# VERTICAL INTEGRATION IN THE LIVE PIG MARKET AS A FACTOR OF COMPETITIVENESS

Elżbieta Jadwiga SZYMAŃSKA [1]
[1] PhD. Eng., Associate Professor, Faculty of Economic Sciences, Warsaw University of Life Sciences – SGGW, Nowoursynowska 166 St., 02-787 Warsaw, Poland
email: elzbieta_szymanska@sggw.pl

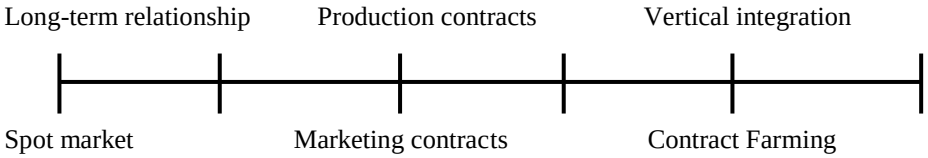
**Abstract**
*The aim of the study was to determine the forms of vertical integration in the live pig market in Poland and in selected EU countries. The primary source of information has been the study of Polish and foreign reference books. There were used the data from the Central Statistical Office (CSO) and General Veterinary Inspectorate (GVI) in Poland. In the research used to case study method for detailed presentation of forms of integration in selected pork markets in the EU. The analysis comprised three different systems present in the Denmark, French and in the Netherlands live pig markets. Then these systems compared them with solutions used in Poland. Especially, different conditions and constraints of domestic market integration are concerned. Due to a significant dispersion of operators in the Polish live pig market, it is expedient to increase vertical integration in the country. Adopting the solutions implemented in Denmark, France or Netherlands poses some difficulty as their special characteristics and conditions differ from Polish ones. The development of vertical integration should be supported by the biggest shareholders and state institutions. A helpful tool should be the creation of appropriate economic mechanisms facilitating this process.*
**Keywords:**
*Vertical integration, contracting, live pig market*

## Introduction

In order to reduce the weaknesses of live pig market and achieve a competitive advantage there are used different forms of cooperation between operators in the supply chain. One of the most advanced being vertical integration which is to combine all production stages i.e. from raw material to the finished product (Szymańska, 2014). From the economic perspective vertical integration means implementation of actions of successive chain stages from producer to consumer in a single company (Martinez, 1999). Vertical coordination refers to the synchronization of successive stages of production, distribution and marketing, with respect to quantity, quality, and timing of product. Methods of vertical coordination include open production (market), contracts production and vertical integration. Open market coordination is accomplished through sales on spot markets. In this system, enterprise does not commit to selling its output before completing production. Buyers may pay premiums for products of superior quality, the size and time of delivery. Contract production involves more interaction between buyers and sellers. The contractor and producer may negotiate delivery schedule, pricing method, and product characteristics. Production contracts vary in control allocated and risk transferred across stages (Martinez, Reed, 1996). Vertical integration is a merger of companies at different stages of production and distribution in the same industry. In this system, a single company controls two or more successive stages of vertical coordination. The transfer of resources is being done across all stages.

In the agro-food chain products, vertical integration helps them to reduce the costs, introduce the company with modern management and control methods, improve and standardize product quality, effectively implement product innovations, and to enhance

brand marketing. The meat industry is one of the branches of agribusiness in which the processes of vertical integration are clearly visible. They are especially visible in many developed countries, such as for example the USA. In recent years, the integration processes have become visible also in Polish meat production chain. In the case of meat processing, especially the connected stages of slaughter, cutting and production of the final meat products are characterized by a high level of vertical integration.
Pig producers and slaughterhouses can choose from different business relationships in the pig live market. Some important alternatives of organizing livestock production have been shown in figure 1.




Source: own elaboration.

**Fig. 1 Vertical organization of meat supply chains**

There are two prevailing solutions in the worldwide production of pigs. In many European countries such as Germany, the Netherlands, France, the level of integration is rather small with dominating spot transactions supplemented by informal long-term agreements and marketing contracts determining the conditions of purchase or sale of the raw material (Traupe, 2002; Boston et al, 2004; Spiller et al. 2005). In other countries like Denmark, the USA, Spain, it is vertical coordination that is widespread, at least partly replacing free market rules. In these countries production contracts restrict the freedom of farms, making them subordinate to centralized decisions of processing plants (Schulze et al, 2006).
The aim of the study was to determine the forms of vertical integration in the live pig market in Poland and in selected EU countries. The primary source of information on the integration of operators in the market has been the study of Polish and foreign reference books. There were used the data from the Central Statistical Office and General Veterinary Inspectorate (GVI). The research considers different forms of integration, their advantages and disadvantages. The analysis comprised three different systems which are present in the Danish, French and in the Dutch live pig markets and then they were compared with solutions used in Poland. As far as different conditions and constraints of domestic market integration are concerned. The choice of these markets was intentional, because these countries are among the leading producers of pork in the European Union. In the research used to case study method for detailed presentation of forms of integration in selected pork markets. It enabled to compare different live pig markets.

**1. Main Advantages and Disadvantages of Vertical Integration**

The advantages and disadvantages of vertical integration vary from industry to industry and depend on the competitive situation of the firm. According to Blois (1972), the basic advantages of vertical integration regardless of the industry are: the certainty of supplies of materials and services, the stability of operations, tighter quality control, decreased marketing expenses, better control over product distribution, the prompt revision of production and distribution policies, better inventory control, and additional profit margins or the ability to charge lower prices on final products. This author adds that advantages must be weighed against the disadvantages. In his view the typically disadvantages the disadvantages are: disparities between productive capacities at various stages of production,

lack of specialization, public opinion and governmental pressure, the extension of the management team, the inflexibility of operations and lack of direct competitive pressures on the costs of intermediate products. In contrast to Blois, Williamson (1971) does not consider the supply reliability as an essential advantage but rather emphasizes the harmonization of interests and the utilization of an efficient decision process.

Porter (1980) describes the benefits and costs of vertical integration from a strategic point of view. In his opinion the strategic benefits of vertical integration are: effects of synergy, tap into technology, offset bargaining power and input cost distortions, assure supply and/or demand, enhanced ability to differentiate, enter a higher return business, elevate entry and mobility barriers, and defend against foreclosure. According to Porter thanks to integration companies achieve cost savings in joint production, sales, purchasing, control, and other areas. Porter further specifies the economies of integration to combined operations, internal control and coordination, information, avoiding the market, and stable relationships.

Porter (1980) also defines the strategic costs of vertical integration. Among the most important indicates the cost of overcoming mobility barriers, reduced flexibility to change partners, increased operating leverage, higher overall exit barriers, foreclosure of access to supplier or consumer research and/or know-how, dulled incentives, capital investment requirements, maintaining balance, and differing managerial requirements

Krippaehne et al. (1992) specify the advantages and disadvantages of vertical integration that are specific to the construction industry. These advantages are improving the cost control, obtaining new management talent, influencing the demand for constructed products, achieving synergies from combining inputs, improving the economies of scale, reducing the uncertainty over availability or cost of future supplies, influencing the supply of construction inputs, and differentiating a company from competition. On the other hand the disadvantages are: increased risk from the requirement of new managerial expertise, decreased strategic flexibility, increased business risk from the extended operations, upsetting the existing supplier/customer relationships, and increased fixed costs which may create cash flow problems.

In the live pig market vertical integration potentially offers the following advantages:

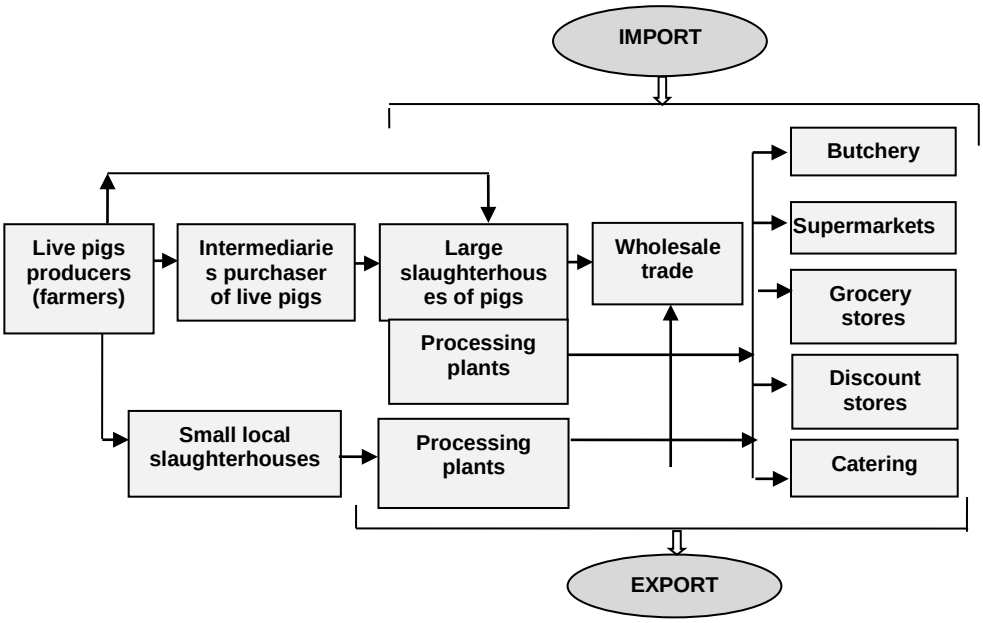
- improve supply chain coordination,
- security of supply
- reduction of transaction costs
- taking over the supplier and distributors margin,
- better protection of resources
- gain access to downstream distribution channels that otherwise would be inaccessible,
- facilitate investment in highly specialized assets,
- lead to expansion of core competencies,
- increase entry barriers to potential competitors.

While some of the benefits of vertical integration can be quite attractive to the firm, the drawbacks may negate any potential gains. Vertical integration potentially has the following disadvantages in live pig market:

- the high level of fixed costs,
- large investment needs and dispersion of investments,
- no pressure on costs and quality,
- little flexibility in the development strategy,
- the high costs of liquidation of the business,
- lack effect of learning from suppliers,
- the increase in management costs associated with high complexity of the business.

**2. Forms of cooperation in the Polish live pig market**

In 2012 the domestic stocking density was 11.7 million animal units in Poland (Rocznik… 2014). There were around 260.1 thousand pig farms. In the structure of farms with pigs dominate entities that hold several livestock units of this species. In 2012, their share accounted for 45.2%. The percentage of largest farms remaining above 200 pigs totalled 3.1%. In these farms were 52% of the pig population (Użytkowanie …2012). The supply chain of pork in Poland have been shown in figure 2.




Source: own elaboration based on (Dybowski, Kobuszyńska, Woźniak 2006).

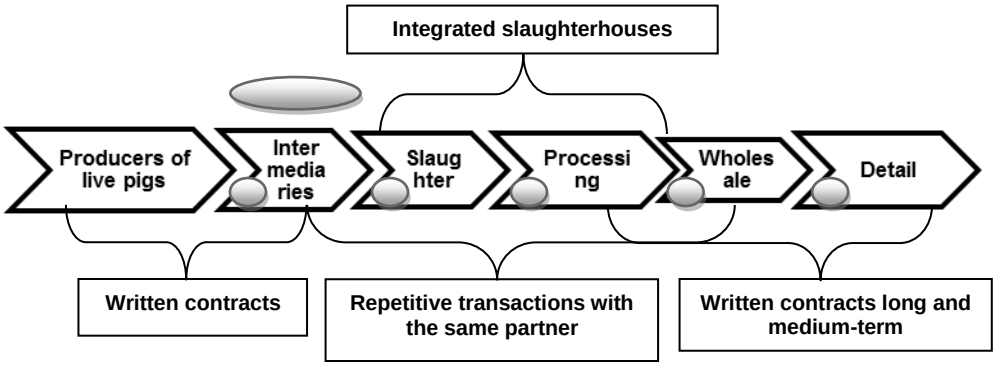
**Fig. 2 The supply chain of pork in Poland**

Pig producers and the domestic processing sector are linked by slaughter plants which are direct or indirect receivers of live pigs from the agricultural holdings. According to the General Veterinary Inspectorate (GVI) at the start of 2014 as many as 617 domestic entities were active in slaughtering pigs. These were mostly small plants, operating locally and serving small, individual farmers. The majority of domestic plants are deal with meat cutting and meat processing – 995 and 1001 entities respectively. Very often, however, these activities are combined within a single plant. The number of meat cutting and processing plants far exceeds the number of slaughterhouses operating in the country which means that many of them are forced to source raw materials in foreign entities. The related margin is therefore captured at an earlier stage of distribution chain (Szymańska, Hamulczuk, Dziwulski 2012).

The characteristic feature of the Polish live pig market are loose relations between the pig producers and the slaughtering establishments. It may be due to:

- the multiplicity of meat processing plants on the market, most of which are characterized by low production capacity and prefer direct forms of buying live pigs from farmers,
- limited range of contracting finishers,
- dispersion in pig breeding (Szymańska, 2014).

Freedom of relations between producers of live pigs and meat processing plants implies inter alia that the sale and purchase transactions do not entail additional rights and obligations (Gawrońska, 2007). This is the farmer who largely decides what number of livestock animals he wants to sell and to which processor. Direct supplies of pork raw material to meat establishments are limited to informal agreements between producers and the owners of establishments. Most transactions are concluded with the same suppliers but they rarely result in strengthening business relationships. Dominant economic relations in the Polish chain in live pig market have been shown in figure 3.




– spot markets

Source: own elaboration based on (Dybowski, Kobuszyńska, Woźniak 2006).

**Fig. 3 Economic relations in the supply chain in the live pig market**

Due to a large dispersion of suppliers, slaughter plants most often use professional intermediary services. The intermediary, however helpful in situations of dispersed livestock production, makes it more difficult to strengthen relations between the partners in the food chain. The basis for its settlement with the slaughterhouse are the results of the carcases' evaluation. Therefore, its interest is to purchase the highest quality of livestock. Not always, however, this high quality is reflected in the price paid to the farmer since that price is based on live weight. In this way, the intermediary captures the margin for higher quality of raw material. What is more, supplies are usually random and the raw material is not standardized. As a processing establishment develops, the role of intermediaries in the supplies of live pigs decreases.

Procurement contract in the live pig market are still rare. They are most often concluded by larger meat establishments which cannot afford to rely on unstable supplies of raw material associated with pigs upturns and downturns. Big establishments have their own raw material services whose role is decisive in the purchase of live pigs for processing. They receive live pigs from large suppliers, either directly from farms or from their own buying stations. As part of cooperation meat plants build facilities for raw material by opening their own farms and supplying farmers with weaners having specific genetic characteristics. Furthermore, farmers can rely on varied credit, zootechnical and nutritional aid from the processors (Szymańska, 2014). According to Mroczek (2002) cooperation develops because of:

- unstable agricultural production (hog cycle),
- changes in eating patterns,
- a large competitiveness between meat establishments,
- Polish accession to the EU and keeping abreast of market competition,
- ensuring food safety for consumers.

**3. Integration in the Danish live pig market**

Denmark has a strong tradition for producing pigs. Pig production has become concentrated in fewer, but larger and more specialised farms. There were around 4,600 pig farms with a population of 18.9 million pigs in 2011. Most pigs are slaughtered at the co-operative abattoirs Danish Crown and Tican. The Danish Crown is the main Danish slaughterhouses with almost 90% of the total pig production. The Titanic share is about 7% in the production (Hamann, 2010).

The success factor of Danish pork is the close cooperation of the farmers with their cooperative slaughterhouses. The first co-operatives where established more than 100 years ago. Within the co-operative structure it appeared to be possible to set up a National Price Quotation System. All pig farmers obtain the same price for the same quality no matter which co-operative slaughterhouse they are a member of. The price they get paid represents the market value of the pigs. Farm cooperatives now dominate the entire breeding, feed, slaughter, and distribution system, accounting for more than 95 percent of the volume of breeding stock and slaughter. Membership in the cooperatives depends solely on a producer's contractual commitment to be a member and market all pigs through the cooperative for at least one year (Schrader, Boehlje, 1996). All activities of the cooperatives are coordinated by an umbrella organization called Danske Slagterier (DS, or the Federation of Danish Pig Producers and Slaughterhouses). Danske Slagterier takes care of certain tasks on behalf of the industry. The organisation can be seen as the co-ordinating factor of breeders and porker farms within 'The Danish Pork Supply Chain'. Therefore it gathers market information which for example is delivered by processing companies and trade organisations. This market information is translated by Danske Slagterier into information that can be used by:

- breeders for the selection of the breeds;
- pork farmers for using the right housing system;
- the co-operative slaughterhouses for sorting the pork in a uniform way.

Because of the National Price Quotation System and the co-operatives that are organised in Danske Slagterier the 'Danish Pork Supply Chain' managed a to develop a standardised meat product. This product is of high uniform quality that can be delivered in large volumes and exact cuts, at any time over the world. Getting reasonable prices for all parts of the pigs the co-operatives have to process certain parts of it. Some of the co-operatives finance process factories by co-operating together and inviting institutional investors. Other co-operatives finance the process factories all by themselves, because they are afraid of a conflict of interest between the institutional investors and their members. To improve the development of new products from the standardised pig, the processing industries often work together with their customers.

Some of the co-operatives also collaborate in trade organisations, while others have their own trade organisations. The co-operatively owned trade organisations are situated all over the world close to their customers. From all over the world the trade organisations buy and sell pork. The pork from 'The Danish Pork Supply Chain' appears to be an intermediary product, that is not able to fulfil the demands of all the customers. To be able to react better to the demands of the market, the co-operatives have started to produce alternative pigs' specially developed for a small segment of the market.

The Danish pork industry is highly export oriented, as 85% of the production enters the world market. Denmark is one of the largest exporters of pork in the World. Denmark accounts for 17% of world exports of pork, and 22% of world exports of bacon and ham. In addition, a substantial number of live piglets are exported. More than half of the meat products is exported to EU-countries, with Germany and Britain as the main customers. The rest is mainly exported to Japan, USA, Russia and Poland.

**4. Integration in the French live pig market**

France is the European Union's third-biggest pork producer after Germany and Spain. French pig production is concentrated in the North Western part of the country. 57 percent of the pig population is in Brittany. In 2012 farmers produced 25 million pigs, on approximately 11 500 pig farms. Half of the farms are farrow-to-finish systems. They concentrate 85% of the sows and 66% of the fattening pigs. This system produces a lower share of the fattening pigs, because some of the piglets are finished on contracted fattening farms (Duflot, Roguet, 2013).

Most French pig farmers are members of a cooperative producers group with more than 85% of total output estimated to be marketed through 130 cooperative associations. Cooperatives also control approximately 50% of the slaughter capacity in France. The largest is Cooperl Hunaudaye. In this group 1,270 farms are consolidated managing an annual production of about 2.7 million pigs. Similar to other cooperatives, Cooperl Hunaudaye integrated enterprises from the feedstuff- and slaughtering industries, in addition to farms with pig production.

Cooperatives have not moved further up the value chain from slaughter to processing; much of the processing is done by smaller private companies. Supermarkets account for approximately 75 percent of the wholesale and retail trade with local butchers and small retail shops accounting for the remaining 25% of product movement. Linkages between supermarket retailers and processors are becoming more formalized. A combination of competitive market conditions and government policy make it highly unlikely for this linkage between slaughter and processor to be bridged by either a cooperative slaughterhouse linking forward into processing or a private processor linking backward into slaughter.

Classification of carcasses in France is carried out by a company called Uniporc Quest. This enterprise was founded by farmers. It is being led by a committee whose members are from the pig keepers and from various abattoirs and from the Chamber of Agriculture. The activity of company is being financed by a fixed charge which must be paid per pig. Uniporc Quest is being used by about 80% of all French abattoirs, where workers classifies and weighs near to 75,000 pigs for slaughter every day.

In France, pig farmers already use different forms of contracts, with a spot price as payment basis, determined by direct confrontation between supply and demand. There are used:

- Contracts for purchasing animal feed;
- Contracts for piglets: these formalise trade between farrowers (or suckling farms) and fatteners. Producer Organisations (POs) are involved in more than half of piglet sales, but with a broad diversity of practices (interrelation of pig farmers, fixing and regulation of piglet prices, model contracts, etc.);
- Contracts between breeders and contractors: These were production contracts, agreed independently between breeders, without intervention from POs;
- Contracts between breeders and their POs: The breeders who belong to a PO do not sign a contract, but instead submit an entry form stating a level of procurement of slaughter pigs and a timespan (three, five or seven years). The mode of payment (reference price, quality scale, time to pay, etc.) for the pigs is fixed by the board and is stated in the internal rules. Breeders choose what type of cooperatives they want to belong to, according to the services they offer (collection/sale, services, procurement, etc.). 90 percent of the pigs marketed in France are sold through POs;
- Contracts between POs and slaughterers: contracts made between groups and slaughterers are seldom written. They most often rely on customary practice or agreements taken to be binding. The great majority of sales are based on agreed Dutch auction market prices (Antoine and el. 2014).

**5. Integration in the Netherlands live pig market**

There are about 6,500 pork producers in all. Swine herds average 320 sows, with 10,000 sows representing the largest (4,000-head maximum on one site), and they produce about 25 million pigs annually. Dutch hog farmers face high feed prices and low margins. Their numbers are declining and herds are getting larger – to a point. More than 60 percent of the country's live hogs and pork cuts are shipped elsewhere – mostly to Germany. Pork production is concentrated in the South and the East of the Netherlands.

Farmers are increasingly specialised. The largest 300 farmers have a share of 20 percent in pig fattening. Halve of all breeding pigs and one third of all fattening pigs are held on specialised farms. The dominant organization form is the private family farm with farmers as the owners of the pigs. Only a very small percentage of the pigs are in vertically integrated operations. Pig production in the Netherlands is generally independent of slaughter and feed companies, with few contractual links except short term

Dutch pig farms are small, typically housing less than 600 sows. More than 99 percent of all farms are family operations. Fifty present of the farrowing and 35 percent of the fattening are specialized pig producing farms. Full-time specialized farrowing operations average 210 sows per operation, where the average capacity of full-time specialized finishing operations is 2,600 head. The farm in the pork sector are typically are diversified with a dairy enterprise.

In the Netherlands, only certain quality sectors operate with contracts: Groene weg, Better Leven, the organic sector, etc. These contracts are based on a market price with a bonus/penalty system, and sometimes take into account production cost. Quantities to be delivered are fixed. Breeders mostly market their pigs either via a dealer, or directly with slaughterers, or else export them. With the appreciable increase in the size of pig farms, modes of direct marketing are being developed. The pigs are sold at the spot market price, but a fidelity bonus can be applied by the slaughterer if the business relation is lasting. These sales are not formalised either in writing or orally, and are the result of customary practices (Janssens, 2011). Production contracts, for both livestock feed companies and major farrowing farms, may make up at most 5% of Dutch production. The Vion group has attempted to set in place long-term deferred delivery contracts. This operation was not successful, unlike, for example, in the poultry sector, where they are much more common.

The Product Board for Livestock and Meat (PVV) provides a system of coordination and self-regulation to the slaughter and processing industry in the Netherlands. In 1992, PVV established a system of Integrated Quality Control (IKB) to guarantee the quality of Dutch pork. IKB is an integrated quality program that controls the entire production chain from breeders to slaughterhouses and the distribution chain, including the retailers. Consumers buy pork with IKB-logo. The program provides guarantees with respect to origin, feed sanitation, use of veterinary medicines, and the absence of residues in the pork. Moreover, the program makes possible the exchange of information between the links in the production chain. This program involves implementing the best manufacturing processes in slaughter and processing, using limited pharmaceuticals and extended removal times prior to slaughter, hygiene standards, and incorporating traceability back to the farm of origin, to guarantee no residues in the meat. A slaughterhouse obtains information about the health and origin of the pigs from producers and producers are given the results of examinations performed in the slaughterhouse. Approximately 80 percent of pigs are produced under this program in 1999. The majority of producers for the export market of live pigs don't produce under the IKB-regime. In the IKB program, farmers can choose to whom they supply their slaughter pigs, and the quality control program has

## Conclusions

1. Vertical integration in pork production brings many advantages. It allows to achieve a competitive advantage in the market by reducing transaction costs, ensuring supply and distribution of products through available distribution channels. It can improve the quality of products, more specialization, efficient control and full protection of the production technology. The result of vertical integration is to increase efficiency and reduce costs in the supply chain.
2. The range of vertical integration in particular countries of the EU varied. In Denmark, vertical coordination is widely developed and replacing partially the free market. High coordination enables the processors conquering the certain segments of market abroad. In Holland and France, the level of vertical integration is less. The spot transaction are dominated in the market, completed by the informal long-term agreements and contracts, marketing, defining the conditions of sale and purchase of raw materials.
3. Denmark, the Netherlands and France are among the largest producers of live bait of pork in the EU. Applied solutions in the supply chain of pork to these countries were deployed and improved for many years. They are not easy to copy for the Polish conditions because of the differing conditions. They are interesting and informative for producers of pigs worldwide, but should be implemented taking into account the internal situation of the country.
4. In Poland vertical integration in the pork market is very limited and applies only to large meat enterprises. The market is characterized by a large variation of manufacturers and butchers and factory for meat processing. In order to increase the competitiveness of Polish pork it is preferable to support and promote of positive examples of vertical integration. The development of vertical integration should be supported by the biggest shareholders but also by state institutions. A useful tool in this respect should be the creation of appropriate economic mechanisms facilitating this process.

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