

# POLAND'S PATH TOWARDS SUSTAINABLE PORK PRODUCTION CHAIN

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**Abstract.** This paper analyzes the situation of the Polish pork production sector in the context of all stages of food distribution. As shown by available information, particular links of the pork supply chain changed significantly. This is true for both real (producer-processor-client) and instrumental aspects (including information transfer between sectors). The analysis also identified two worrying developments. The first one is related to the pig production structure (the decreasing number of farms does not result in a considerable increase in the production volume per farm). The other one is related to competitiveness: in Poland, the seemingly strong concentration of operators at slaughter and meat processing stages is still insufficient to face the competitive power of foreign businesses active in the increasingly liberalized agri-food market, both inside and outside the EU.

**Keywords:** sustainable food chain, agribusiness, pork production, pork chain, concentration in pork supply chain

## INTRODUCTION

An analysis of studies on the production management processes in the agri-food economy provides many suggestions on the involvement of businesses in the food supply chain. Some researchers claim that while operators in the processing sector are not directly involved in the raw material production process, they are willing to share the responsibility for monitoring the entire food supply chain. In practice, rather than a selfless act focused on implementing the corporate social

responsibility approach, this is an economically viable commitment to add more value (Motowidlak and Fajczak-Kowalska, 2010, p. 91–99). Whatever the reasons may be, practical measures taken to develop, operate and monitor the sustainable food supply chain are among the expected and welcomed socio-economic initiatives.

This paper refers to the condition of the Polish pork production sector, and uses it as a basis for exploring the factors of proper functioning of the food supply system. The purpose of this paper is to show the changes in the pork supply chain that occur despite a prolonged downturn in this sector and affect the mutual relationships between its participants, including the consumers.

## MATERIAL AND METHOD

Agri-business supply chains may vary from one sector to another, or even from one product to another. Therefore, it is sometimes difficult to assess their sustainability level. A specific example, chosen to be studied, is the pork supply chain spanning from the producer to the consumer (commonly called the “pigpen-to-fork” path). To carry out the research, the case study method and some selected aspects of Porter’s Five Forces Analysis were used. Both methods have been successfully used for years to diagnose the condition of various sectors. The first one allows to analyze a sector by referring to processes taking place in other parts of agri-business. The use of the other method is determined by the availability of source data. The information was supplemented

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with reports on the production and organizational status of the pork sector, as delivered by the Central Statistical Office, and with data from industry institutes, including the Institute of Agricultural and Food Economics – the National Research Institute and the National Veterinary Research Institute in Puławy.

### **Social and economic role of a sustainable supply chain**

While the supply chain (including in the agri-food market) is considered to be a term as old as economic activities, it is believed to be first defined and implemented in the 1960s or 1970s (Maternowska, 2004, p. 21–27). Essentially, the implementation of this term was an attempt to name the interactions, systems and relationships existing along the path from the product (service) supplier to the recipient (customer). This allowed to redefine the way the relationships between the suppliers and recipients are perceived, shifting the perspective from antagonistic individual needs to cooperation. However, the essence itself of the supply chain system is highly complex and keeps evolving. Also, it is difficult to clearly define its boundary conditions (Rutkowski, 2004, p. 2–8). According to the supply chain concept, operators aware of their interdependence in the market make efforts to harness the resulting synergies. In practice, this means that institutions who used to compete with each other engage in cooperation which does not only include their own specific activity (for example, the processing and delivery of products to end customers) but also support for and monitoring of the other production stages. The resulting network of relations contributes to creating new value, and results in socio-economic benefits for all its participants. Nowadays, the term “supply chain” is extended with the “sustainable” adjective. It emphasises the implementation of the sustainable development concept based on three interdependent areas: the social, environmental and economic area (Rokicka and Woźniak, 2016, p. 6). In practice, the supply chain means such a cooperation between operators in the production and delivery of products to the final customer where the product's preparation and delivery methods as well as sales support processes meet the requirements of responsibility for the areas referred to in this paper. This is particularly important in the case of the agri-food market where most of raw material and products are of biological nature, i.e. require special

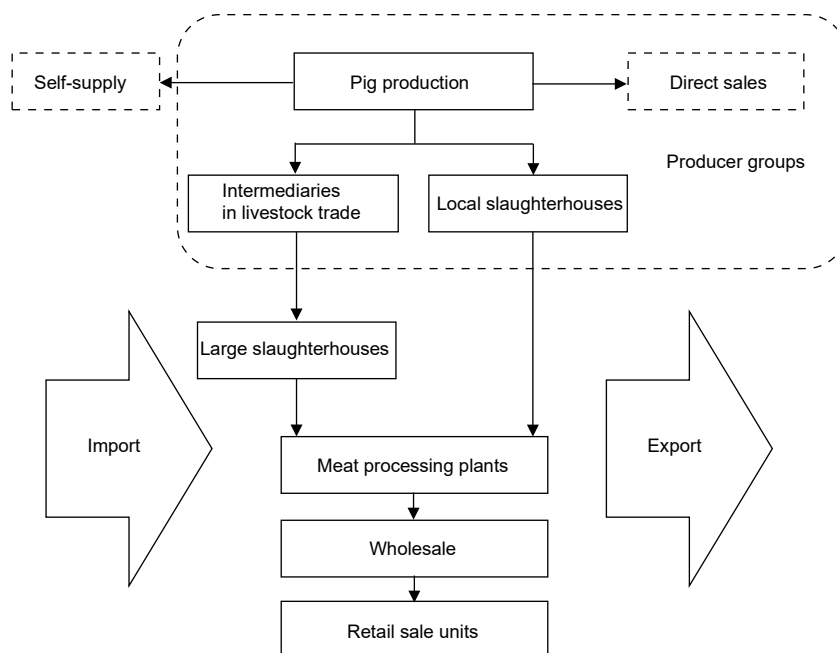
attention at all stages of production, processing, storage, transport and marketing.

In the agri-food economy, the sustainability of the supply chain has a socio-economic dimension, i.e. it covers stakeholders throughout the product lifecycle so as to enable them participating in the new values created. The supply chain is a system of interlinked business activities which, while ensuring a commercial success, contribute towards improving the social well-being and enhancing the environment. The combination of factors which may create business values in a sustainable supply chain is assumed to be divided into four groups corresponding to risk management, performance enhancement, development of sustainable products, and building the responsibility culture (Sroka, 2012). The first area includes benefits brought by: minimizing business disruption by environmental or workplace issues; protecting the brand's reputation and value; broader access to financing; and reducing the cost of capital. The second area is a commitment to reduce the material, energy and transport costs; to improve labor efficiency; and to enhance strategic supplier relationships in order to provide a greater synergy. The third one focuses on marketing innovative or more customized products, entering new markets and strengthening customer loyalty. In the area of building the responsibility culture, attention is paid to attracting and retaining employees strongly committed to their work, and building strong relationships with external stakeholders, but also to gaining broader access to financing.

### **Factors shaping the sustainability of the pork supply chain in Poland**

A highly complex structure, the pork supply chain is affected not only by socio-economic conditions but also by political aspects, often at a macroeconomic level, which have an impact on economic decisions. In the classic approach, it consists of farmers producing pigs, buyers and intermediaries, slaughterhouses at various levels of activity, and finally processing and packaging companies. In this process, wholesalers and distributors responsible for the delivery of meat and its preserves to consumers are the recipients (Fig. 1). The customer group includes traditional consumers purchasing meat in butchery shops, hypermarkets or outlets, and institutional buyers, with a growing role of the HoReCa<sup>1</sup> sector. The analyses

<sup>1</sup> Hotel/Restaurant/Café.



**Fig. 1.** Pork supply chain in Poland

Source: own elaboration based on Program..., 2016, p. 14–20.

of the economic development in Poland within the last two decades should also take into consideration the impact of meat import streams (primarily resulting from foreign capital investments in the Polish meat sector). The export of pigs and pork to the UE and other markets has also influenced the pig supply chain.

The pork supply chain operates within a network of strong institutional relationships typical of the agricultural market, and is mainly influenced by:

- government agencies, including the Agricultural Market Agency and the Agency for Restructuring and Modernization of Agriculture<sup>2</sup>;
- R&D entities, including: operators active in animal breeding and feeding (including the Institute of Genetics and Animal Breeding of the Polish Academy of Sciences, the Institute of Animal Physiology and Nutrition) as well as agriculture universities (including Universities of Life Sciences in Poznań, Lublin and Wrocław; Krakow University of Agriculture; Warsaw University of Life Sciences; and

the Bydgoszcz University of Science and Technology) and agricultural consultancy centers (including the Agricultural Consultancy Centers in Brwinów, Minikowo, Sielnik etc.);

- production support and inspection units, including: veterinary services attached to the Main Veterinary Inspectorate, sanitary and epidemiological stations attached to the Main Sanitary Inspectorate, the National Trade Inspectorate, the National Labor Inspectorate, the Environmental Protection Inspectorate etc.;
- financial institutions, including banks and other institutions of the finance sector (lessors, financial brokers, intermediaries as well as insurers etc.);
- government authorities of various levels;
- agricultural industry organizations, e.g. agricultural chambers, “POLSUS” Polish Pig Breeders and Producers Association, Greater Poland Pig Breeders Association etc.

The form and strength of network links in the pork supply chain are also impacted by large meat enterprises operating in the market. These include the following groups of companies: Animex, Sokołów S.A., Gobarto (previously, Polski Koncern Mięsny Duda S.A.), as well as Henryk Stokłosa ZM, CEDROB S.A. and Pini

<sup>2</sup> Which, together with the Agricultural Property Agency, are to be merged into a single National Center of Agricultural Support pursuant to a draft plan of the Ministry of Agriculture.

Polonia Sp. z o.o. They include a strong group of enterprises with a prevailing share of foreign capital which is an important factor shaping the condition of the entire meat supply chain. The role and meaning of that factor in the pork sector has been discussed for many years. It is alternately believed to be a driver of transformation or a destructive development for national meat production and processing sectors (Janiuk, 2011, p. 83–102; Tereszczuk, 2014, p. 316–322).

The complex nature of the extensive network, and in particular the impact of the institutional environment, generate an increasing flow of information (mainly related to balance issues) which significantly impedes communication (especially feedback) and makes it more difficult to monitor the process as a whole. Indisputably, this is because the number of participating operators varies between particular groups of the chain. The pig producer link continues to be the largest one, even though a decline (by almost 80%) in the number of farms engaged in pig production has been observed in the last two decades. It should be noted, however, that the shift is reflected neither in productivity nor in efficiency (number of pigs per farm) figures, which could be a positive effect of structural changes taking place in the sector (Table 1).

In 2015, the estimated number of pig farms was nearly 180,000. However, an analysis of the scale of breeding operations shows that farms with up to 9 porcine animals are prevailing. And the general direction, still evolving, is positive only to a certain degree. While the number of farms is decreasing, there is no increase in concentration of animals in large holdings. Furthermore, the number and production capacity of such holdings are not enough to fully compensate for the decreasing

volume of the national pig livestock production. This weakness is exploited by intermediaries who meet the demand of the processing sector by importing pigmeat. Thus, there is clearly a problem with the fragmentation of the pig production link in Poland which results in numerous socio-economic issues related to the large number of small pig farms (Utnik-Banaś, 2015, p. 69–80).

When looking at the operation of the analyzed link of the pork supply chain, the average unit production volume (per producer) is barely 61 pigs per year, and is among the lowest figures in Europe (compared to 584 in Germany, 467 in Spain, over 2,000 in the Netherlands and over 3,000 in Denmark). This represents a competitive disadvantage for Polish producers in the integrated meat processing link. Trying to act as a counterbalance, groups of agricultural producers active in the pig sector are not only a horizontal integration framework for farmers but are increasingly seeking to establish direct vertical links to processors or even to create clusters so they may acquire local slaughterhouses and processing plants (Kozera-Kowalska, 2016, p. 12–14). Compared to other product groups, pig producer groups are among the largest ones, and their number has been dynamically growing for many years. Among 1308 groups listed by the Ministry of Agriculture in March 2016, as many as 300 declared to be active in the production of pig livestock, piglets, weaners and fresh, chilled or frozen pork (Ministerstwo..., n.d.). This provides an opportunity for increased consolidation of that link, provided however that the groups actually act as an integrator instead of just helping their members access EU aid measures, which is a common complaint against them.

Production consolidation is also an issue for butchery and meat processing companies who impose their

**Table 1.** Changes in the number of farms engaged in pig production. Production scale in selected years

Year	Number of farms (thousand)	Production scale (pigs per farm)					
		1–9	10–19	20–49	50–99	100–199	200 and more
2002	760.6	402.2	146.4	133.5	48.0	20.9	9.5
2010	397.7	193.7	74.0	73.7	31.0	15.3	10.1
2014	219.6	91.7	43.5	44.9	20.8	10.5	8.2
2015	172.2	61.3	35.6	38.4	17.7	10.0	9.0

Source: own elaboration based on Program..., 2016.

**Table 2.** Changes in links of supply chain of pork in Poland

Specification	Years	
	2006	2016
Number of pig farms (thousand)	761	172
Number of slaughtering and meat processing companies (thousand)	4 271	5 548
Number of retail supply entities (thousand)	7 191	3 610
National population (thousand)	38.14	38.43
Farms-to-processing companies ratio	178.18	31.00
Farms-to-retail supply entities ratio	105.83	23.92
Population-to-pig farms ratio	50.11	223.43

Source: own calculations based on Roczniki... (n.d.) and PWC (2015).

conditions on dispersed individual farmers, but have little power to compete with foreign companies. According to countrywide data published in 2013 by the General Veterinary Inspectorate, there were 1453 slaughterhouses approved and supervised by the Inspectorate, including 785 farm animal slaughtering facilities, 1110 cutting and boning facilities and 883 meat processing facilities (<https://www.wetgiw.gov.pl/>). More comprehensive information is provided in the REGON register, according to which as at December 31, 2016 in Poland, there were a total of 5458 slaughter and meat (including poultry) processing facilities of different size and location (Public..., n.d.).

Regardless of data sources and figures, there is a noticeable downward trend in the slaughtering and cutting market, accompanied by an increase in the number of processing facilities. The driving force behind this shift are the economic conditions affecting these businesses and the increasing direct competition from foreign companies or, indirectly, from companies with significant foreign capital participation. Interestingly, despite many years of economic transformation, including consolidation within the supply chain, the barriers to entry in the meat sector are weak, especially if the entrant is a company with foreign participation.

When comparing the numbers of operators participating in the meat production link and in the animal slaughtering and processing link from 10 years ago<sup>3</sup>

with corresponding information from 2016, significant changes should be noted in the area under discussion (Table 2). They may be deemed favorable or adverse, depending on the adopted analytical assumptions.

If consolidation is assumed to be a priority for the production link, the direction of changes could definitely be considered as desirable. However, even the pace of changes seems worrying, especially when taking account of the changing production volumes and sizes of herds per farm. Another important finding is the persistently low market saturation with operators active in the animal slaughtering and processing sector whose responsibilities, similarly to retail trade links, include the transfer of information on the sustainable growth principles to producers. What is also noticeable is the decreasing number of entities representing the retail trade link. Their share could be even lower if the analysis was based only on the number of food trading entities (115,000 approximately). This reflects the general pattern of retail trade concentration around large-surface stores and discount stores, which is increasingly popular in Poland. However, in the context of sustainability of the pork supply chain, as discussed in this paper, this becomes another barrier to the implementation of that concept. A separate problem is the ratio of the population to the number of pig holdings. Although purely conventional, this figure may stimulate reflection on the probability of future problems with the country's self-supply of red meat (as pork is ranked first in this category) and, subsequently, with the country's general food security.

<sup>3</sup> Information from a paper by Kozera, 2007.

## SUMMARY

A process is underway from the moment the raw material is obtained until the product is purchased by the consumer. At each stage, it requires full and informed cooperation with the environment. None of the pork supply chain elements does exist in a vacuum. Each of them separately and all of them together affect people and the environment to a various extent.

The case of pork supply chain seems to be of special importance in the context of the sustainable supply chain considerations. One reason for this is the pace of transformation which is too often of an illusive nature (just as in the case of the changing number of pig holdings with no direct relationship to changes in herd concentration). Another reason is the strong impact of biological factors beyond human control. In the supply chain under discussion, this relationship is specifically reflected by the animal health issues faced by the production link. For nearly three years, Poland has been fighting the African swine fever (ASF) which is nearly unstoppable from the biological point of view. The producers' proactive measures in this area (biosafety) should be supported by other links of the supply chain, especially by the processing sector. Also, the consumers cannot remain indifferent to activities which include informing of the wholesomeness of finished products of animal slaughter and of pork processing. The observable functioning conditions of the sector discussed in this paper indicate the absence of such interaction between the links of the pork supply chain. This seems to suggest a very low level of understanding of what the sustainable supply chain should be, and an even lower degree of its implementation in the pork sector.

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