled at taking a proactive approach to resolving quality and food-safety issues, rather than waiting for the heavy hand of legislative coercion to enforce change. The Danish pork industry offers an example of how the private sector, through the operation of an industry-led co-ordinating body, can offer a flexible, efficient, and credible alternative to legislative control of food safety and quality assurance issues.

The Situation

BASED ON ANY CONVENTIONAL COST MEASURES, THE Danish pork industry should be at a considerable competitive disadvantage relative to its major international competitors, particularly Canada and the US. Land in Denmark is scarce and relatively highly priced; there are strict limits on farm size due to environmental regulations; feed prices are inflated by the effects of the European Union's (EU) Common Agricultural Policy (CAP); labour costs in the processing sector are two to three times as high as those in Canada; and Denmark is considerably further from the important Japanese market. A casual appraisal of these facts might lead one to expect the Danish pork industry to be a minor player on world pork markets. After all, how could it be competitive with the Canadian and US industries given their production cost advantages?

As anyone familiar with global pork markets will know, however, Denmark is a major player, accounting for 25–30 percent of global pork exports and representing almost 29 percent of Japanese pork imports by volume in 1999. Why is the Danish pork industry so successful when the relative costs of production appear to be stacked against them? The secret of this success lies in the organization of the Danish industry. There is close co-ordination of activities along the supply chain from breeding and genetics, to production, slaughter, processing, further processing, and exporting. This enables the industry to respond to the needs of different markets with specific products tailored to the needs of market segments. A notable difference between the Danish pork industry and its Canadian counterpart is its co-operative structure. Earlier work investigated the reasons behind the success of the Danish pork industry in the face of obvious cost disadvantages (see for example, Hobbs et al. 1998). Since that time there have been major changes to the structure of the Danish industry, and it is timely to re-evaluate the industry and its organization in light of these changes.

This study addresses a number of questions. What has been the impact of recent merger activity within the Danish industry? What role does the industry's co-operative structure play in its exporting success? How have the industry's initiatives in quality assurance, traceability, food safety, and product differentiation affected its competitiveness? Finally, are there lessons for Canadian agri-food business and co-operatives?

Agricultural Co-operatives in Denmark

THE CO-OPERATIVE MOVEMENT HAS A LONG HISTORY IN Danish agriculture. The first co-op, a dairy co-op, was established in 1882. The first co-operative slaughterhouse was established in 1887. Farmer-owned co-operatives span a wide range of Danish agricultural products and account for varying percentages of production in these

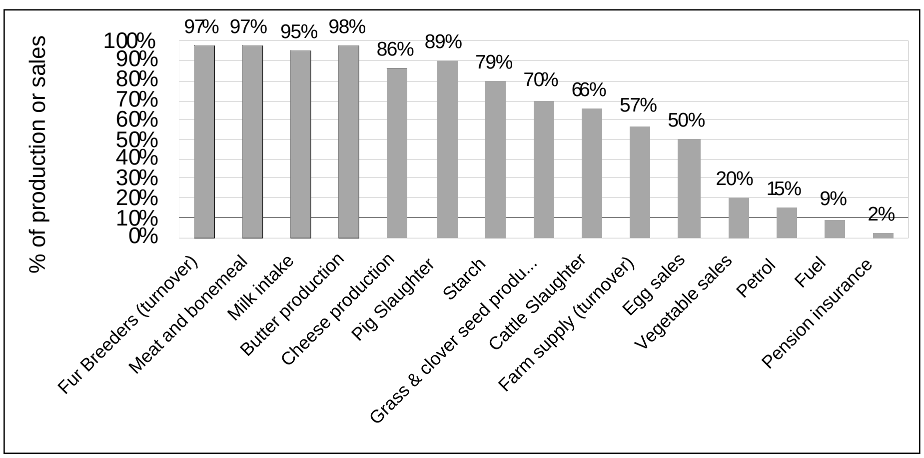

Figure 1: Market Shares of Danish Agricultural Co-operatives, 1998. Source: FDC (1999)

industries. Figure 1 shows that, in 1998, Danish agricultural co-operatives accounted for significant shares of farm output, sales, or supply in a number of sectors.

Slaughterhouses dominate the co-operative sector in Denmark in terms of turnover (Figure 2)

All agricultural co-operatives belong to the Federation of Danish Co-operatives. The federation lobbies various levels of government on behalf of the co-ops and provides information to the co-ops on a range of issues from financing, to procedural issues, to pricing policies.

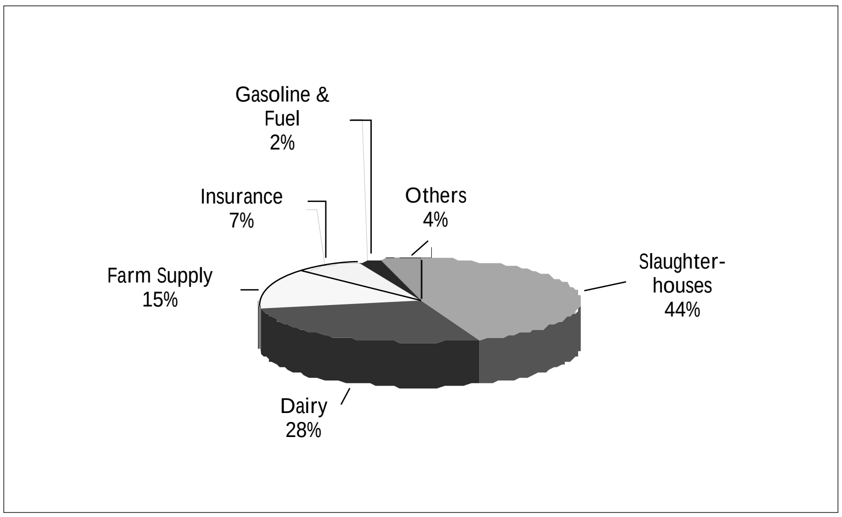

Figure 2: Percentage Share of Co-operative Turnover. Source: FDC (1999)

The Danish Pork Industry Today

Production

Over the last twenty years, the number of hog producers in Denmark has declined, while the average size of hog farms has increased. For example, the number of hog farms fell by 75 percent, from 73,586 in 1979 to 18,750 in 1999. In the co-operative sector in 1999, 77.5 percent of hogs were produced by suppliers with between one thousand and ten thousand hogs. This represented 30 percent of suppliers. At the other end of the scale, 69.5 percent of suppliers had less than one thousand hogs but only accounted for 15 percent of production. The biggest suppliers are classed as those with more than ten thousand hogs. In 1999, these producers accounted for 0.6 percent of suppliers, but 7.3 percent of co-operative hog supply (Danske Slagterier 2000).

Hog production in Denmark has been increasing steadily and reached just over 22.5 million hogs in 1999. Of this, approximately 1.57 million (7 percent) were exported live; 0.77 million (3 percent) were slaughtered by private (non–co-operative) slaughtering companies; and the remaining 20 million (90 percent) were slaughtered by the co-operative sector (Danske Slagterier 2000). Industry analysts predict that the Danish herd will continue to expand to around 25–26 million, but probably won't grow much beyond that size given current technology because of the environmental limitations on farm size (Moesgaard 2000).

Current environmental regulations limit stocking densities to 1.7 livestock units per hectare,[1] and require that farms own sufficient storage capacity and land for manure disposal. New Danish regulations come into effect in August 2002 that will limit farm size on the basis of nitrogen added to and taken out of the land rather than by the number of animals. Thus, technological developments that reduce the amount of waste produced per animal will somewhat ease this restriction on farm size.

Processing

Around 90 percent of Danish hog production is slaughtered through producer-owned co-operatives. The processing sector has witnessed considerable rationalization over the past twenty years, moving from fifty co-operative slaughter companies in 1970 to just three in 1999. In 1998, the four co-ops in existence at that time operated twenty-two plants, but that number is expected to drop with further rationalization of slaughtering and processing capacity. Of the three co-ops remaining today, Danish Crown easily dominates the industry, accounting for around 78 percent of co-operative hog slaughtering in Denmark. The two others, Steff-Houlberg and Tican, account for about 16 percent and 6 percent respectively (Danske Slagterier 2000).

The domination of the industry by a single co-op is a new development resulting from a series of mergers. Effective October 1998, Danish Crown and Vestjyske Slagterier (Foodane as it was known in English) merged. Prior to this, these were the two dominant co-ops, with a 50 percent and 30 percent share of slaughtering respectively.

Danske Slagterier

Historically, Danske Slagterier (DS) has played a pivotal role in the Danish pork industry. Danske Slagterier (or the Danish Meat and Bacon Council as it is known in English) is an umbrella organization encompassing all of the pork co-operatives. It represents the industry in consultations and negotiations with outside bodies, formulates industry-wide strategies, conducts market research, and co-ordinates this research with breeding, technological, and product quality research to provide the industry with information on the requirements of different markets. It therefore encourages close co-operation vertically among all stages of the hog production, processing, and distribution chain (Hobbs 1996).

The co-operatives are primary DS members, while the downstream further processing and distribution companies (outlined below) are secondary members. Each member has at least one representative on DS's board, with the number of representatives determined by the co-op's proportion of industry throughput. For example, Danish Crown currently has eight board members, Steff-Houlberg has two and Tican has one. In addition to lobbying on behalf of the industry at the domestic level, DS lobbies EU policy makers, maintaining its own office at the EU centre of power in Brussels.

Danske Slagterier is funded by a producer levy per hog that varies with the size of the animal. In 1998/99, its budget was Dkr 307 million (equivalent to about Cdn $60 million). Figure 3 illustrates how this budget was allocated among its various activities. These numbers probably understate the extent to which DS is involved in research and development as R&D activities also occur under a number of the other categories (Moesgaard 2000).

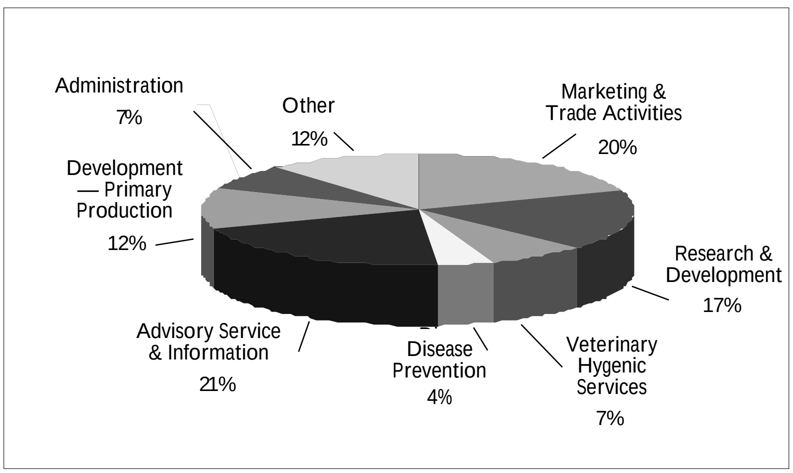

Figure 3: Danske Slagterier Expenditures, 1998–99. Source: Moesgaard (2000)

The emergence of Danish Crown as the dominant co-op has interesting implications for its relationship with Danske Slagterier and raises questions about the future role of DS in co-ordinating industry research and development and promotional activities. These issues are discussed in more detail later.

Exports

Around 80 percent of Danish pork production is exported. In 1999, this amounted to just under 1.5 million tonnes of pigmeat. About 60 percent of Danish hog and pork exports go to other EU countries. Figure 4 shows that Germany is the most important export market for Denmark in terms of volume, followed by the UK, Japan, Russia, and Italy.

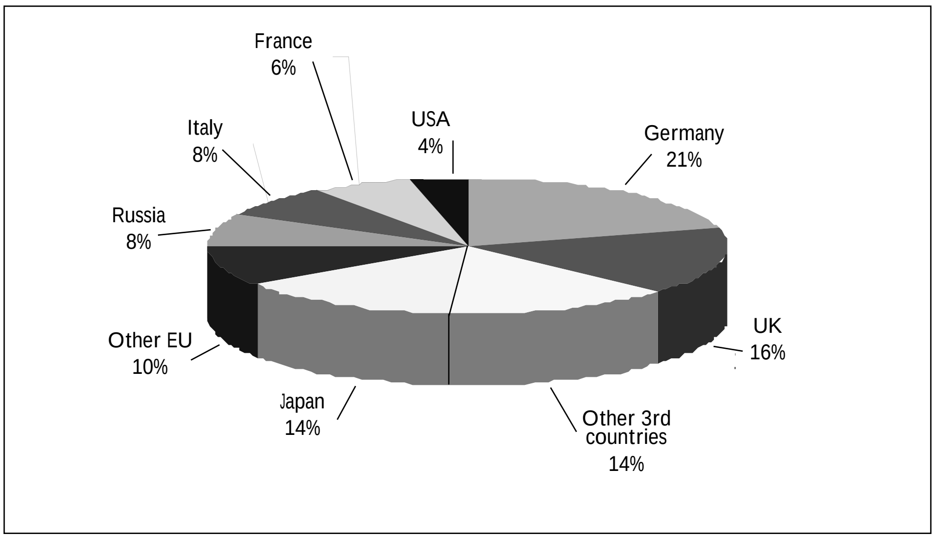

Figure 4: Danish Pork Export Markets by Volume, 1999. Source: Danske Slagterier (2000)

If we take a look at the share of Danish pork exports by *value*, however, the numbers tell a different story. In 1999, Danish hog and pork exports were worth approximately Dkr 20.5 billion.[2] Figure 5 shows the share of Danish exports by value across the same markets. Japan is the most important, followed by the UK and Germany. Whereas Japan represented around 14 percent of Danish exports in tonnes, the Japanese share is more than 23 percent by value, making it a high-value market. The opposite is true of Russia. Exports to Russia accounted for just under 8 percent of Danish pork exports on a tonnage basis, but only 3 percent by value, making it a low-value market.

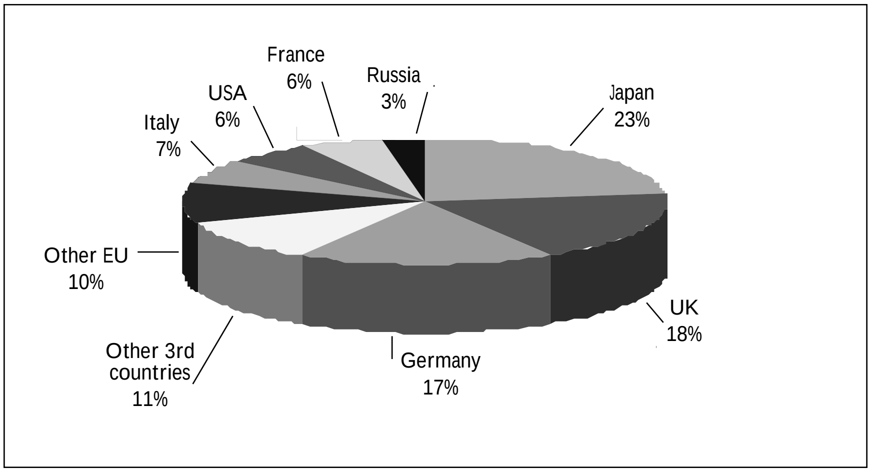

Figure 5: Danish Pork Exports by Value, 1999. Source: Danske Slagterier (2000)

Another way to make this comparison is to calculate unit values for exports to each country. A unit value is a method of approximating the price of the export and is calculated by dividing the value of exports by the volume for each market. Figure 6 presents unit values for the key Danish export markets. Higher unit values indicate high-value markets, whereas lower unit values indicate the markets that take relatively lower-valued cuts. Clearly, Denmark exports high-value products to the Japanese and US markets, with unit values of Dkr 23,300/tonne and Dkr 20,630/tonne respectively.[3]

Despite its relative cost disadvantages, Denmark accounts for around 29 percent of Japanese pork imports by volume. Its share of the lucrative Japanese market has fallen slightly since the early 1990s as exports to Japan from the US, Canada, and other countries have increased (see Figure 7, overleaf). A major windfall for many of these exporters was the outbreak of foot-and-mouth disease in the Taiwanese hog industry during 1997, which effectively wiped out Taiwan's exports to Japan. Prior to that, Taiwan had dominated the Japanese market, accounting for more than 40 percent of its pork imports. As can be seen in Figure 7, the US industry and others (including Korea) benefited most from the removal of Taiwan from the scene, with smaller gains for Canada and Denmark.

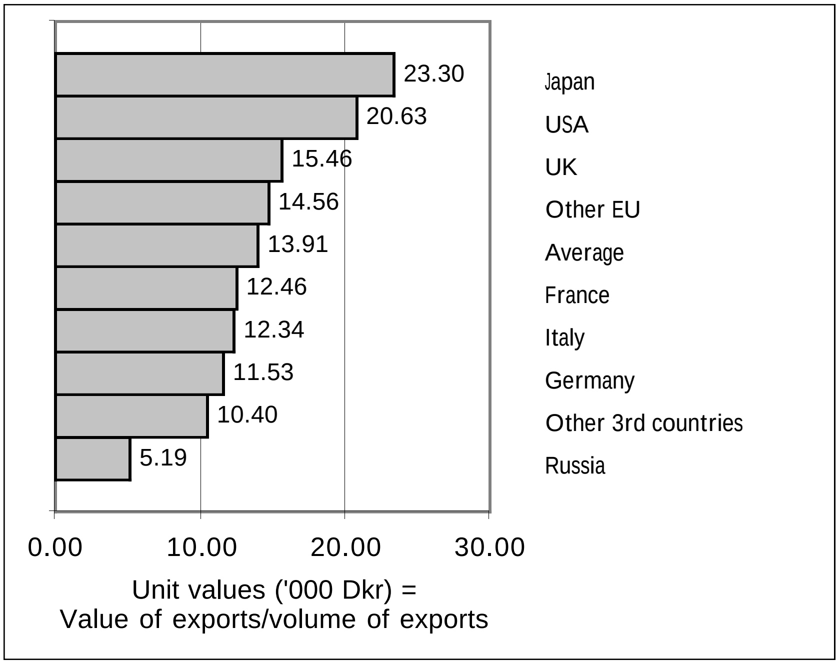

Figure 6: Danish Pork Exports by Market: Unit Values, 1999. Source: Danske Slagterier (2000)

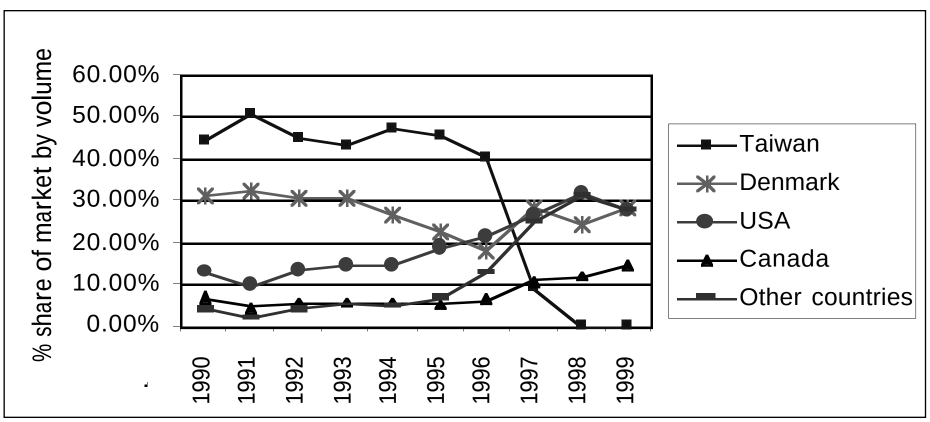

Figure 7: Shares of Japanese Pork Import Market, 1990–99

It should be remembered when reading Figure 7 that these are shares of the Japanese market by *volume* and not by *value*. Denmark exports only high-value cuts to the Japanese market, whereas several of the other countries export lower-valued products. We can expect the Danish share of that market by value, therefore, to be somewhat higher. It may also explain why Denmark gained a smaller share of the Japanese market that became available when Taiwan was forced to withdraw. Taiwan was a lower-quality supplier, a segment of the market where Denmark has chosen not to compete. In early April 2000, both Korea and Japan suffered an outbreak of foot-and-mouth disease and have banned pork imports from one another. Korea had supplied 10–15 percent of Japanese pork imports. This is expected to create further opportunities for Canadian and US exporters.

The Danish Crown–Vestjyske Slagterier Merger

EFFECTIVE OCTOBER 1998, DENMARK'S TWO LARGEST HOG-slaughtering co-ops, Danish Crown and Vestjyske Slagterier, merged. The merger is important not simply because it created the largest hog-slaughtering company in Europe (and third largest in the world), but also because of the impact it has had on the organization of downstream exporting activities within the Danish industry. Prior to the merger, the four hog-slaughtering co-operatives jointly owned several further processing companies and export/trading companies. Following the merger, the three remaining co-operatives continue to jointly own a meat rendering company, DAKA (in which the poultry industry also has ownership shares) and DAT-Schaub (an export trading company originally trading intestine/casing products but now also meat products). They also jointly own Scan-Hide—a hide rendering plant—and SFK, an additives and equipment supplier. An important change, however, has been that ESS-Food, an export trading company with a network of local sales companies globally, is now wholly owned by the new and larger Danish Crown. Previously it had been jointly owned by all of the co-ops. This is significant because, prior to the merger, it was unclear the extent to which the co-operatives competed in export markets served by ESS-Food, or whether they operated joint international marketing strategies through this company.

The merger between Danish Crown and Vestjyske Slagterier was the subject of an EU Commission competition investigation because it created dominant positions in the Danish market for the purchase of live slaughter hogs and in the domestic retail market for pork. The commission's investigation found that the merger would result in the creation of a duopoly (between Danish Crown and Steff-Houlberg), giving these two co-operatives a dominant position in the domestic market for the purchase of live hogs, the sale of fresh pork through supermarkets, and in the market for abattoir by-products (EU Commission 1999). Despite this, in March 1999, the EU Commission ruled in favour of the merger (making it retroactive to October 1998), subject to a number of conditions that were intended to "solve the competition problems identified" (EU Commission 1999, p. 1).

The conditions include a requirement that the merged co-operative partially relinquish its exclusive supply requirement for members by allowing farmers to supply up to 15 percent of their weekly production to other slaughterhouses. The period of notice for leaving the co-operative was shortened from two years to one year. Given the regional domination of the two large co-operatives in Denmark—Danish Crown on Jylland (Jutland) and Steff-Houlberg on Sjælland (Zeeland)—however, it is questionable as to whether this creates a realistic alternative for farmers. In theory, there remains the option of shipping to other slaughterhouses outside Denmark, transportation costs notwithstanding.

The EU report also required that the industry abandon its weekly price quotation for slaughter hogs. Previously, base hog prices had been determined by a weekly price committee within DS, consisting of representatives from all of the slaughter co-operatives. Although the final return to the farmer was determined by a carcass grading system, the base price before premiums or deductions for quality was set by the pricing committee. The EU Commission determined that this was not sufficiently competitive, and that it was too easy for the co-operatives to "detect competitive actions by competitors" (EU Commission 1999, p. 2). As a result, the three remaining co-operatives are now required to price independently. In practice, industry observers comment that Danish Crown acts as the "price leader," setting the base hog price each week, which Steff-Houlberg and Tican then follow (Moesgaard 2000).

The co-operatives were required to dissolve their co-ownership in the export company ESS-Food, thus giving Danish Crown sole ownership. Danish Crown is also required to buy-out at "full value" the ownership shares of Tican and Steff-Houlberg in the co-owned meat-trading and sausage-casing company DAT-Schaub, should the other two co-operatives decide to exit the company. The new, larger Danish Crown undertook to sell off some slaughter capacity, namely a slaughterhouse, to a third party other than Steff-Houlberg. Finally, Danish Crown was required to sell "a sufficient ownership stake" in the abattoir by-products company DAKA in order to ensure that it did not take control of the company (EU Commission 1999). The commission decided that dissolving the joint ownership of ESS-Food and giving Steff-Houlberg and Tican the right to exit DAT-Schaub removed important structural links between the three remaining co-operatives. One of the commission's fears may have been that Danish Crown's dominant ownership stake in ESS-Food, in particular, could be used to pressure the other two co-operatives and might enable Danish Crown to abuse its dominant position in the market to the detriment of competition.

ESS-Food is an export trading company, however, so it is not clear how dissolving the joint ownership of this company improves the level of competition among the co-operatives in their *domestic* pork market. It should be noted that the sole focus of the EU Commission investigation was the creation of a duopoly in the Danish domestic markets for hogs and retail pork. It did not concern itself with the impact on export markets within the European Union or elsewhere. As a result of the ESS-Food decision, Steff-Houlberg and Tican have had to establish their own sales networks and, in some cases, brand identities, in export markets in which they had previously channelled products through ESS-Food. This almost certainly gives Danish Crown the competitive edge in those export markets because it can continue to use the existing exporting infrastructure of ESS-Food and, importantly, the ESS-Food name and reputation.

Co-operative Profiles

Tican

TICAN WAS FORMED IN 1978 AND OPERATES ONE SLAUGHterhouse in Thisted in the northwest corner of Jutland. In 1999, it slaughtered 1.15 million hogs, or 5.7 percent of Danish co-operative slaughter. Some industry observers have speculated that Danish Crown may eventually buy out Tican. Following the recent merger, which resulted in Danish Crown obtaining a 100 percent share of ESS-Food, Tican and Steff-Houlberg have jointly invested in a UK bacon company. Tican has also begun establishing its own sales offices in export markets. It now has a Spanish sales company, for example (Tinggaard 2000). Along with the other slaughtering co-operatives, Tican has ownership shares in DAT-Schaub (casings and trading), DAKA (meat rendering), Scan-Hide (hides), and SFK (additives and equipment).

Steff-Houlberg

Steff-Houlberg was formed in 1968 and has two slaughter facilities —at Ringsted on Zealand and at Rønne on one of the smaller islands. The slaughter plant at Ringsted is the largest in Europe. In addition, the company has three meat-processing plants and a waste-meat plant. In 1999, Steff-Houlberg slaughtered 3.2 million hogs, or 16 percent of Danish production. The company had an annual turnover of approximately Dkr 4 billion[4] in 1998–99 and about three thousand employees. It co-owns meat rendering, hides, casings, and equipment companies in the Danish pork industry, and operates sales and distribution subsidiaries in some key markets, including France and Russia. Its primary export markets are the UK, Japan, Germany, France, the US, and Russia. Steff-Houlberg was one of the first slaughterhouse groups in the world to achieve ISO–9000 status (Steff-Houlberg 2000).

Danish Crown

It is important to appreciate the size of Danish Crown and its relative significance in Denmark and Europe following the recent merger. In addition to being the largest pig-slaughtering company in Europe, Danish Crown is also the second largest company in Denmark (the largest being a dairy co-operative). It produces 7.5 percent of the pork in the EU and 1.6 percent of world pork production. The co-operative accounts for just over 50 percent of Denmark's total agricultural exports and almost 7 percent of all Danish exports. Perhaps the most significant statistic of all, Danish Crown has become the world's largest pork exporter, responsible for around 20 percent of world trade in pork (Tinggaard 2000).

In the 1998–99 financial year, the Danish Crown Group had a turnover of approximately Dkr 36.5 billion.[5] The parent company (consisting of the pork and beef divisions) represents about 50 percent of total turnover, with the remainder accounted for by subsidiaries. Table 1 lists Danish Crown's main subsidiaries, their key products, the markets they serve, and the co-operative's ownership share.

Danish Crown has a number of other smaller, wholly or partly-owned subsidiary companies including Defco Foods, which operates a small processing plant in Aarhus and in which Danish Crown has a 33.3 percent share along with private investors; Q.A. Meat Co., a UK trading company in which Danish Crown has a 25 percent share; Sunhill Food of Vermont Inc. (100 percent); Foodane (sales company, Japan and Switzerland—100 percent); Carnes Danesas (sales company, Spain—100 percent); Unibeef (sales company, Italy—100 percent); Danish Bacon International (sales company, UK—100 percent); plus additional nonconsolidated subsidiaries and associated companies (Danish Crown 1999b).

Clearly the co-operative has an extensive array of downstream further processing and trading subsidiaries. Of these, ESS-Food had the largest

Table 1: The Danish Crown Group—Key Subsidiaries

Subsidiary	Role	Products	Ownership Share
Tulip International	Production and export of processed food products for domestic market and more than 130 export markets	Bacon, ham products, sliced sandwich meats, sausages, canned meats (brands: Tulip, Danepak, Den Grønne Slagter)	100 percent
Danish Prime	Production and sale of processed foods and ready-made dishes; mostly in Denmark, Germany, UK, and Sweden	Ready-meals, pizza toppings, soups, meatballs, dumplings, etc.	100 percent
VJS Foods	Production and sale of processed products and ready-made dishes in the UK (previously owned by Vestjyske Slagterier)	Sliced meats, canned meats, cooked products (brands: Plumrose, Celebrity)	100 percent
Plumrose	Produces and processes ham and bacon for US market	Bacon, ham, special products for large retail and food-service companies (brands: Plumrose, DAK, Danola)	100 percent
ESS-Food	Export and trade; operates globally; (owns a UK subsidiary: Danish Bacon Company)	Fresh pork, beef, poultry, fish, and processed foods	100 percent
DAT-Schaub	Production and trading	Production of casings and meat products; export of meat and other foods (fish, poultry, dairy, spices)	80 percent
SFK	Trading and production group supplying products to the food industry globally	Additives; slaughter processing machines	67.3 percent
Scan-Hide	Processing of hides and sale to international tanning companies	Hides	81 percent

Sources: Danish Crown 1999a; 1999b.

turnover in 1998–99 at Dkr 7.2 billion (approximately Cdn $1.44 billion), followed by DAT-Schaub at Dkr 5.15 billion (or just over Cdn $1 billion). The fact that, until very recently, these subsidiaries were jointly owned by all the Danish pork co-operatives suggests that prior to the structural changes required by the EU Commission competition investigation, there was horizontal co-operation among the co-ops for a substantial portion of the downstream processing and exporting activities of the Danish industry.

Each part of the Danish Crown Group has its own board of directors and develops its own strategies. The subsidiaries are not necessarily required to trade with one another or with the parent company. For example, Danish Crown does not require Tulip or Danish Prime to source their raw material from Danish Crown. A degree of separation is required between these various subsidiaries and the parent company for confidentiality reasons. The pork division of Danish Crown supplies industrial customers in export markets who are competitors with Danish Prime and Tulip International. Furthermore, Danish Prime and Tulip International may be competitors themselves in some markets. Hence, the parent company pork division must be careful not to be in a position to divulge the new product development ideas of one subsidiary or customer to another. This could create credibility problems and reduce the trust between Danish Crown and its customers. The Danish Crown Group as a whole has common departments in a number of areas, including technical support, purchasing, information technology, and finance (Tinggaard 2000).

By value, Japan is the most important export market for the pork division of Danish Crown, accounting for almost 25 percent of exports, followed by the UK, Germany, France, and Korea (Danish Crown 1999b). Approximately 70 percent of raw pork from the pork division is sold for further processing, with 15–20 percent going to the retail sector and 5–10 percent going to the catering/institutional sector (Tinggaard 2000). There is some branding of product for the domestic market, but no branding of (raw) pork in export markets, although, of course, some of the subsidiaries sell their further processed products under brand names. The lack of brand identity with Danish Crown in fresh pork markets may be a weakness in safeguarding these markets against competitive threats because there is not a strong consumer association with, or loyalty to, a recognizable Danish Crown brand.

Danish Crown conducts its own market research, primarily through its sales offices. The key subsidiaries (e.g., Tulip International, Danish Prime, etc.) undertake separate market research activities since their customer base is different (and in some cases, Tulip's competitors are also Danish Crown's customers). In the past, the majority of the industry's general marketing activities and broad (not product-specific) international market research activities have been carried out by Danske Slagterier. The emergence of Danish Crown as by far the dominant co-operative almost certainly changes the relationship between Danish Crown and DS. It may be that Danish Crown in the future will be reluctant to continue committing resources to the market research activities undertaken by DS if they perceive that a portion of the benefits from this research flow to their competitors, Steff-Houlberg and Tican. Whether there will be a reorientation of marketing efforts within the Danish pork industry, with a reduced role for the umbrella organization, Danske Slagterier, and an increase in private marketing expenditures by the individual co-operatives, remains to be seen. Certainly, one of the strengths of the Danish industry in the past has been its sound understanding of the requirements of different markets and close vertical co-ordination along the supply chain to respond to those market needs. Danske Slagterier has played a pivotal role in co-ordinating market research, breeding and genetics research, etc., thereby reducing transaction costs for the industry players. A reduced role for DS may mean that these activities become internalized within the vertically integrated structure of Danish Crown. Clearly, the relationship between the umbrella organization for all pork processing co-operatives and its member co-operatives is bound to change when a single co-operative represents 80 percent of the industry's production. Whether this change will enhance or harm the competitive position of the Danish industry in world markets is not yet clear.

Horizontal and Vertical Co-ordination Initiatives

The key to the Danish industry's success in export markets has been the close degree of horizontal and vertical co-ordination, which has allowed the industry to produce products of a consistent quality, tailored to different markets. Danske Slagterier has played a pivotal role in co-ordinating a number of horizontal and vertical initiatives to enhance the quality of Danish pork and the competitiveness of the industry. These initiatives include R&D in genetics and meat quality, traceability systems, on-farm quality assurance, "Special Pigs" for the UK market, an initiative to eradicate salmonella from the Danish pig herd, and initiatives that respond to consumer concerns over the use of artificial growth promoters in livestock production.

Breeding Research

There are forty breeding herds in Denmark, a few of which are owned by DS. These provide hogs to multiplier herds (all privately owned), who in turn provide hogs to production herds (consisting of sows and slaughter hogs) and to "pig rings" (in which sows and slaughter pigs are owned separately). Approximately 50 percent of production is produced in the traditional (sow/slaughter pig) herd, while the remaining 50 percent is produced in pig rings. Hogs are traded between sow and slaughter herds within the pig rings, but there is no open trade in hogs for production. Danske Slagterier owns the industry's central testing and artificial insemination stations. Breeding research has emphasized meat percentage and meat quality in response to consumer demands; it has also emphasized herd health and strength in response to concerns over farm animal welfare. The industry has developed a common breeding index with a base of one hundred. Breeding stock or semen are awarded an index number relative to one hundred so that the farmer has a comparison parameter against which to evaluate these items.

Quality Assurance

Under the auspices of DS, but in response to the demands of international markets and domestic legislative requirements, the Danish industry has adopted an on-farm quality assurance scheme. The scheme covers a range of elements including traceability, transportation, housing, feed, use of veterinary products, environmental standards, animal welfare, and food safety.

Although it was not a legislative requirement, the Danish co-operatives, through DS, decided to ban the use of artificial growth promoters in all

Danish hog production. This followed vocal public debate over the issue. The ban came into effect in March 1998 for slaughter hogs weighing more than thirty-five kilograms, and was followed in January 2000 by a voluntary ban on the use of these products in piglets. Farmers are required to sign a statement promising not to use artificial growth promoters, and there is also an agreement with feed manufacturers not to use antibiotic-resistant growth promoters in feed.

Traceability

Danske Slagterier has co-ordinated the introduction of a traceability system for Danish hogs through the Central Animal Husbandry Register (CHR), which covers all farms in Denmark. Every animal carries an ear-tag with the CHR number that identifies the farm of origin. These numbers are recorded in all contract sales with other farmers. There are no open markets for the trade of hogs between farm units; instead, hogs are traded within pig rings on the basis of contracts for regular deliveries. Farmers are required to register all movements of hogs, even those within multisite production facilities. When hogs are transported to the slaughterhouse, the CHR number is tattooed on both hindquarters of the carcass. The objective of this system is to be able to trace and isolate all potentially affected hogs in the event of a disease outbreak. As with most other livestock traceability systems, it is reactive in nature and is not intended to convey information proactively to downstream firms or end consumers on the safety, production practices, or quality of the final product.

At slaughter, the carcass grade and any veterinary marks are electronically connected with the producer CHR ID number, and the information is sent to the farmer. It is therefore possible to trace each carcass from the chilling room back to the farm. Once the carcass is cut up, however, final cuts cannot be traced back to the farm of origin. The boxed meat products are identified with a lot identification number and production date; thus, currently, it is possible to trace cuts of meat to an approximate slaughter time—but only approximate.

Interestingly, Danish Crown recently tested beef cuts in the domestic market with a far more sophisticated traceability mechanism. The products were labelled with an electronic barcode that the consumer in the retail store could swipe under a barcode reader to find information pertaining to the farm of origin, the production methods used on that farm, etc. Industry sources claim that this is currently technically feasible on a test-market scale with beef rather than pork because of the relatively larger carcass size for cattle (Tinggaard 2000).

This is an important development because it takes us to the next level of traceability—that is, forward traceability, or the provision of information on the so-called “credence” attributes of products. These are attributes that the consumer cannot detect even after having consumed the product —for example, the animal welfare practices used on the farm, whether the farming methods are environmentally friendly, or whether the product contains undetectable additives such as artificial growth promoters. For some consumers, these credence attributes (many of which refer to the *process* by which an item was produced) are important in their purchase decisions. Being able to signal the presence (or absence) of these attributes to consumers offers additional ways for the agri-food industry to differentiate its products and capture more of the consumers’ “willingness-to-pay” for these new attributes. Traceability is perhaps the wrong word to use in this context because it implies a retroactive process of tracing products to their origin. Instead, this is a *proactive* process of providing information, which lowers search costs for consumers and downstream food-distribution firms. The information provision is a value-adding process in itself because it lowers transaction costs.

Herd Health

Herds are subject to veterinary inspection at least once a year, and most farmers have a health advisory contract with a veterinarian that usually includes monthly consultations. A veterinarian contract, though voluntary, enables farmers to meet some of the demands for certain markets such as that in the UK, which requires that the farmer identify the hogs he/she has been treating pharmaceutically and monitor withdrawal periods. Under a regulation introduced in 1995, Danish veterinarians are not permitted to sell medicines; they can distribute antibiotics for five days, after which time farmers must obtain medications from a registered pharmacy, provided that they have a prescription from a veterinarian. The intent of this regulation was to reduce unnecessary prescriptions because veterinarians were no longer able to sell medicines for profit (Hvidkjaer 2000).

Danske Slagterier has identified Salmonella DT104 as a priority for eradication in Danish pork production. Although this is not a legislative requirement, the industry has decided that its eradication is necessary to protect market share and to maintain and enhance the image of Danish pork in both the domestic and export markets.

Market-Specific Contracts

Danske Slagterier has developed a set of production standards for so-called "Special Pigs" reared for the UK market. Farmers rearing these hogs produce them under contract following specific production practices that conform to the animal welfare and food safety requirements of the UK market. For example, sows must be loose housed and not tethered; feed containing meat and bonemeal may not be used; farmers must keep mandatory records of feed composition; withdrawal periods for medications are regulated. The farms producing UK Special Pigs are audited to verify that the correct practices are being followed. There is an additional external "audit of the auditors" to ensure that the system is being implemented uniformly in all areas. A farmer wishing to produce hogs under this system must apply for a UK contract through his/her co-operative slaughter company. The co-operatives have been offering farmers a premium for entering into a UK market contract. For example, Danish Crown was offering a Dkr 0.40 per kilogram premium (approximately Cdn $0.08) throughout 1999 and 2000, and has guaranteed a minimum Dkr 0.30 per kilogram premium over the following two years. Approximately 65 percent of the Special Pigs contracted to Danish Crown for the UK market were approved for sale to that market, i.e., they met the basic weight limit and meat percentage requirements (Danish Crown 1999b, p. 9).

Some heavier hogs are also produced under contract. For example, hogs for some German retail markets require slaughter weights of between

83–105 kilograms as opposed to the 67–79.9 kilograms that is the standard weight rewarded by the Danish carcass-grading system. The Italian market also requires heavier hogs. Danish Crown slaughters hogs for the German market at a dedicated plant, where the slaughtering process has been adapted to the German method. Free-range and organic hogs are also produced following specific production practices. Danish Crown sells the products from these hogs primarily on the Danish market through Friland Food, a company that it recently acquired.

Why are contracts used for the production of UK Special Pigs and heavy pigs for the German and Italian markets, when the co-operatives are required to purchase all hogs produced by their members anyway? There are a few reasons for this. First, it enables a co-operative to assure its UK customers that the hogs are being reared according to UK specifications, which Danske Slagterier developed in its own production system in response to the needs of that market. The double auditing system, administered by DS, verifies that these practices are being followed. This reduces monitoring and enforcement costs for the co-operative slaughterhouses.

Second, the UK and Germany are two of Denmark's most important export markets. Only hogs reared under specific conditions in the UK case, or only heavier hogs, for some German retail markets, are suited to these markets. Thus, the co-operatives need to be assured of a supply of the right quality of hogs at the right times to meet their commitments in these important export markets. Contracting with specific producers for the production of these hogs reduces the search costs for the co-operatives in fulfilling their export contracts.

Third, in undertaking to produce hogs to these specifications, farmers incur higher production costs and may also incur higher production risks. Without a contract with guaranteed premiums, they are subject to the classic "hold-up" problem, having invested in assets specific to one market with a reduced value in other markets. A guaranteed market premium is necessary to entice farmers into making the investment required to produce for these specialized markets.

Quality Schemes and Labels

There are nine different quality schemes and labels in the Danish pork industry. Some are industry-wide labels developed by Danske Slagterier or the Ministry of Agriculture; others are specific to retail supermarkets or butchers. These quality labels are used in the Danish domestic market for fresh pork but not in export markets. The nine schemes are similar, having many features in common, although each is differentiated by slight variations. Ironically, only one scheme selects for meat quality. Several industry observers believe that the plethora of labels is confusing to Danish consumers and is a weakness of the Danish quality-labelling system. Table 2 outlines the different quality labels, with column two listing the specifications for the "normal Danish pig" as a basis of comparison with the nine quality labels. The third column defines the standards required to receive the national quality label, which is the official label sanctioned by the Danish Ministry of Agriculture. The symbol on this label depicts a blue magnifying glass with a crown at its centre. This symbol has been incorporated into several of the other quality labels to indicate that they meet (and exceed) the national quality standards.

Through their industry marketing activities, Danske Slagterier has been very successful at promoting a generic Danish image in some markets, in particular, the UK. Traditionally, this has not been the case in Japan, where Danish exports are mostly to industrial users, who further process the product and do not identify it as Danish. Recently, an initiative was begun with some Japanese further processors to include a "Danish" logo on consumer packages. The co-operatives and DS have engaged in joint marketing activities in Japan to promote Danish pork, apparently with some success (Lassen 2000; Tinggaard 2000). The use of "Danish" labels and promotion has also been tried in the German market, where it was not successful, however, perhaps because of a perception among German consumers that domestic German product is superior. As a result, most Danish (raw) pork is not labelled as such in the German market.

Table 2: Danish Pork Quality Labels

	Normal Danish Pig	National Quality Label (MAFF)	Organic Pigs (authorized by state)	ANTONIUS	Eng Gris
Breed [a]	D(LY), H(LY) HD(LY), or Y(LY)	Min. 25% D		D(LY) or HD(LY)	
Sows (stabling, etc.)	Danish legislation	Min. 2 m^2	Sows on grass min. 150 days in summer. Snout ring.	Min. 2 m^2	Loose housing
Teeth clipping, castration, taildocking	Teeth grinding & clipping allowed. Castration before 4 weeks age.	Teeth grinding allowed. Castration before 2 weeks.		Teeth clipping not allowed. Teeth grinding allowed if not routine. Castration as soon as possible.	No intervention. Only female pigs.
Weaning	After 3 weeks	After 4 weeks	After 7 weeks	After 4 weeks	After 3 weeks
Feed	Danish legislation	Danish legislation	Min. 75% organic	Standards for feed composition	Feed from own prod^n and mixing
Antibiotic growth promoters	Voluntary ban from 1 Jan 2000	Not allowed	Not allowed	Not allowed	Not allowed
Medicines	Only therapeutic	Only therapeutic	Only therapeutic	Only therapeutic	Only therapeutic
Withdrawal periods after medication	Danish legislation	Danish legislation	3 x Danish legislation	3 x Danish legislation	Pigs taken out of the scheme
Space	Danish legislation: 50-85 kgs: .55m^2; 85-110 kgs: .65m^2	30% more space than Danish legislation		50-85 kgs: .66m^2; 85-110 kgs: .78m^2	Free range
Flooring	Slatted floors allowed. Danish legislation.	Slatted floors allowed in resting area.	Slatted floors not allowed in resting area.	Max. 50% slatted floors. Slatted floors not allowed in resting area.	Slatted floors not allowed.
Bedding		Bedding in resting area.	Bedding in resting area.	Bedding in resting area.	Bedding in resting area.
Outdoor area	No	No	Slaughter pigs have access to outdoor area.	No	Yes
Slaughter weight [b]	75.5 kg (67-79 kg)	Min. 80-85 kg	80 kg (72-89 kg)	87 kg (82-93.9 kg)	90 kg (80-92 kg)
Maturing of meat	No	Yes: 24 hrs. unpacked	No	No	No
Retailers				300 supermarkets and butchers	De grønne slagtemestre (the green butcher)
Part of national quality label				Yes	Yes

a: Y = Danish Yorkshire; L = Danish Landrace; D = Duroc; H = Hampshire; b: Carcass weight

Freerange Pig	Gourmet Pig	Porker Mester Kvalitet	Vitalius	Vores Egen Gris
Min. 25% D	Min. 25% D	Min. 25% D	Min. 25% D	Min. 25% D
Loose housing Outdoor farrowing huts. Snout ring.	Min. 2 m^2	Min. 2 m^2	Min. 2 m^2	Min. 2 m^2
Teeth grinding allowed. Castration before 2 weeks age.	Teeth grinding allowed. Castration before 2 weeks age.	Teeth grinding allowed. Castration before 2 weeks age.	Teeth grinding allowed. Castration before 2 weeks age.	Teeth grinding allowed. Castration before 2 weeks age.
After 4 weeks	After 4 weeks	After 4 weeks	After 4 weeks	After 4 weeks
Danish legislation	Danish legislation	Danish legislation	Danish legislation	Danish legislation
Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Only therapeutic	Only therapeutic	Only therapeutic	Only therapeutic	Only therapeutic
3 x Danish legislation	Danish legislation	Danish legislation	Danish legislation	Danish legislation
30% more space than Danish legislation	30% more space than Danish legislation	30% more space than Danish legislation	30% more space than Danish legislation	30% more space than Danish legislation
Slatted floors not allowed in resting area.	Slatted floors not allowed in resting area.	Slatted floors not allowed in resting area.	Slatted floors not allowed in resting area.	Slatted floors not allowed in resting area.
Bedding in resting area.	Bedding in resting area.	Bedding in resting area.	Bedding in resting area.	Bedding in resting area.
Slaughter pigs have access to outdoor area.	No	No	No	No
81.5 kg (75-89 kg)	Min. 80-85 kg	Min. 80-85 kg	Min. 80-85 kg	Av. 80 kg (75-90 kg)
Yes: 24 hrs unpacked	Yes: 24 hrs unpacked	Yes: 48 hrs unpacked	Yes: 48 hrs unpacked	Yes: 48 hrs unpacked
	FDB	Dansk Supermarked	100 supermarkets and butchers	Members of the butchers' union
Yes	Yes	Yes	Yes	Yes

Returning Value to Farmers

THE DANISH PORK INDUSTRY REPRESENTS A CURIOUS MIXture. On one level, it remains an almost wholly farmer-owned and -controlled supply chain. On another level, the slaughtering and processing sector is highly concentrated, giving farmers little alternative to membership in one of two dominant co-ops.[6] Value is returned to farmer members partly through the end-of-year dividend based on the profits earned by the co-operative, and partly through the market access and returns for the hogs, which filter down from the co-op's success in international markets.

Danish industry experts were divided as to the importance of the end-of-year dividend. Some argued that the size of this dividend was important in determining a farmer's choice of co-op membership (Moesgaard 2000). Others suggested that the goal of the co-op was to ensure that the payment back to the farmer at the end of the year was as small as possible, since it represented the difference between the price paid to the farmer and the price received in the marketplace for the final product. Therefore, a large end-of-year dividend would reflect a co-op having under-paid its farmer members for their hogs (Tinggaard 2000). This last viewpoint might be true if the co-op were simply handling farmers' products and not adding any processing and marketing services. Instead, one can interpret the dividend as the value that the co-op adds to the live hogs it receives from its farmer members. Through further processing and product development, the co-ops are able to create a larger "marketing margin" between the price the farmer receives for his/her hogs and the price of the final product. This marketing margin represents a return to the further processing and marketing activities performed by the co-op's subsidiaries. A larger end-of-year dividend may simply reflect the larger marketing margin that the co-op was able to capture for its farmer members through value-adding activities.

Despite the EU competition ruling reducing the period of notice a farmer must give before switching co-ops and enabling farmers to sell up to 15 percent of their hogs outside of the co-op, the recent industry consolidation has reduced farmers' flexibility in their choice of market outlet. Although each co-op has a board of directors dominated by elected farmer members, the one member/one vote principle has meant that some larger farmers feel underrepresented in the co-operative system. Regardless of the organizational form, lack of competitive pressure can breed inefficiencies. Is there a strong enough efficiency incentive for the management teams of the two remaining dominant co-ops? Will they face the problem, as can be the case in large business organizations, of a divergence between the objectives of the owners (i.e., the farmer members) and those in day-to-day control (i.e., the management team), particularly in light of reduced competitive pressure from other Danish co-ops? For farmers disgruntled with the activities of their co-op, or feeling underrepresented, few if any alternative marketing channels are currently available. As long as Danish Crown and Steff-Houlberg continue to be successful in international markets and are able to provide their farmer members with an acceptable return, there may not be a problem. The industry, however, is now significantly less competitive at the producer-processing interface. This is highlighted by the EU ruling requiring that processors abandon their weekly price committee, which set the price paid to farmers for a base-grade hog. Instead, Danish Crown has emerged as the effective price leader. Thus we have the unusual situation where, despite the fact that the processing and downstream supply-chain activities are performed by farmer-owned organizations, there remain concerns over the effects of concentration in the industry.

Lessons

WHAT LESSONS CAN BE LEARNED FROM THIS OVERVIEW of the Danish pork industry? Primarily because of its structure, the industry is extremely competitive in global pork markets despite its apparent production-cost disadvantages. Through close vertical and horizontal co-ordination, the industry is able to reduce transaction costs, increase efficiency, and enhance the quality of its products. It is able to tailor products to specific market needs and to respond to the evolving demands of a range of different markets. The industry's co-operative structure helps to achieve these goals by putting in place the vertical supply-chain relationships necessary to facilitate the flow of information among various stages of breeding, production, slaughter, and processing. It may be that similar results could be achieved without the co-operative structure underpinning the industry—through a close "value chain" relationship among producers, processors, and distributors, for example, or through a series of strategic alliances. What sets the Danish example apart, however, is that it is an industry-wide achievement, attainable because of the dominance of the co-operative movement within the pork industry.

As an umbrella organization representing all of the slaughtering co-operatives, Danske Slagterier has played a pivotal role in co-ordinating industry activities, both horizontally among the co-operatives, and vertically throughout the hog-pork supply chain. Recent initiatives, including on-farm quality assurance, traceability, food safety, and the development of the UK Special Pig production standards, are examples of how DS has been able to co-ordinate an industry-wide response to domestic and export market requirements in terms of quality and safety. These initiatives have credibility in the marketplace because they were developed by a recognized and representative industry-wide body, thereby reducing the need for export-market customers to undertake their own monitoring activities.

Of course, similar initiatives are also being undertaken in many other countries. The Canadian pork industry, for example, has been developing an on-farm quality assurance scheme for a number of years. Several industries are introducing livestock identification schemes to facilitate the trace-back of livestock in the event of a health or food-safety problem. The development of an industry-wide standard such as the UK Special Pig program in Denmark is a little more unusual. In most cases, individual processors in Canada or the US might develop their own set of production guidelines for producers to follow under contract if they wished to meet the specifications of particular markets. The advantage of the Danish approach, perhaps, is that a credible, and to some extent independent, third party verifies that the production system is sound and that producers are complying with its requirements. Individual slaughter companies can then "build-on" their own additional quality standards to meet the needs of specific buyers.

It will be interesting to watch developments in the Danish pork industry in the ensuing years as the industry adjusts to the merger between Danish Crown and Vestjyske Slagterier. While the process of consolidation and rationalization within the Danish hog-slaughtering sector has been ongoing for twenty years or more, this latest merger has the potential to alter the relationship between Danske Slagterier and its member co-operatives like no other change before. Will this happen? It is still too early to tell. Speculating a little, we may see DS taking a less active role in international marketing and market-research activities as the individual co-operatives develop branded products to serve specific market niches and specific customers rather than trading on a generic Danish image. Where DS may still have an important role to play is in co-ordinating industry responses to legislative changes and market developments that call for a change in production methods and/or verification of production methods for different markets, and in responding to threats to the high health-and-safety status of Danish pig herds.

In the past, the Danish industry, spearheaded by DS, has excelled at taking a proactive approach to resolving quality and food-safety issues, rather than waiting for the heavy hand of legislative coercion to enforce change. This has enabled the industry to achieve a competitive edge, a "first mover" advantage in markets in which other industries were slow to change until forced by legislative pressure. A topical debate at present is the extent to which quality assurance and food safety should be the purview of the public or the private sector or some combination of the two. Perhaps the Danish pork industry offers an example of how the private sector, through the operation of an industry-led co-ordinating body, can offer a flexible, efficient, and credible alternative to legislative control of food safety and quality-assurance issues.

Endnotes

1. This translates into approximately thirty slaughter hogs.
2. The equivalent of about Cdn $4.1 billion.
3. This corresponds to approximately Cdn $4,660/tonne and Cdn $4,126/tonne.
4. The equivalent of about Cdn $0.8 billion.
5. The equivalent of about Cdn $7.3 billion.
6. Given their regional dominance, in some cases the choice is limited realistically to one co-op.

References

Danish Crown. 1999a. *Facts on Slagteriselskabet Danish Crown*. Randers, Denmark, June.

Danish Crown. 1999b. *Annual Report and Accounts 1998/99*. Randers, Denmark.

Danske Slagterier. 2000. *The Federation of Danish Pig Producers and Slaughterhouses: Statistics 1999.* Copenhagen, Denmark, May.

EU Commission. 1999. "Commission Clears the Merger Between Danish Crown and Vestjyske Slagterier Subject to Conditions." DGIV, Press Release, Document No. IP/99/165, http://Europa.eu.int/rapid.start.cgi. Brussels, Belgium, 9 March.

FDC. 1999. "The Federation of Danish Co-operatives 1998–1999." Copenhagen, Denmark.

Hobbs, J.E. 1996. *Danish Pork in Asia-Pacific Rim Markets: A Culture of Excellence.* Excellence in the Pacific Research Institute (EPRI), University of Lethbridge, EPRI Study No. 96–01.

———, K.K. Kerr, and K.K. Klein. 1998. "Creating International Competitiveness through Supply Chain Management: Danish Pork." *Supply Chain Management* 3(2):68–78.

Hvidkjaer, P. 2000. Danske Slagterier. Personal communications. Copenhagen, Denmark, February.

Lassen, B.C. 2000. Chairman, Danske Slagterier and Vice-Chairman, Danish Crown. Presentation made at the Conference on the International Competitiveness of European Food and Agribusiness, Institute for Food Studies and Agroindustrial Development (IFAU). Copenhagen, Denmark, February.

Moesgaard, A. 2000. Manager, International Affairs, Danske Slagterier. Personal communications. Copenhagen, Denmark, February.

Steff-Houlberg. 2000. http://www.steff.dk/engelsk.

Tinggaard, S. 2000. Marketing Manager, Pork Division, Danish Crown. Personal communications. Randers, Denmark.