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Consolidation in the Meat Sector

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Slaughter industries are consolidating, as the number of firms falls and plant sizes grow. Related changes are occurring in upstream livestock production sectors: large cattle feedlots and hog farms account for sharply growing shares of livestock sales. As in poultry, new contractual relationships have begun to replace spot market cash transactions for cattle and for hogs. Those sharp structural changes have raised concerns about market power, pollution control, and the reliability of traditional price reporting sources. This is a research conference, aimed at encouraging evaluation and discussion of research methods, data sources, and results.

Topics covered at the conference include the following:

- * The existence, extent, and effects of market power in livestock and meat industries; Causal factors in consolidation, such as scale and scope economies, mergers, changes in product mix, innovation, and changes in contractual relations;
- * Vertical coordination, as compared to spot markets for transferring livestock, including summaries of recent developments and implications for location, for product characteristics, and for price discovery;
- * Externalities associated with consolidation, including the effects of larger animal production facilities on pollution and the effects of local control regulations on consolidation.



Coordination Mechanisms in the Canadian and the Dutch Pork Industries

Raman Srivastava and Gerrit-Willem Ziggers

Introduction

Pork constitutes about 45 percent of the world's total meat consumption. Recent trends indicate that pork consumption is likely to continue to increase in the future. The international pork industry is undergoing a structural and organizational change as a result of changes in pork production and processing technology. These changes are occurring as a result of many factors. One of the most important factors is the change in consumer demand patterns. There is an ongoing shift from commodity to product specific demands. Consumers increasingly demand very specific product attributes including color and texture of the meat, origin of the meat, labeling information pertaining to nutritional contents, drug and chemical residues, and production methods used.

In order to meet product specific demands at the lowest costs, the need for closer coordination of pork production stages is being recognized in many countries. The extent of vertical coordination varies both within and among the countries. Also, the nature of coordination mechanisms varies considerably among countries.

The objectives of the study are:

1. to identify the extent and nature of coordination mechanisms and methods of transactions used between stages of pork production in Canada and the Netherlands.
2. to discuss the differences between the methods of transactions between the two countries.

Methodology

The methodology adopted in this paper originates from Porter's theory of "The Competitive Advantage of Nations" (1990). Porter introduced four attributes that improve the innovative capability of the companies. Porter calls these four attributes the Diamond of National Advantage.

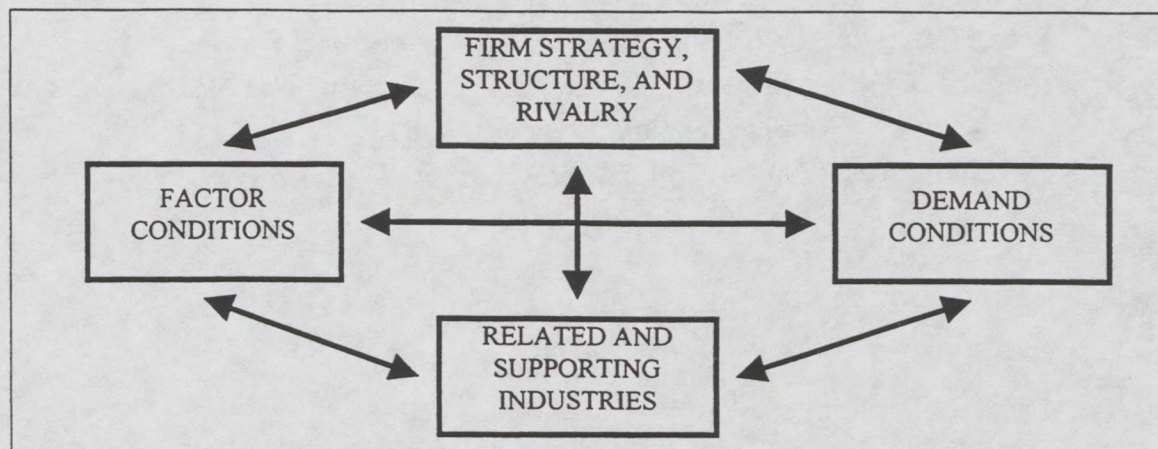


Figure 1: The Diamond of National Advantage (Porter 1990)

Porter's research identifies the fundamental determinants of national competitive advantage in an industry, and how they work together as a system. This paper, however, focuses only on the policy environment and demand factors as they affect the method and process of transaction between

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Dr. Raman Srivastava, Research Economist
Agri-Food Chain Analysis Section
Economic and Policy Analysis Directorate
Policy Branch, Agriculture and Agri-Food Canada
Room 669, 930 Carling Avenue, OTTAWA, ON K1A 0C5 Canada
E-mail: srivasr@em.agr.ca
Phone: (1)(613) 759-7384, Fax: (1)(613) 759-7034

and

Dr. Gerrit-Willem Ziggers, Head
Department of Quality and Supply Chain Management
Agricultural Research Department (DLO)
State Institute for Quality Control of Agricultural Products
Bornsesteeg 45, P.O. Box 230, NL 6700 AE Wageningen, The Netherlands
E-mail: g.w.ziggers@rikilt.dlo.nl
Phone: (31)(317) 47 54 75, Fax: (31)(317) 41 77 17

any two stages of a supply chain.

Figure 2 shows the methodology developed by Srivastava et al. (1998) to explain the impact of policy environment and pressures for change on the methods of transactions between any two stages of a supply chain or a production process. This paper uses this methodology and compares the methods of transactions in the Canadian and the Dutch pork industries.

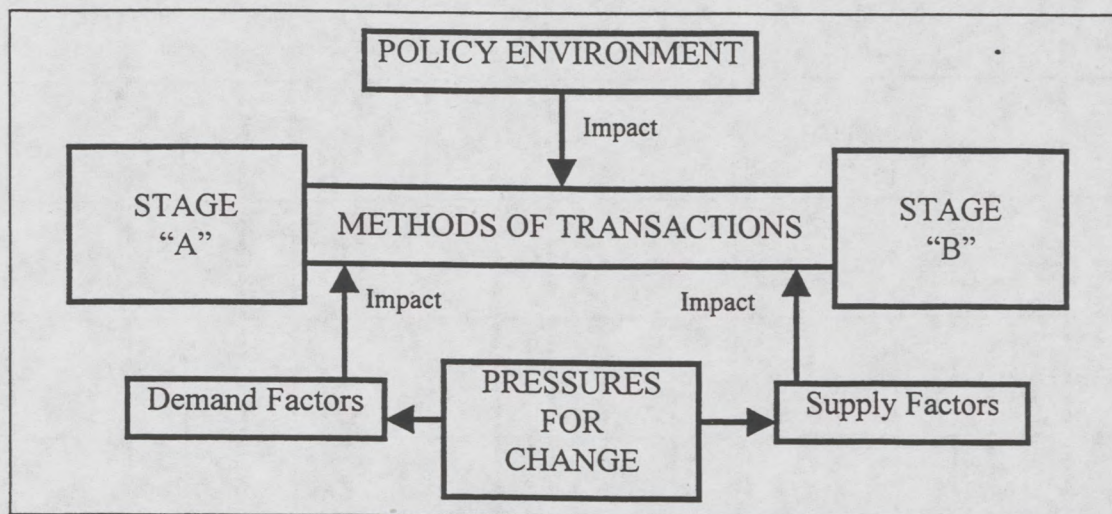


Figure 2: Factors Affecting Methods of Transactions

The analytical framework developed to assess the nature of vertical coordination explains the type of coordination mechanisms that are used to facilitate the flow of product from one stage to another. Coordination mechanisms used between stages of pork production were classified under one of the following five methods: use of contracts, verbal agreements, legislation/rule, ownership, and open market. Contracts vary from simple to complete and very complicated. Verbal agreements are non-written and perhaps non-enforceable contracts or agreements between two players. Legislation/rule refers to the existence of certain rules and regulations implemented by the government/industry that guide or control the transfer of a product from one stage to another. Ownership refers to the control of a part of the supply chain, i.e. control of more than one stage of pork production. Open market refers to the absence of any particular type of coordination mechanism used in the flow of the product. In this case, flow of the product depends on the market forces.

Coordination Mechanisms and Methods of Transactions

This section explains the major coordination mechanisms and the methods of transactions used between the stages of pork production in Canada and the Netherlands.

Table 1 shows the major chains operating parallel within the sectors and the transaction methods used in Canada and the Netherlands to facilitate the flow of product from one stage to another.

Table 1: Major supply chain linkages in the Canadian and the Dutch pork industries.

Production Linkages	P R O D U C T				F L O W		
	CANADA			THE NETHERLANDS			
Genetics	C	OM/VA	O	O	O	C	OM/VA
Farrowing	C	OM/VA	O		O	C	OM/VA
Finishing	C C L	OM/VA L	O	O	O	C	OM/VA
Slaughtering	C L	L		O O	O O	C	OM/VA
Processing	VA/OM	OM/VA	C O		O	C	OM/VA
Distribution/ Wholesale	VA/OM	OM/VA	C		O O	C	OM/VA
Retail/ Food Service	VA/OM	OM/VA	C	O	O	C	OM/VA

C: Contract

VA: Verbal Agreement

L: Legislation/Rule

O: Ownership

OM: Open Market

| : not very common

|| : common

||| : very common

In Table 1, use of a vertical line indicates existence of coordination mechanisms. Thickness of a particular line indicates how common a mechanism is. A line exceeding more than one stage means 'from...to'.

Canada

Feed/Genetics and Production

There are predominantly three types of production systems in Canada:

- 1) Traditional producer-owned and operated enterprises
- 2) Feed/Genetics company owned/coordinated enterprises
- 3) Community-based investor owned enterprises

Traditional producer-owned and operated enterprises (Type I) are typically 100-300 sow farrow-finish operations. All or most of the feedgrains required are grown on the farm. Producers typically buy vitamin and mineral supplements from local feed companies and mix their own feed

on-farm. Most of these operations depend on family labour with little hired labour. Producers take both market and production risk, and there is little, if any, formal vertical coordination. Genetics and feed inputs are purchased through normal market channels. Although long-standing relationships with suppliers may exist, these are usually not formalized by long-term contracts.

Feed companies, particularly in Quebec and Manitoba, began (in the early 1970s) offering grower contracts to producers and supplying feeder pigs, feed, and herd health services. These grower contracts (Type II) are part of a contractual arrangement whereby producers provide the buildings and the day-to-day management in return for a guaranteed fee per pig produced. The fee per pig often reflects some kind of performance bonus. Producers just starting out often use this arrangement to qualify for bank financing to construct the necessary hog buildings. Bankers like to see guaranteed prices and contractual arrangements. Once the building loans are cleared, many of these operations revert to type one grower-finisher operations. The feed companies usually enter into contracts with genetic suppliers to obtain the weaner pigs needed for these operations. The feed companies retain ownership of the pigs and usually also enter into contracts with slaughter-processors in those provinces where selling through the hog marketing board is not mandatory. The feed company takes most, if not all, of the market and some of the production risk in these operations.

More recently, genetic suppliers have started making similar arrangements with producers. The genetic companies either produce the necessary feed or contract feed companies to supply the feed. Again, the genetic company retains ownership of the pigs and enters into contracts with slaughter-processors in those provinces where selling through the hog marketing board is not mandatory. The genetic company takes most, if not all, of the market and some of the production risk in these operations.

There is an emerging trend toward community-based investor-owned hog operations (Type III), especially in western Canada. In some cases, a group of grain producers form a company. This company contracts with a management company that specializes in building the hog barns, arranging for the genetic supplies, and often providing the management and labour for the hog operation. Ownership of the complete facilities is held by the producer-owned company. A management company is employed to operate the facilities and individual producer-owners often contract with hog operations to provide feedgrains. Management and production risks are taken by the producer-owners. Typically these facilities are 600 sow farrow-finish operations on one site. Larger operations involving 1200 or 2400 sows usually are achieved by establishing multiple 600 sow farrow-finish operations. Contracts with slaughter-processing companies are common in such operations.

A variation on this theme is the establishment of multi-site operations consisting of 2500 sows farrowing units on one site with nursery units on the same site or on a nearby farm and between 10 and 15 grower-finisher operations, each on separate sites. In these cases, the original investor group is made up of the producers who operate the individual grower-feeder barns and may include the operator of the farrowing and nursery barns as well. These producers hold the controlling shares in the company. Non-controlling shares are then offered as an investment opportunity to local residents. Feedgrain producers who hold shares in the operation can obtain the right to deliver feedgrains to the operation, which is outlined in a contractual agreement. Contracts are made with genetic suppliers, feed suppliers and herd health professionals. Professional herders may also be employed by the company to operate the farrow and nursery barns or perhaps provide some or all of

the labour required in the grower-finisher barns. In some cases, genetic companies are also involved as one of the original investor-owners and supply the hybrid-genetics used in the entire operation. A local feed company may also be involved as one of the original investor-owner groups supplying the majority of complete feeds used in the operations. These operations may be managed by a management company employed by the investors. The management company may be run by one of the genetic or feed suppliers or may be strictly an operating company. Management and production risks are shared by all investors. Such operations can produce approximately 50,000 finished hogs annually.

Production and Slaughter/Processing

Traditional owner-operated hog operations use short-term marketing arrangements with slaughter/processing plants. There is rarely any vertical coordination between these operations and slaughter-processors.

As noted above, the larger Type II and Type III hog operations tend to favour long-term contractual arrangements with slaughter-processors. Slaughter-processors, presently restructuring to achieve world scale, high-throughput slaughter facilities, are very interested in establishing such supply contracts. In fact, the recent decision by the Manitoba, Saskatchewan and Alberta hog marketing boards to give up voluntarily the exclusive right to market all hogs produced in the province is one of the structural changes occurring. These structural changes facilitate the ability of slaughter plants to enter into long term supply contracts.

Slaughter-processors produce branded products. They are interested in maintaining brand quality and are beginning to express interest in contracting for hogs of specific genetic composition, size and type, which have been fed a particular way.

Contracts are rarely, if ever, fixed price contracts. Rather, prices are derived from the U.S. market and are negotiated on a periodic basis and may reflect premiums for specific characteristics or timeliness of delivery, for example. Some Canadian plants are negotiating prices with producers in advance to ensure a continuous supply of hogs. A number of Canadian hog producers, particularly in Manitoba and Ontario, have business contracts or marketing arrangements with slaughter plants in the U.S. as well.

Producers, through their marketing boards have vertically integrated into slaughter-processing in some cases. Recently, the Saskatchewan Wheat Pool, a large cooperative in Saskatchewan, purchased 30 percent ownership of Fletchers hog slaughter plant in Alberta. Saskatchewan Wheat Pool has also recently announced plans to participate in the establishment of ten to twenty 2500-sows multi-site farrow-finish operations in Saskatchewan over the next several years.

Slaughtering, Processing and Further Processing

There is a very high degree of coordination between slaughter and processing stages of the pork supply chain. Most Canadian slaughter plants also conduct primary processing operations and may produce some cooked or smoked products in addition to fresh, chilled and frozen cuts. This is an example of vertical integration since these activities are performed at the same plant and operated

under a single ownership.

There are a number of plants that do only further processing. These plants obtain their meat supplies from slaughter-processors and produce a variety of processed meat products. In some cases these plants are owned by the same firm that owns the slaughter-processing plants while in other cases they are independent operations. The independent operations may or may not use long-term contracts with meat suppliers.

Slaughter/Processing and Wholesale/Distribution

There is little, if any, vertical coordination between slaughter/processing and wholesale/distribution stages. The transactions between these stages tend to rely on the open market system and price negotiations are carried out on a daily basis.

Slaughter-Processing and Retail

The major chain stores in Ontario and Quebec (Loblaws, Oshawa group, A&P Dominion group and Provigo) have committed to buying case-ready fresh pork and are working primarily with four suppliers: Cargill through their Toronto Trillium Plant, Maple Leaf Foods, Olymel and Quality Meat Packers. Butcher operations are moving out of retail stores and these services are increasingly being provided by slaughter-processors under contract to the retailers.

Wholesale/Distribution and Retail

Canada exports almost one third of its total pork production to wholesalers and retailers in about 70 countries. In the domestic market, most further-processed pork products are sold to retailers by wholesalers/distributors.

In general, the move toward Efficient Consumer Response (ECR) in Canada is driven by wholesalers/distributors. They are working with retailers to streamline the shipping and handling process and produce a just-in-time delivery system that reduces storage requirements and eliminates storage costs. Retailers have not yet begun to seriously exploit the information they collect on consumer purchasing patterns and to embrace Electronic Data Interchange (EDI) with their suppliers in an effort to streamline their operations and reduce costs. The necessary trust between the various players is still being established. Wholesalers/distributors with their information on retail orders have stepped in to fill this gap.

Wholesale/Distribution and Food Services

With an increased role of food services in Canada, a significant amount of pork and pork products flows directly from wholesalers and distributors to food services. These food services include hotels, restaurants, hospitals, schools and office cafeterias.

Large food service chains, like McDonalds, or large institutions like hospitals or prisons, are most likely to be involved in contractual arrangements with wholesalers/distributors, processors or further-processors to supply products regularly meeting well defined specifications. Smaller, independent food services tend to rely on open market arrangements with wholesale/distributors,

where prices are determined on a daily basis.

Retail to Consumers

Most branded meat products are owned by slaughter-processors or further-processors who produce them. Retail chains also have branded products that are usually supplied by co-packing arrangements with processors and further-processors. In the past, retail brands emphasized the low-end commodity-type products marketed on the basis of price. More recently, some retailers have introduced high-end gourmet-type branded products. Most branded meat products have trade marks of the manufacturers, however.

In the absence of a well-established trend toward retail brands, there is little incentive or need for retailers to have explicit or implicit arrangements with consumers. The food product manufacturers are, for the most part, the stage of the chain with the greatest interest in establishing consumer relationships through branded product recognition and advertising.

Retail advertising to consumers is based more on promising the lowest prices for one's total food bill rather than on any commitments to specific product brands.

The Netherlands **Genetics – Farrowing**

The genetics stage includes the spectrum of cooperative and private breeding companies. Usually they are integrated into the multiplier stage of grandparent or parent stock. Parent stock at the multiplier stage is mainly supplied by breeding companies. The transactions are usually based on verbal agreements. Some of the common contracts are labour wage contracts, integrator/breeder contracts based on supply of sows and boars, delivery of piglets, and financing contracts. The use of contracts and the importance of breeding companies in general has increased because more "brands" are used at the multiplier stage. Prices for breeding stock are based on price quotations at the pig trade exchange that are published and negotiated on a weekly basis.

Farrowing-Finishing

The main distribution channels for the producer of feeder pigs are his own farm, pig traders, breeding companies and finishing farms. The first two are the most important, especially for the bigger farms which produce feeder pigs for themselves. Contracts are not very common, but if used, they include deals with breeding companies, feed suppliers, cooperative trade companies or foreign purchasers. It is not very common to purchase feeder pigs by means of fixed price contracts. However, if farmers are members of a cooperative trade company, they are obliged by means of the cooperative articles to deliver their feeder pigs to the cooperative trading company without the use of contractual arrangements (this is considered a verbal agreement). Economies of scale and herd health considerations are causing changes in these transactions. There is an increase in farrow-to-finish production and producers have started to develop partnerships. The most common contracts are supply/delivery contracts. Prices for feeder pigs are based on price quotations at the pig trade exchange that are published and negotiated on a weekly basis.

Finishing – Slaughtering

The main distribution channels for finished hogs are pig traders and slaughter houses. Contracts with specified arrangements with regard to delivery and price for long term periods are not very common. If contracts are used, they include deals with cooperative trade companies and slaughter companies. Most common contracts are supply/delivery contracts, minimal-price-warranty contracts, minimal quantity contracts, and labor wage contracts.

The price for finished hogs is based on price quotations at the pig trade exchange that are published on a weekly basis. This price acts as a standard price for purchase alliances of meat processors and is subject to many different deductions and bonuses depending on supply and demand.

Slaughter-Processing-Wholesale

Many slaughter houses are involved in both processing and wholesale. Besides these, slaughter houses supply carcasses to the meat processing industry and wholesalers. Many meat-processing companies are also involved in wholesale. Pork distributed to meat processing companies is very often subject to some form of contractual arrangement for a 3 months to 1-year period, because of more stringent requirements with regard to product composition (cut, fat and meat). Many of the transactions still take place in an open market system where prices are negotiated on a day-to-day basis at the export market and on a week-to-week basis in the domestic market. Even the prices in the contracts are not treated as fixed.

Processing-Wholesale-Retail-Food Services

Transactions with retail are based on daily or weekly orders, depending on demand, even when products are delivered under private label. If private label delivery is involved, more long-term relationships develop. Long term contracts (one-year period) are not very common, except in cases where products are delivered under private label and special requirements are requested (e.g. free-range pork). Long-term contracts also count for the food services industry, where large food-chains have special contracts with suppliers. On the other hand there is a trend of large meat-processors integrating in the food-services industry (ready to cook meals). In many cases, the products are produced to the customers' satisfaction including exact portion sizes. Transfers of these products are priced by formula with the supplier committed to exact orders. The price itself is subject to negotiations and even the prices in contracts are not treated as fixed.

Differences in the use of Coordination Mechanisms

The following section provides a discussion on the differences in the use of various coordination mechanisms and the methods of transactions between the Canadian and the Dutch pork industries.

In the case of Canada, an increasingly common method of transaction used between the stages of genetics and farrowing is contracts. Most of these contracts are initiated by genetic companies or feed companies. The other common methods of transactions are open market or verbal agreements. Recently genetics and/or feed companies have taken ownership positions in these two

stages of the pork supply chain. Therefore, ownership is becoming a new way of coordinating activities between the two stages. When two or more stages are under a single ownership, coordinating various activities and making business decisions becomes easier. In the case of the Netherlands, the most common method of transaction between the stages of genetics and farrowing is based on verbal agreements. Also, there has been a continuous increase in the use of a variety of contracts and ownership of a number of stages in the supply chain.

Between the stages of farrowing and finishing, the most common method is ownership in both Canada and the Netherlands. The other common methods are open market/verbal agreements and contracts.

Until recently, the only way hogs could flow from finishing to slaughtering stages in Canada was through the legislation that gave monopoly power to the provincial marketing boards to buy all the hogs from the producers. Now that the prairie provinces have voluntarily given up this monopoly power, an increasing number of hogs are being sold to slaughtering plants through producer contracts. However, the marketing boards still remain the major force in their new role as marketing agents for producers who still want to use the board. In the case of the Netherlands, however, open market and verbal agreements are still the key methods of transferring hogs from finishing to slaughtering stages. Ownership and contracts are the other methods of transactions.

Ownership is the only method of transaction used in Canada between the stages of slaughtering and processing. This is because both slaughtering and processing is done in the same plant under single ownership. There are a very few plants in Canada that do only further processing. However, in the case of the Netherlands, open market and verbal agreement are the most prevalent methods of transactions followed by short-time contracts and ownership.

In Canada, verbal agreements and open market are used as the major methods of transactions between the stages of processing and distribution/wholesale. Use of contracts is slowly becoming common as a result of stringent conditions being imposed by the distributors and wholesalers on the processors. In the Dutch system, however, a large proportion of the flow is still based on the open market and verbal agreements. Ownership and contracts are also used to achieve efficient coordination between the stages of processing and distribution/wholesale.

Finally, between the stages of wholesale and retail, open market and verbal agreements are used along with several types of contracts to achieve efficient coordination in the Canadian pork industry. The wholesalers and/or retailers normally have contracts with schools, hospitals, airlines, restaurants to ensure constant consistent food supply. Similar types of coordination mechanisms are used between the stages of wholesale and retail in the Netherlands as well.

Pressures for Change

A preliminary assessment of the hog industry in Canada and the Netherlands indicates that the pressures for change being faced by the two countries are very similar. The extent of these pressures may vary in some cases, however. Some of the common factors that are acting as pressures for change and have impacts on the methods of transactions used between the stages of pork production are listed in Table 2.

The availability and timeliness of the products are acting as a pressure for change only in the Netherlands. As a result of increased competition, internationalization, market globalization and industrialization in the pork industry, most of the factors exert similar pressures for change in the two countries. These pressures have had a tremendous impact on the methods of transactions used in the pork supply chain. Most of these pressures result in increased accountability and responsibility of various players at the adjacent stages of the pork supply chain as contracts are legally binding.

In order to meet some specific conditions (like delivery date, time, quantity, grade and place, attestation to drug residue and disease free status, raising and feeding conditions etc.), use of some legally binding contracts or the ownership of a part or the whole supply chain may be necessary. Contracts and ownership also help in achieving system efficiencies and thus cost competitiveness in the market place.

Table 2: Factors as Pressures for Change

Demand Factors	Productivity and Technological Factors
1. healthfulness and safety	1. economies of scale
2. taste and variety	2. specialization in production
3. convenience and freshness	3. use of information technology
4. availability and timeliness	4. use of logistics technology
5. animal welfare and environment	5. use of biotechnology
6. production and processing methods	6. use of environmental technology
	7. use of measuring/monitoring technology
Resource Factors	Government Regulations and Policy Factors
1. scarcity of resources and location of production	1. changes in international/domestic policies
2. resource sustainability	2. shift in responsibility from government to industry
3. environmental sustainability	3. shift from domestic market protection to international market access
	4. changes in traditional form of subsidies
	5. trend toward increased harmonization

Summary and Conclusions

The pork supply chain in Canada is not vertically integrated. Maximum coordination exists between feed companies and producers. The rest of the stages in the Canadian pork supply chain use a variety of market arrangements or the traditional business contracts to achieve coordination and an efficient flow of products and information. To a very large extent, prices are fixed in an open market system at each stage. A number of newer slaughtering plants are beginning to use both backward and forward contracts to assure an efficient flow of product in the pork supply chain. Also most of the plants are continually improving their tracing and tracking capabilities to ensure product safety.

In the case of the Netherlands, there is a relatively high degree of co-ordination between various stages of pork production, although among adjacent stages a lack of trust and an adversarial rather than a co-operative attitude is still limiting the development of customer oriented chains. Therefore, industry partners are facing the challenge to establish mutual trust, develop market (chain) strategy, adjust information exchange and pricing systems, shift from commodity to value added products, and shift from optimising individual stages of the supply chain toward the entire chain. The development of the Integrated Quality Chain Control system (IKB) can be considered as an attempt

to provide necessary vertical liaisons among adjacent stages in the supply chain.

In conclusion, industrialization, globalization, and changes in consumer demand and preferences seem to be the principal factors driving massive structural and operational changes in the Canadian and the Dutch pork industries. Production costs at each stage must be minimized to achieve cost efficiency. However, there is also a need to achieve efficient flow of products from one stage to another. As a result of changes in the policy environment and in addition to the aforementioned pressures for change, various stages in the pork supply chain need to coordinate extensively to minimize transaction cost and to achieve a rapid and reliable information flow throughout the chain. Increased coordination between the stages of production should lead to increased efficiency that in turn should lead to lower costs and thus increased competitiveness.

References

1. Agriculture Canada. 1986. "Policy Issues and Alternatives facing the Canadian Hog Industry". Edited by J.C. Gilson and R. Saint-Louis.
2. Klein, K. K., M.D. Faminow, K. Foster, B. Larue, R. Romain, and A.M. Walburger. April 1995. "An Evaluation of Hog Marketing Systems in Canada". Working Paper 4/95, Policy Branch, Agriculture and Agri-Food Canada.
3. Martin, Larry, Ron Ball, and John Alexiou. November 1997. "Cost Competitiveness of the Canadian Pork Processing Industry". George Morris Centre, Guelph, Ontario, Canada.
4. Porter, Michael E. 1990. *The Competitive Advantage of Nations*. The Free Press. New York.
5. Rabobank. 1993. *Competitiveness in the Pig Industry*. Utrecht, The Netherlands.
6. Rabobank. 1995. *The international food industry: developments and strategies*. Utrecht, The Netherlands.
7. Sparks Companies Inc. May 1993. "Enhancing the competitive position of the Canadian hog and pork sector. Volume III: The Competitive position of the Canadian hog and pork sector".
8. Srivastava, Raman. 1997. *A Vertical Trade Model of the International Pork Industry*. Unpublished Ph.D. thesis. University of Saskatchewan, Canada.
9. Srivastava, Raman and John Bamford. 1998. "A Multi-Country Study of Vertical Coordination in the Hog/Pork Industry". DECANETHUS Project - Canadian Paper. Agriculture and Agri-Food Canada (to be published soon).
10. Srivastava, Raman, Gerrit-Willem Ziggers and Lee Schrader. 1998. *Vertical Coordination in the Swine Industry: A Multi-Country Study*. Paper presented at the 3rd International Conference on Chain Management in Agribusiness and the Food Industry. Ede, The Netherlands. May 28-29, 1998.
1. Ziggers, Gerrit-Willem. 1998. "A Multi-Country Study of Vertical Coordination in the Hog/Pork Industry". DECANETHUS Project - The Dutch Paper. University of Wageningen, The Netherlands (to be published soon).