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HUNGARIAN PIG SECTOR: ACTUAL PROBLEMS AND PROSPECTS FOR THE FUTURE DEVELOPMENT

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Abstract

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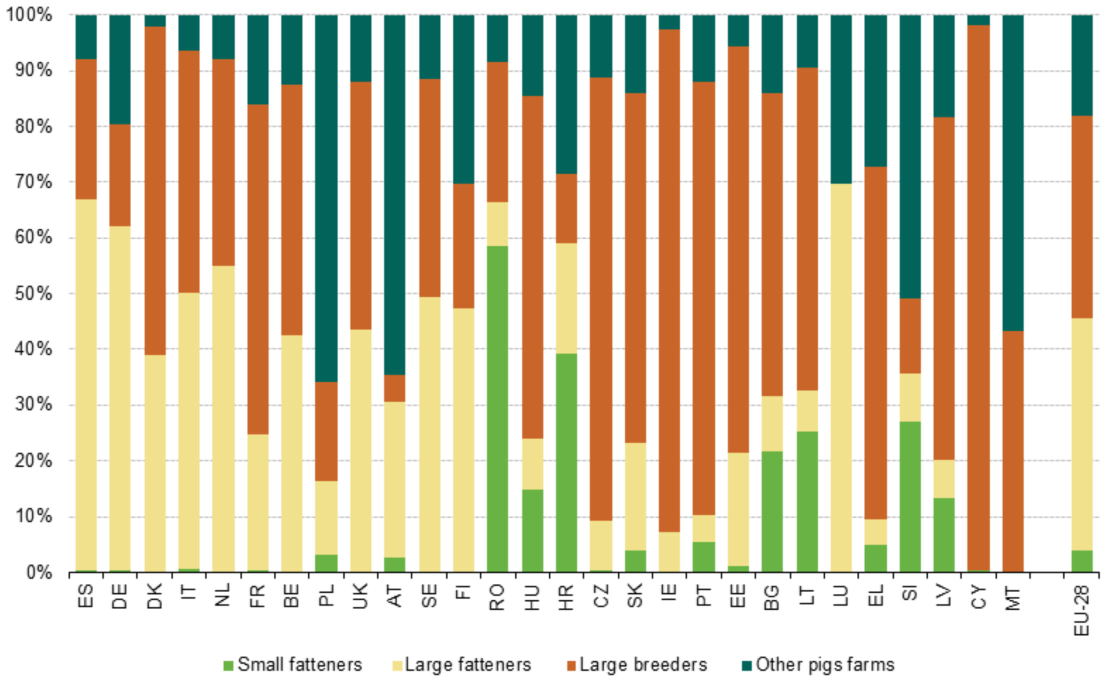
Over the past decades, the Hungarian pig sector has undergone remarkable changes. In the 1980s, the Hungarian pig sector was the main pork product provider of the Eastern bloc, but after the political and economic transition, the sector lost its main markets and the size of pig herds decreased radically. The economic changes have brought negative impacts for all the players of the pork supply chain: the producers have been mostly affected, but slaughterhouses and the processing industry had to face new circumstances as well. The goal of this paper is to review the present situation and the current problems of the Hungarian pig-producing sector and to draw up the main prospects and favourable directions of the future by the findings of the SWOT analysis of the Hungarian pig sector and based on the proposed directions of the government's new pork strategy. As the pig sector is an important pillar of the Hungarian agriculture and the rural communities, it is worth to summarize the sector's present market position and to set those opportunities, which could give advantages for Hungary in the international competition. The paper concluded that the most prominent problems of the pig sector are caused by the economic and structural problems of the sector, based on the problem tree and sector's SWOT analysis the main external and internal factors were detected, and the results were compared to some measures of the government's pork strategy.

Keywords: agriculture, pig sector, pork production, Hungary, SWOT analysis, development programs, competitiveness

INTRODUCTION

Pork is one of the most consumed meat in the world and pig production is global, except those countries where pork meat is not consumed due to cultural and religious reasons. Together with poultry, the pig sector is the fastest growing livestock sector. According to FAO data (FAO, 2009), the world's pork production almost doubled between 1987 and 2007 from 63.6 million tonnes to 115.5 million tonnes. While in 1987 the developed countries (i.e. former centrally planned economies and other developed countries) produced 58% of the pork meat and 42% was produced by developing countries of Asia, Latin America and Africa, in 2007 developed countries represented 34% of the world pork production while developing countries played the dominant role with 66% of pork meat production.

Pig production can be considered as double-faced all over the world: in one hand, it is represented by the traditional subsistence-driven small-scale production, while the specialized industrial farming represents the other. Nevertheless, in the past decades, the major improvements in pig breeding technologies have turned the commercial pig production into a high-input and high-output industry. Most pigs are produced on specialised farms. They are fed with concentrated feed and kept in buildings with concrete floors, producing liquid manure, which represent environmental hazards (water, soil and air pollution). The changes, from



1: *Distribution of other pigs by type of pig farm (FSS 2010)*
Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/Pig_farming_sector_-_statistical_portrait_2014

a traditional to intensive industrial production systems were associated with a huge increase in production and animal densities. Meanwhile, in the past decade, consumers and citizens became more conscious and formulated a more critical opinion about intensive production systems and their attention turned to animal welfare, environmental impacts, product quality and safety (Basset-Mens and van der Werf, 2005). On the other side of the coin, the popularity of outdoor production is a consequence of financial considerations (low investments and overhead costs) and the need for more extensively produced meat (Edwards, 2005). Outdoor production is also often perceived to be more environmentally friendly and sustainable, consumers often perceive that meat produced in outdoor systems is more nutritious and safer, with lower use of feed additives and antibiotics. Nevertheless, these system may be applied for special, traditional breeds. Bonneau and Lebret (2010) added that production systems have significant impacts on meat quality, animal density and animals' activity. The sustainability of extensive systems is depending on the breed, the traditions, the market need and the location. The top producing EU countries base their production on intensive systems with large fatteners and large breeders, whereas less developed and new member states have more small fattener farms (Fig. 1).

The pig sector was one of the most important sectors of the Hungarian agriculture for many decades, as Hungary was one of the main providers of the former socialist countries. Pork meat represents a great proportion of food consumption in the Hungarian market and Hungary has long time traditions in the pork meat processing industry as well. After the political and economic transition, the situation changed fundamentally. Due to the restructuring of the agriculture (privatization and structural changes), the agricultural production decreased in all transition countries, which still determines their market position.

The same situation was observed in other Central Eastern European countries. Analysing the Czech pig market, Pourová and Pour (2002) concluded that the problems are very similar in the following aspects: distrust between the players of the supply chain, varying prices, strong influence of the processing companies.

Szymanska (2015) highlighted that the Polish pig market is characterised by great price volatility, which determines the profitability of pig production and influences the level of income generated from the production of pigs for slaughter. A general problem is the high consumption of feed per kilogram of body weight gain which results from the quantity and quality of feeding stuff. In Poland and Hungary, many producers still prefer own-produced feed, which is unbalanced in terms of the compositions of essential nutrients, with a significant protein deficiency (Nagy, Hryszko, and Rycombel, 2014).

Vojtech and Peterková (2015) defined the three key areas of the Czech pig-producing sector: dealing with issues of food quality and safety, animal welfare and environmental requirements. Popp and Potori (2010) and Rumánková (2012) highlighted the common problem of Hungarian and Czech pig sector: farmers are not able to compete with foreign farmers and their cheap imports. Due to the constant level of pork consumption, decreasing production must be and is substituted by imports.

In the past two years the problems of the pig sector became more serious as a result of the Russian import sanctions on agricultural products (Kraatz, 2014), which stopped the export of fresh, chilled and frozen meat and even salted, smoked and processed products like sausages to the Russian Federation.

MATERIALS AND METHODS

As the main goal of the paper was to give an outline of the present and the future prospects of the Hungarian pig sector, besides the comprehensive literature review, different statistical data was gathered and processed for the analysis.

For the background calculations of the analyses the authors used the databases of the Hungarian Central Statistical Office (KSH), Eurostat and selected data from the FAO database, using long term statistical data from the 1970s until present. Databases of the Farm Accountancy Data Network Public Database and Hungarian database were examined from the date of Hungary's EU accession, 2004.

The results of the calculations on the profitability, efficiency and the different indicators showing the financial circumstances of the players of the pig sector are not included in this paper, but the trends, the main indicators and the financial and production performance of the pig producing enterprises were used in the formulation of the problem tree and the SWOT analysis. The present situation and the proposed strategic actions were summarized and described based on the problem tree by the SWOT analysis of the Hungarian pig sector. For the elaboration of the problem tree and the SWOT analysis, the authors made a comprehensive literature review and database search to find and describe the driving forces of the pig sector. In the course of the analysis, the proposed strategic steps were explored and compared to the Hungarian government's pork strategy.

Research results and discussion

Pork meat forms an important part of the world population's diet, providing a high quality source for protein requirements of the consumers. It is consumed worldwide except in those countries where the it is noit allowed due to religious reasons or cultural traditions. The main pork producers represent all continents of the world and countries at different development level.

China plays the leading role in the world's pork production nearly (55 million tonnes of production). The second is the European Union having more than two times less amount of pork production (23 million tonnes); the third is the USA with slightly more than 11 million tonnes of meat, which represents one fifth of the Chinese production. Brazil's production is 3,5 million tonnes, while Russia produced 2,6 million tonnes in 2015 (USDA) The next in the rank are Vietnam, Canada, Philippines, Mexico and Japan.

The total production of the EU-28 was about 23 million tonnes in 2015. The most important producer is Germany (5,562 thousand tonnes) it is followed by Spain. The next countries in this rank are France, Poland, Denmark, Italy and the Netherlands, roughly with the same production level. Hungary is the 11th in the rank (Tab. I.).

Consumers (mostly from Western:Europe) prefer novel processing technologies (e.g. marinating or shock-wave treatments) that enhance the tenderness of meat are being experimented with. However, consumers seems to be cautious about accepting novel technologies for food processing because of the perceived risks and lack of perceived benefits

I: *Production of pork meat (1000 tonnes) in 2015 (total carcass weight of pigs slaughtered in slaughterhouses)*

Rank	Country	2015	Rank	Country	2015
1.	Germany	5,562.00	**15.**	Sweden	233.50
2.	Spain	3,895.85	**16.**	Czech Republic	227.74
3.	France	1,967.61	**17.**	Finland	191.93
4.	Poland	1,906.11	**18.**	Greece	90.00
5.	Denmark	1,598.70	**19.**	Croatia	73.00
6.	Italy	1,485.83	**20.**	Lithuania	66.17
7.	Netherlands	1,456.22	**21.**	Bulgaria	60.68
8.	Belgium	1,124.31	**22.**	Slovakia	45.24
9.	United Kingdom	898.33	**23.**	Cyprus	43.40
10.	Austria	527.77	**24.**	Estonia	42.41
11.	**Hungary**	**409.30**	**25.**	Latvia	29.33
12.	Portugal	377.46	**26.**	Slovenia	20.23
13.	Romania	330.47	**27.**	Luxembourg	12.29
14.	Ireland	276.40	**28.**	Malta	5.55

Source: Eurostat data

(Werbeke *et al.*, 2010). Ngapo, Martin and Dransfield (2007) also concluded that consumers' attitudes and their preferences are strongly determine by food safety and food quality requirements. Consumers will require the latest info about fresh meat and meat products.

Main features of the Hungarian pig sector

The Hungarian meat consumption showed a decreasing tendency in the past decades, which is resulted by many different economic and social factors.

In 2000, the total meat consumption (beef and veal, pork, poultry, other meats and offal consumption) was about 70 kg per capita per year, which decreased by ten percent until 2005, and it reached 55.5 kg per capita in 2013. In 2014, the total meat consumption reached 58.9 kilograms per capita i.e. the Hungarian meat consumption is just over 1 kilogram per week per capita. The composition of meat consumption is represented by the dominancy of pork and poultry. Based on the KSH (Hungarian Central Statistical Office) database (between 2000 and 2015) the proportion of the consumption of different meats should be considered as stable, 4-5% is beef and veal consumption, 40-45% is pork, 43-48% is poultry, while 6-8% is represented by other meats and offal consumption.

The main feature of the domestic market is price-sensitivity of the consumers, which roots in the general economic problems of Hungary. The domestic market is determined by the consumption level, while the chances of the Hungarian pork products are influenced by the other EU and non-EU producers. In a study conducted in Western European countries, Stern *et al.* (2005) concluded that the main issues among the wide public were food safety and health, animal welfare and animal health, environmental impact and the price of pork. Their report concluded that in Western Europe there is a public demand for more sustainable production, and not only for inexpensive pork. (Stern *et al.*, 2005).

Focusing on the pork production, the situation is more serious when compared to the former performance of the sector. In the 1980s, Hungary was one of the main food provider of the eastern bloc, the main market was the former Soviet Union. The number of pigs was the highest in 1983, when 9,844,000 pigs and 740,000 breeding sows were kept in the country. In the 1990s, Hungary lost its leading role in exports. After the political and economic changes, the stable market collapsed, and the number of herds decreased radically.

The decrease could be detected in pork production and consumption as well. The proportion of imports increased significantly, while exports – after a declining stage – seem to be stabilized. The main data of Hungarian pork production, exports, imports and consumption are summarized in Tab. II. In recent years, the Hungarian pig sector showed a declining trend, but the latest data shows some promising data for the future.

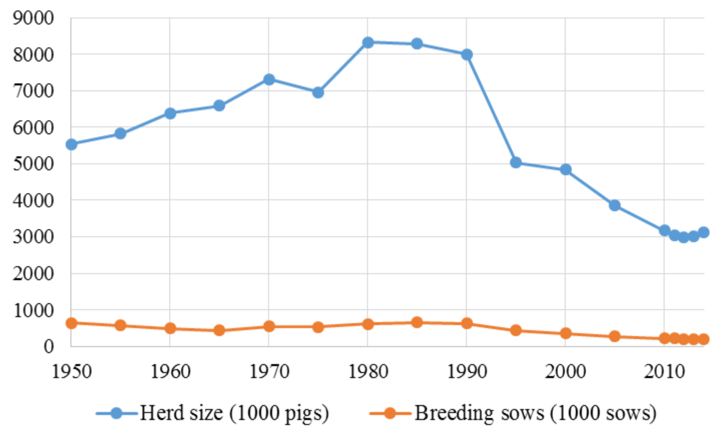
Based on the livestock census December 2012, the number of pigs – following three years of strong decrease – started to rose slightly, and since then, the increase of the number of pigs could be observed (Fig. 2)

The importance of the need for the development of the Hungarian pig sector was highlighted by different authors even before the EU accession. Illés and Bíró (1998) and Lehota and Illés (2001) described the opportunities for improving the competitiveness of the sector, from organizational, operational and efficiency aspects. Their results highlighted the need for building vertical cooperation between the players of the supply chain: small- and large-scale producers, slaughterhouses, processing industry, traders as well as the breeders, the different research and

II: *Hungarian pork production, exports, imports and consumption*

Year	Production (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)	Consumption (kg/capita)
1970	321.0	28.8	29.3	29.8
1975	501.4	2.1	63.3	41.4
1980	564.3	4.0	127.1	40.2
1985	627.6	0.8	167.0	43.1
1990	615.9	2.9	197.4	38.8
1995	332.9	19.1	72.7	27.1
2000	397,3	27.2	131.2	28.0
2005	289.9	88.5	102.5	26.7
2010	300.6	136.0	174.3	25.3
2011	288.4	139.0	171.2	24.8
2012	261.2	145.2	154.7	24.5
2013	245.9	154.6	154.4	24.0
2014	274.2	149.0	159.9	25.3

Source: own table based on KSH data



2: *Fig. 2: Hungarian pig sector – number of pigs and breeding sows (1950-2014)*
Source: own figure based on KSH data

innovation centres. Many of the problems are still actual. Nyárs and Udovecz (2005) discussed the economic background and competitiveness of the sector during the pre- and post-accession period. Keszthelyi and Pesti (2008) and Illés *et al.* (2012) concluded that the pig sector was one of the losers of the EU accession, which main reasons are the lack of specialization and the cooperation between the players of the sector. According to their results, the main reasons of the unsuccessful performance of the Hungarian pig sectors are rooted in technological background, the negative impacts of supporting scheme (which caused serious problems for livestock farmers without land).

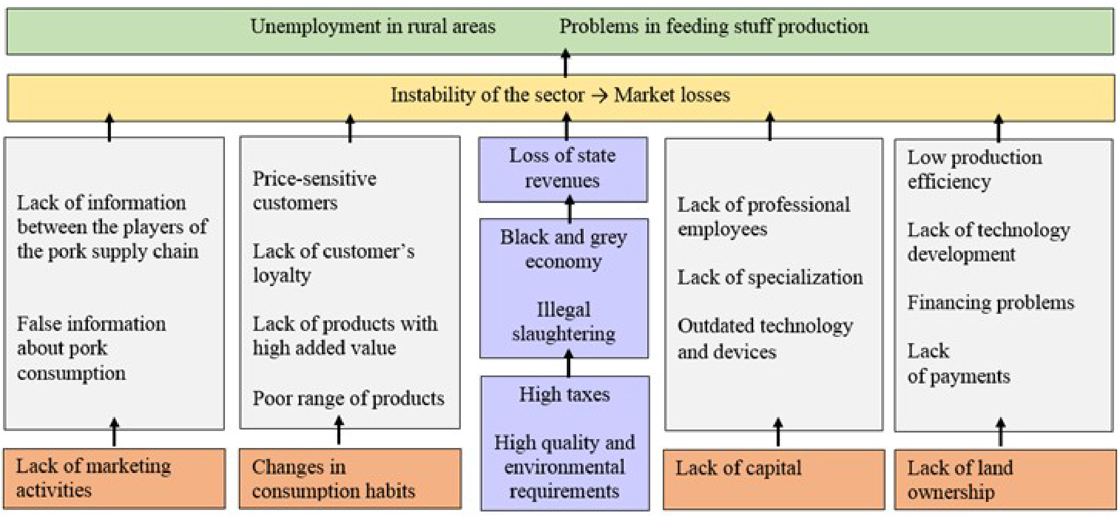
Udovecz, Pesti and Keszthelyi (2012) and Dunay *et al.* (2012) called attention for the need for strategic steps by the help of the financial support available through the measures of the CAP Reform 2014-2020 and the Europe 2020 strategy. Of course the decline in pig herds can be detected in most attributed mainly to low profitability

Problem analysis of the Hungarian pig sector

The problem tree analysis is an important tool of mapping out main problems, along with their causes and effects. By mapping the problems, it is possible to identify clear and manageable goals and the strategy of how to achieve them. The problem tree of the Hungarian pig sector is described by Fig. 3.

The bottom boxes of the figure represent the negative aspects of the existing situation. The boxes in the middle column (high taxes, black economy, the loss of state revenues etc.) identify the general problems of livestock sectors. The middle and top rows of the figure show the interdependence of the different elements. The top boxes identify the final impacts of the problems.

As it is shown by the problem tree, the roots of the problems are determined by the market, namely the changes of the consumption habits, particularly the price-sensitiveness of the consumers, secondly,



3: *Problem tree of the Hungarian pig sector*
Source: own research

the problems are caused by the unfavourable economic environment of the pig sector. The high taxes and strict requirements may support the existence of the black or grey economy, which will generate additional losses of state revenues. The Hungarian pig sector shows instability because of these economic factors, which is also influenced by the technical-technological problems of the producers. These complex problems initiated the development and implementation of the new Hungarian Pork Strategy.

SWOT analysis of the Hungarian pig sector

The present situation of the Hungarian pig sector is summarized by a SWOT analysis of the sector, which is comprehensive result of former literature sources (Illés and Bíró, 1998; Fórián, 2008; Bartha, 2012) and our own researches conducted in the past ten years (Tab. III).

The SWOT analysis describes the internal and external factors affecting the environment of the Hungarian pig sector, according to the main fields and activities of the sector (consumption,

III: *SWOT analysis of the Hungarian pig sector*

Strengths	Weaknesses
Consumption	**Consumption**
Quality of traditional meat products Customer loyalty Quality Hungarian Pork trademark (KMS)	Increase in the import of meat and meat products Decrease of pork meat consumption Poor marketing of pork products Price sensitive consumers
Trade and export-import	**Trade and export-import**
Export exceeds import Meat production exceeds domestic demand Value Added Tax reduction	Increase in the import of meat and meat products Import meat has lower price Market losses (Russia) High competition at the EU market Black market
Processing	**Processing**
Supports for family farms and young farmers Credit programmes for SMEs and micro enterprises Well-known brands (Pick, Herz, Gyulai) Food processing traditions (small manufacturers)	Lack of support for the processing industry Lack of foreign capital in the processing industry Weak supply chain
Production and breeding	**Production and breeding**
Natural conditions Long-term traditions of pig farming Supply of feeding stuff Existence of animal welfare and animal health measures and quality assurance systems Health status of national herd is good Supports for family farms and young farmers Credit programmes for SMEs and micro enterprises	Lack of skilled workers Lack of professional, full time, specialist producers Lack of specialization Lack of cooperation Black market No formal training available for staff Technical efficiency is declining The return on investment has been low Ownership structure is unbalanced Weak supply chain
Opportunities	**Threats**
Consumption	**Consumption**
Marketing campaigns promoting pork consumption Premium products / Mangalica products Products with higher added value	Decrease of the market Negative marketing campaigns Decrease of domestic production may decrease customer loyalty
Trade and export-import	**Trade and export-import**
Marketing campaigns promoting pork consumption	Price volatility Prolongation of Russian import sanctions
Processing	**Processing**
Recovery of small manufacturers New slaughterhouses Cooperation between pork chain	Environmental legislation is a significant constraint High energy prices
Production and breeding	**Production and breeding**
More developed communication between the players of the sector Formulation of a complex agricultural strategy	Increase of energy prices Increase of the feeding stuff prices Environmental legislation is a significant constraint

Source: own research

trade and export-import, processing, production and breeding). It shall be noted that it is a general overview on the whole sector; the situation might be different if examining the farms and enterprises individually.

The strengths of the sector may encourage the players of the sector, and it is promising that under more stable economic conditions the opportunities also could be reached. The key factor of the future success is strategy development, but for establishing the appropriate economic background of the sector, special governmental support is needed as the support from different EU funds are specified for modernization, waste management plans, support of environmental measures, rural development programmes, etc.

As it was shown in the SWOT analysis, the Hungarian pig sector has many strengths, which are mostly derived from the traditions and the good quality of the products. Besides the strengths of the sector, the new measures of the Hungarian Pork Strategy should be underlined. The strategic measures were announced at the end of August 2012, and were adopted by the Hungarian government. The Hungarian government allocated 1.6 billion HUF (5.2 million EUR) designed to boost pig breeding and pork consumption in Hungary. The pork strategy may help the Hungarian pig sector to improving product quality and genetic bases, to create various quality assurance systems. The programme also supports the promotion of domestically produced pork meat products and the breeding of the special Mangalica pigs. The most important goals of these measures connected to increase the number of herds and to improve the quality of meat and meat products. Lack of cooperation is a very negative phenomenon of the sector. Different Hungarian and foreign authors (Udovecz and Nyárs, 2009; Popp and Potori, 2010; Boger, 2001; Perez, De Castro and Font i Furnouls, 2009) highlighted that the members of the supply-chain get more opportunities by collaboration, which allows them to become more competitive than if they stay isolated and without a global perspective of the whole chain. The main weaknesses and threats are connected to the general economic and structural problems of the Hungarian agricultural sector, i.e. the input prices exceed product prices, strict environmental legislation, the lack of cooperation and spcialization and the small size of the domestic market, which makes the Hungarian pig sector more dependent on the foreign markets whith very sharp competition.

The strategic actions needed for solving the abovementioned problems and for utilizing the strengths and opportunities are summarized by the measures Hungarian Pork Strategy.

Prospects for the future development of the Hungarian pig sector

The implementation of the Hungarian Pork Strategy has already been started. The main goals are to increase both the pig stock and pork consumption.

To accelerate this process, the Hungarian government aimed at doubling the number of pigs in the next 6-7 years. Another important goal is to solve the problem of the black market. This could be done by the full implementation of standardized registry and identification system. The reduction the VAT on live and half pigs from 27 percent to 5 percent can also support this process, and after the first experiences, this measure seems to be successful, as the first positive changes may be observed.

A severe problem may arise from that the existing production capacity is out-of-date, new slaughterhouses and modern processing plants are needed.

In Tab. IV, we collected the most important steps and measures concerning the pig sector.

The Pork Strategy includes different measures and supporting tools, which may help in the recovery of the Hungarian pig sector.

In 2013, the processing sector was supported by 400 million HUF (1.3 million EUR) under the financial scheme of the strategy, where the support of research and development activities were preferred, especially increasing the proportion of domestically produced protein in pig feed and improving meat quality. These measures may improve the technology problems of the sector, particularly in feedstuff utilization.

A government decision was also made concerning the High Quality Pork quality assurance system and trademark, which main features are the following: the meat of pig bred in Hungary, fed with GMO-free corn and other cereal-based feed certified in the EU; the share of non-vegetable origin ingredients must be below 5 percent in the feed. The introduction of this quality standard will represent an added value for customers, so it may motivate the health conscious and demanding consumers as well.

Promotional campaigns of Mangalica products is another important part of the pork strategy: the National Association of Mangalica Breeders is supported for establishing a certificate of origin and quality assurance system, while Purebred Pig Breeders' Association was given financial help for improving the genetic stock of Hungarian pigs and for finalizing the registry system. This system, which issues certificates of origin and ensuring appropriate quality assurance, will constitute an important tool in acquiring new markets.

A production and market information system (https://sertesinfo.aki.gov.hu/) was developed and implemented in the past years by the experts of the Research Institute of Agricultural Economics (AKI). The thematic website coordinates already existing databases and systematises their data, focusing on the number of pigs, quantity data and market processes. This website can be a valuable tool for the players of the pig market (producers, suppliers, researchers) as it is differentiated

IV: *The implemented programmes in the pig sector and their impacts*

Year	Programmes	Possible impacts
2013	Launching the Hungarian Pork Strategy for public debate	general impacts, new proposals from public
	Elaboration of new animal welfare support for breeding sows	animal health issues, quality assurance
	Development of Quality Hungarian Pork (KMS) trademark quality assurance system	fostering domestic consumption, increasing customers' loyalty
	Starting the new pig production and market information programme (https://sertesinfo.aki.gov.hu/)	information sharing
	Supporting the activities of the Hungarian Purebred Pig Breeders' Association and the National Association of Mangalica Breeders	new products and new customers' segments
2014	Reduction of VAT on live pigs and half carcasses from 27% to 5%	whitening the black market
	Submission of the proposals for the new animal welfare support for breeding sows to Brussels	improving the animal health level and quality
	proposal for standardized identification system for breeding sows	whitening the black market traceability
2015	Brussels has accepted the new animal welfare support and breeding sow support	a more predictable economic environment
2016	development of IT support of standardized identification system for breeding sows	whitening the black market and improving traceability
	intensive marketing campaign of Quality Hungarian Pork (KMS) products	new products and new customers' segments increase of domestic consumption

Source: own research

according to the needs of the users. For farmers, the recent market data, applications, support opportunities etc. are available in a filtered and clustered form through the newsletter, while researchers can find comprehensive market and technology data of the different activities and processes of the sector.

An outstanding result of the new strategy was the reduction of Value Added Tax of pork meat and meat products, which stimulated the market and the consumers' behaviour positively. As the paper's main goal was to provide a general

Of course, the Pork Strategy is a set of general measures, which may contribute to the recovery and future success of the sector. Nevertheless, the implementation and the successful application of the strategy is strongly depending on the attitudes and the position of the different stakeholders of the sector, i.e. the players (producers, breeders, farms, small enterprises, large companies and the players of the processing industry) institutional background (research institutes, universities, governmental institutions).

CONCLUSION

In recent years the Hungarian government in cooperation with professional associations, farmers, processing companies, research institutions etc. elaborated a comprehensive Pork Strategy, which several elements have already been implemented. The programme provides help for the players of the Hungarian pig sector, for producers, breeders, research institutions, the players of the processing industry. The financial support may improve the general conditions of the sector, and may create a more stable economic and administrative background for all the parties.

The three most important tasks for the players of the sector are the following:

establishing a stable supply chain with stable markets, well-organized sector structure and well-operated representative bodies,

improving productivity (improving production indicators and efficiency which may result the improvement producers' bargaining power),
increasing added value of products (technology development and product development by the help of financial support).
The management questions of agricultural farms are another key issue of the further development. The managerial approach, the managerial skills should be acquired by the farmers. The different professional associations should take part actively in this process, by organizing trainings, exhibitions, workshops for providing the most recent information to the producers. The measures of the pig strategy provided some financial and institutional framework for achieving these goals, but there are many further tasks and problems to be solved. Close cooperation should be built between the producers, increasing the trust between the players of the sector is also needed, which should be managed by the players themselves. External help and reorganization is also needed for example between financial institutions and the farmers in order to improve the financial situation of the producers: the financing opportunities should be tailored according to the special needs and conditions of the pig producers.

REFERENCES

BASSET-MENS, C., VAN DER WERF, H. D. G. 2005. Scenario-based environmental assessment of farming systems: the case of pig production in France. *Agriculture, Ecosystems and Environment,* 105(2005): 127–144.

BARTHA, A. 2012. *A sertésvertikum stratégiai elemzése*. PhD Thesis, University of Debrecen, Karoly Ihrig Doctoral School of Management and Business, 161.

BOGER, S. 2001. Quality and Contractual Choice: A Transaction Cost Approach to the Polish Hog Market. *European Review of Agricultural Economics*, 28: 241–261.

BONNEAU, M., LEBRET, B. 2010. Production systems and influence on eating quality of pork. *Meat Science,* 84(2): 293–300.

DUNAY, A., ILLÉS, B. C., VINOGRADOV S., and GÁBRIELNÉ TŐZSÉR G. 2012. Lessons of the EU accession for agricultural enterprises in V4 countries in the light of CAP 2014. *Problems of World Agriculture,* 12 (3): 138–148.

EDWARDS, S. A. 2005. Product quality attributes associated with outdoor pig production. *Livestock Production Science,* 94(2005): 5–14.

FAO 2009. *The State of Food and Agriculture 2009*. Rome.

FÓRIÁN, Z. 2008. *A magyarországi élelmiszeripar középtávú stratégiájának alapjai*. Agrár Európa Kft. Budapest. 61.

ILLÉS B. C. DUNAY, A. and PATAKI, L. 2012. The impact of EU-accession on the economic support level of farms in Visegrad countries. *Annals of the Polish Association of Agricultural and Agribusiness Economists*, 14(6): 95–98.

ILLÉS B. C., BÍRÓ O. 1998. A vertikális integráció és a versenyképesség növelésének további lehetőségei a magyar sertéshústermelésben. *Tudományos Közlemények – GATE GTK*, 4: 185–206.

KESZTHELYI S., PESTI C. 2008: A gazdaságok jövedelmének és a mezőgazdaság üzemszerkezetének várható változása 2010–ig. *Agrárgazdasági Információk, 2*. AKI, Budapest, 78.

KRAATZ S. 2014. *The Russian Embargo: Impact on the Economic and Employment Situation in the EU.* European Parliament, 10.

LEHOTA J., ILLÉS B. CS. 2001. *Hold-up problems and institutional strategy in the Hungarian pig sector.* In: Kowrygo B, Halicka E, Rejman K (eds.) Institutional economics and the food sector in Poland, Hungary and the Czech Republic. Fundacja Rozwój SGGW, Warsaw, Poland, 81–96.

NGAPO T. M., MARTIN, J. F., DRANSFIELD, E. 2007. International preferences for pork appearance: II. Factors influencing consumer choice *Food Quality and Preference* 18. 139–151.

NAGY, L:, HRYSZKO, K., and RYCOMBEL, D. 2014. *Structural changes in the Polish and Hungarian pig sector since EU accession* pp. 165-183. In: Potori, Chmielinski, Fieldsend (eds): *Structural changes in Polish and Hungarian agriculture since EU accession: Lessons learned and implications for the design of future agricultural policies*. Research Institute of Agricultural Economics, Budapest, 292.

PEREZ, C., DE CASTRO, R., and FONT i FURNOLS, M. 2009. The pork industry: a supply chain perspective, *British Food Journal*, 111(3): 257–274.

POPP, J., POTORI, N. 2010. Nemzetközi agrárpiaci kilátások 2010, *67. Agrárgazdasági Kutató Intézet*, Budapest.

POUROVÁ, M., POUR, M. 2002. Institutional problems of pig meat sector in the Czech Republic. *Agricultural Economics*, 48(1): 29–35.

RUMÁNKOVÁ, L. 2012. Examination of market structure in selected livestock agri-food chains in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 60(7): 243–258

STERN, S., SONESSON, U., GUNNARSSON, S., ÖBORN, I., KUMM, K. I. and NYBRANT, T. 2005. Sustainable Development of Food Production: A Case Study on Scenarios for Pig Production. *Ambio,* 34(4/5): 402–407. [Online] Available at: http://www.jstor.org/stable/4315622.

SZYMANSKA, E. J. 2015. Profitability of pig farms in Poland after integration to the EU. In: *Proceedings of the 2014 International Conference Economic Science for Rural Development No39*. Jelgava Latvia, 97–107.

UDOVECZ G., NYÁRS, L., 2009. A sertéságazat versenyesélyei Magyarországon. Állattenyésztés és *takarmányozás*, 58(5): 451–466.
UDOVECZ, G., PESTI, CS. and KESZTHELYI, K. 2012. Nyertes és vesztes gazdaságok Magyarországon. *Gazdálkodás,* 56(5): 387–397.
VOJTECH, T., PETERKOVÁ, J. 2015. Changes in the Cost Structure of Hogs Feeding in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63(4): 1387–1393.
VERBEKE, W., PÉREZ-CUETO, F. J. A, DE BARCELLOS, M. KRYSTALLIS, A. and GRUNERT, K. G. (2010) European citizen and consumer attitudes and preferences regarding beef and pork. *Meat Science,* 84(2010): 284–292.

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