Czech Republic`s Self-sufficiency in Case of Pork Meat and its Impact on Trade Balance Development

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Anotace

Tento článek analyzuje soběstačnost ve výrobě vepřového masa v České republice, predikuje její objem v roce 2013 a identifikuje faktory, které významně ovlivňovaly zvyšující se objem importů vepřového masa v ČR během doby výzkumu 2003 - 2011. Příspěvek využívá Index komparační výhody RCA pro hodnocení konkurenceschopnosti na trhu vepřového masa.

Příspěvek byl zpracován v rámci VZ MSM 6046070906 „Ekonomika zdrojů českého zemědělství a jejich efektivní využívání v rámci multifunkčních zemědělskopotravinářských systému".

Klíčová slova

Soběstačnost, vepřové maso, konkurenceschopnost, predikce, zemědělský trh, Německo, cena.

Abstract

This paper analyzes self-sufficiency in pork production in the Czech Republic, predicts its size till the 2013, and identifies factors that were significantly influencing the increasing volume of imports of pig meat in the Czech Republic during the referred years 2003 to 2011. The paper uses Index of competitive advantage RCA for the evaluation of competitiveness on the pork meat market.

It was found out that the pig meat self-sufficiency went down – from 96.23 % in 2003 to 63.83 % in 2010. RCA index reached negative values of -15.82 in 2011, in comparison with the year 2003 when the RCA index showed value of +90.23.

This paper is a part of a research project undertaken by the authors on the topic „Economics of resources of the Czech agriculture and their efficient use in the frame of multifunctional agri-food systems", the grant No. 6046070906, funded by the Czech Ministry of Education, Youth and Sports of the Czech Republic.

Key words

Self-sufficiency, pig meat, competitiveness, prediction, agrarian market, Germany, price.

Introduction

The area of pig breeding / stock rising is not important only in terms of pork production, but also because of significant connection to the outputs of crop production. Pork meat is important component of the Czech population´s diet. To the total consumption of meat it contributes by more than 51 %. The position of the livestock production sector has changed significantly from the entry of Czech Republic in the European Union. The pig breeding industry had undergone many changes for accepting common agricultural policy in the year 2004. Subsidies for pig breeding are not part of SAPS payments. Disregarding that pork meat production is production of sensitive commodity it is neither supported by additional national payments TOP-UP. Grants from the Rural Development Programme and those according to the Agricultural Act are not sufficient. Negative trend in pork meat production since 2004 is also due to accumulation of other factors such as rising cost of

pork production, especially the growth of feeding grain prices in the last two years. Furthermore, a reduction in breeding sows, decreased number of weaned piglets, smaller investment opportunities for farmers, increased imports of pedigree pigs and as a result, insufficient ability of producers to deliver large and standardized supplies of meat to meat processors.

Market attractiveness and market position for pigmeat on the German, Italian and French markets analysed Traill et al. (1998)

With the production of about 5 million tonnes of pig meat, Germany was in 2007 the largest pig meat producer in the European Union. (ZMP, 2008a) Germany has produced increasingly more pork meat from 2004 to 2007, which raised the self-sufficiency rate from 91.7 percent to 99.2 percent. Germany is a far more important exporter of processed pig meat than of livestock fat pigs. (Reynolds, 2010)

Russia has been a large net importer of livestock products, especially meat. In 2003, the Russian government created restrictive tariff rate quotas for imports of beef and pork and a pure quota for poultry. The annual quota for poultry was set at 1.05 million metric tons, and the low tariff quota for beef and pork at around 0.45 metric tons. In 2005-06, the government liberalized the meat import policy. (Anderson and Swinnen, 2008)

Karminski (1999) used RCA Index to analyse situation in the Hungary. The calculation is derived from the United Nations Commodity Trade Statistics Database as reported by the EU.

Nin, A., et al. (1999) derived Index of revealed comparative advantage for livestock products and for selected regions – France, Germany, United Kingdom, China, India.

The policy analysis matrix (PAM) approach was used to evaluate the competitiveness of polutry and pig production in Vietnam compared to imports from an open global market. Import and export parity prices of live pig were calculated based on Asian CIF and FOB prices. (Akter et al., 2003)

The main aim of the paper, based on introduced data sources and methodological procedures, is to analyze the impact of self-sufficiency in pork meat imports to the Czech Republic, to predict its size till 2013 and to identify factors that were significantly influencing the increasing volume of imports of pig meat to the Czech Republic during the referred years 2003 to 2011.

Partial goals of the paper can be summarized into the following areas:

- To perform structural analysis of various types of imported pig meat in the period 2003-2010. Definition of factors of the imported meat in terms of its value and quality.

- To actualize comparison of import and export prices of the most representative types of pork meat in the foreign trade and an analysis of the causes of difference.

- Prediction of trend in the foreign trade with pork meat for period 2011-2013.

Hypotheses:

H.1. Decline in self-sufficiency, respectively, with decreasing production of pig meat and stagnancy of its consumption, its imports will increase. Those are variables with high correlations.

H.2. High volumes in imports of lower quality and less valuable parts of pork meat from Germany to Czech Republic are mostly influenced by its low entry price.

This paper is based on the study of sources written by experts in the fields of pig breeding and pork meat production, namely from IAEI (Institute of Agriculture Economics and Information) (Pohlová, Trdlicová, 2010), and MoA (Ministry of Agriculture) (Machek, 2010).

Material and Methods

This paper was prepared on the basis of following documents:

- Balance tables of MoA, published in „Výhledové a situační zprávy" no. 8/2007 and no. 12/2010 (Chapter: The development of pork meat commodity, units: tonnes of live weight).

- Custom Statistics database, accessible from the website of Czech Statistical Office (CSO). The data from reference period January 2003 – May 2011 were examined. To find information on the value of exports, imports, balance and turnover in the trade with pig meat, the view level of the four-digit harmonized system code was used. Analytical information on the price of traded items is identified on the basis of eight-digit combined nomenclature code.

Relationships and methods used:

- The scale of self-sufficiency indicates to what extent can own agricultural production cover the total consumption while stopping exports (= above 100%) or the percentage to what

exceeds domestic needs (= above 100%). (Kraus, 2003)

$$self - sufficiency\ (S) = \frac{own\ agricultural\ production}{total\ domestic\ consumption} * 100\ \%$$

(1)

- Index of competitive advantage RCA was used for the evaluation of competitiveness. It is an auxiliary index of apparent competitive advantage (Revealed Comparative Advantage). For the calculation a method has been chosen, which is expressed (Balassa, 1977)[1] as follows:

$$RCA = \frac{Ex_j - Im_j}{Ex_j - Im_j} * 100$$

(2)

Legend:

Ex_j and Im_j: values of export and import of foreign agrarian trade of j-th commodity in the country. $(Ex_j - Im_{j)}$ = balance, $(Ex_j + Im_j)$ = turnover

Competitive commodities can be defined as those which reach balanced high positive values of index RCA in a given period. As well as uncompetitive commodities can be evaluated those whose values of RCA index move in high negative numbers for a long term.

In which way outstanding imports of pork meat projected are into negative of foreign agricultural balance of Czech Republic was found using the relationship:

$$Balance\ of\ trade\ loading = \frac{B_{it}}{B_t} * 100$$

(3)

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1 See Bela Balassa, "Trade Liberalization and Revealed Comparative Advantage," The Manchester School of Social Studies 33,2 (1965): 99-123; Liesner, H.H., "The European Common Market and British Industry," Economic Journal 68 (1958): 302-316; Vollrath, T. L., "A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage," Weltwirtschaftliches Archiv 130 (1991): 265-279.

Legend:

B_{it}… Export $_{i\text{-commodity}}$ – Import $_{i\text{-commodity}}$, time period t

B_t…Foreign trade balance- agricultural commodities, time period t

Necessary condition : amount of balance B_{it}, <0;

B_t <0

The research uses software Microsoft Excel and Statistica. The regression and correlation analysis was performed on the basis of these programs which proves or disproves influence of factors affecting scale of pork meat import according to the set of hypotheses. T-test was performed within the scope of regression analysis, which tested the statistical significance of absolute term and beta coefficient for the significance level α = 0,05. If the significance p<0,05 is achieved for both members, then is the entire model statistically significant. Furthermore, a prognosis for future three years for those values defined in the goal of the paper was made by using regression equations.

Results and discussion

Domestic pork meat production (tonnes of live weight) has decreased by 36.75 % over the period 2003-2010 (Table 1). Consumption of pork meat in the period stagnated. Self-sufficiency of the Czech Republic in the production of pork meat reflected EU accession by decrease in production in 2005 by 14.06 % in comparison with year 2003. According to MOA and IAEI estimate, the self-sufficiency will decrease to about 60.6 % in year 2011 which would mean a reduction of self-sufficiency relative to year 2003 by 35.63 %. If it remains true that the pork meat will contribute to the overall meat consumption by more than 50 % and the trend of production decrease will continue, Czech consumers will consume mainly meat imported from abroad.

Indicator	2003	2004	2005	2006	2007	2008	2009	2010
Production *)	576.3	547.0	472.0	449.3	463.7	431.6	370.3	366.4
Domestic consumption *)	598.9	564.6	569.9	564.0	588.9	583.0	568.9	574.0
Self-sufficiency (%)	96.23	96.88	82.82	79.66	78.74	74.03	65.09	63.83

Note: *) Production and domestic consumption = thousand tonnes, life weight

Source: Pig meat market: position report, December 2010, side 29 and July 2007, side 26, Ministry of Agriculture, Czech Republic

Table 1: Pig meat self-sufficiency – time series 2003-2010.

1. Live pigs (KN 0103)

Production of live animals (item: KN 0201 – breeding pigs, sows, piglets and slaughter pigs) is a category with minimal added value and the competitiveness is desirable in terms of economic level of our country.

From 2003 to 2007, RCA was positive in the trade with live animals, represented mainly by piglets and slaughter pigs. The trade balance was positive. Countries for export were mainly Slovakia, Croatia, Hungary and Germany. Till the year 2007, Germany was important export country for slaughter pigs. The highest natural value of exports to Germany was recorded in 2006. Czech farmers by those increased exports solved problems with unfavourable price situation on the domestic markets. Since 2007 exports of live pigs to Germany begin to significantly decline, since Germany has increased self-sufficiency in terms of pork meat to 106%. The loss of markets in Germany was compensated by exporting pigs to Hungary. The exports of live pigs in 2010 were realized by 47% in Hungary and by 41% in Slovakia. Since 2008, the balance of trade with animals is negative, according RCA coefficients (Table 2) fell the production of pigs under the level of competitiveness.

Competitive disadvantage reflects the negative balance and low turnover of trade values. Although the values of the RCA coefficients from 2010 show an improvement, it is clear that Czech farms are still well behind for low farm specialization, small scale of investment in housing and equipment. The low competitiveness is also significantly contributed by absence of broader subsidy policies for pig breeding. With increasing imports of pigs

has therefore during the years changed also a structure of imported animals (Table 3). Pedigree animal import is significantly on decline in favour of import of piglets for fattening.

The largest importers of live animals into the Czech Republic nowadays are Denmark, the Netherlands and Germany. There are 21 piglets for each sow in the Czech Republic which is by 7 piglets less than in Denmark or Germany. Mortality during fattening is between 4-5 % in contrast with compared countries where it is 1 %. Daily gains on Czech farms are between 650 g and 700 g. These values are around 850-920 g per day in Denmark or Germany (Jandejsek, 2010). In Denmark, the Netherlands and Germany, there are large concentrated pig farms. These countries, which have a high-quality genetic potential and good health of pigs, require compliance with high hygiene standards in the entire pork meat production process. Two-thirds of total costs of slaughter pig production are feed costs. This item is subject to significant fluctuations depending on grain production in domestic conditions as well as abroad, the price of soybeans on the world markets etc. Due to the rise in prices of feeding grain in last two years and the above-mentioned factors, the profitability of pig breeding could continue to be low. Therefore, a drop in production of slaughter pigs and their increased import from European countries is real.

Import prices of slaughter pigs are higher than export prices as well as prices of domestic production. (Graph 1).

Processors are willing to accept this higher import price due to the need to receive stable, long-term and standardized volumes of animals. This brings

	2003	2004	2005	2006	2007	2008	2009	2010	2011
RCA	90.94	92.13	54.40	27.74	20.41	-16.93	-55.12	-30.58	-15.82

Note: * Values to May 2011
Source: Authors according Czech Statistical Office, Foreign trade database
Methodology: Formula (2)

Table 2 : Coefficient RCA (Reveal Competitive Advantage) – live pigs (KN 0103).

	2003	2004	2010	2011*
Slaughter pigs - KN 1039219 (%)	0.00	28.01	35.20	31.59
Piglets - KN 01039110 (%)	0.00	33.64	60.74	60.67
Breeding pigs - KN 01031000(%)	100	38.35	4.05	7.69
Live pigs (million CZK)	6.615	25.318	959.617	357.159

Note: * Values to May 2011
Source: Authors according Czech Statistical Office, Foreign trade database

Table 3: Live pigs - Import value and KN structure.
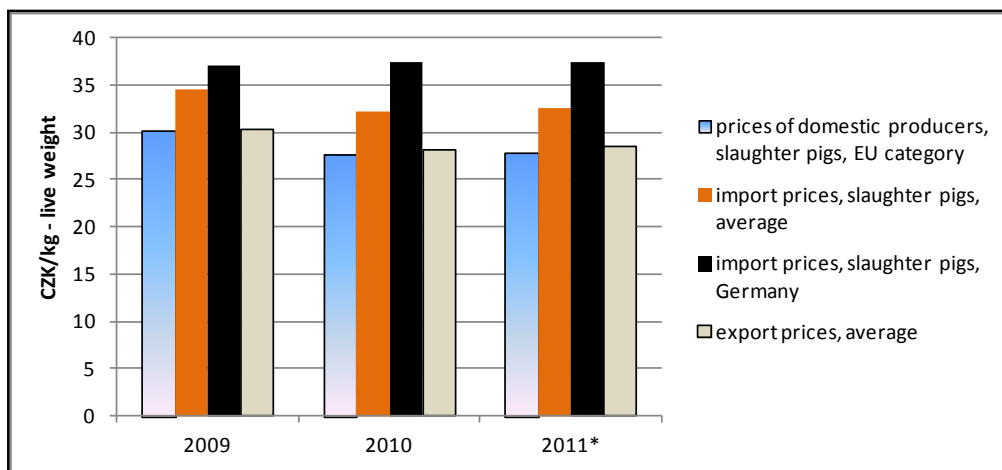
Note: * Values to May 2011
Source: Authors according Czech Statistical Office, Foreign trade database and TIS No.10 2011; pages 8-10.
Graph 1: Slaughter pigs: Export and Import prices, prices of domestic producers, 2009-2011,
CZK/kg – live weight.

	Thousand CZK				(%)	Coefficient
	Export	Import	Balance B_{203}	Balance B_t	B_{203}/B_t	RCA (2)
2003	411 287	1 350 617	-939 330	-25 454 644	3.69	-53.31
2004	675 542	3 320 742	-645 200	-32 295 453	8.19	-16.14
2005	1 137 452	5 397 047	-4 259 595	-25 002 745	17.04	-65.19
2006	1 269 864	6 159 325	-4 889 461	-34 194 621	14.30	-65.81
2007	1 585 872	6 905 046	-5 319 174	-32 453 106	16.39	-62.65
2008	1 874 282	8 017 809	-6 143 527	-24 117 060	25.47	-62.11
2009	1 955 462	9 477 701	-7 522 239	-32 027 522	23.49	-65.79
2010	1 873 848	9 675 624	-7 801 776	-33 603 646	23.22	-67.55
2011*)	766 024	3 686 389	-2 920 365	-15 148 423	19.27	-65.59

Source: Authors according Czech Statistical Office, Foreign trade database
Note: * Values to May 2011
Table 4: Pig meat foreign trade (KN 0203) and RCA coefficient.

even additional costs associated with haulage abroad.

2. Meat of pigs, chilled and frozen (KN 0203)

2.1. Effect of pig meat imports on agrarian trade balance and prediction of meat imports by 2013

Czech products with higher added value are not competitive in the surrounding markets nowadays nor had been before the entry to European Union. The competitive disadvantage is still increasing in recent years. It is not affected only by manufacturing economy, but also by decrease in the number of live animals produced by Czech farmers and growing negative balance of trade in pork meat. Increased imports of pork meat have increasingly negative effect on Czech foreign agricultural balance. The

calculations (Table 4) shows that in 2003 the negative balance of pork meat (B203) changed a total negative trade balance in food products (Bt) only by 2.39 %. This value was in range 23-25% in the years 2008-2010. If the RCA result is negative due to negative foreign trade balance, then it is necessary in terms of competitiveness to keep negative value of coefficient at lowest possible level. This is possible to achieve by balanced import and export values as well as, if possible, by higher values of turnover. RCA coefficients reach still increasing negative values because the constituents grow unevenly. Unlike the RCA coefficients of live pigs (KN 0103), which are improving from the year 2008, the pork meat RCA coefficients indicate dynamics in foreign trade as late as first five months of 2011.

Prognosis of self-sufficiency of the Ministry of Agriculture (MoA) and the Institute of Agricultural Economics and Information (IAEE) concerns decrease in self-sufficiency in pig meat for the year 2011 to 60.6 percents. By instalment of this value in the function y1, an estimation of value of total imports of pig meat in 2011 in amount 204 141.14 tonnes was found out. It would be dealt with year-on-year increase in imports by 4.18 %. Other possible values of self-sufficiency in pig meat and their impact on development of imports of pig meat is presented in the Table 5.

Results of Regression Analysis, No. 2 and 3

Dependence of pig meat import development in time in natural expression (regression No. 2) and following pig meat import analysis in time in value expression (regression No. 3).

Regression 2 determinant coefficient $R^2 = 0.9585$, R2 is a statistic that will give some information about the goodness of fit of a model. In regression, the R^2 coefficient of determination is a statistical measure of how well the regression line approximates the real data points.

Original selected collection contained 8 values (years 2003 – 2010). Nevertheless, the model showed statistical irrelevancy because t-test results were not <0.05. Data in the model were adjusted and marginal value of the year 2003 was taken away from the input values. Other t-test confirmed that the model is statistically significant and its conclusion can be taken into consideration for data of the basic collection.

	Absolute term	Regression coefficient (Beta)	p-value (absolute term)	p-value (independent variable)
N=8	467939.3	-4353.1	0.000003	0.000018
	Equation of Regression		Prediction	-95%	95%
X=60.6	y1= 467939.3-4353.1x	204 141	184 817	223 466
X=59.0	y1= 467939.3-4353.1x	211 107	190 594	231 619
X=58.0	y1= 467939.3-4353.1x	215 460	194 192	236 727
X=57.0	y1= 467939.3-4353.1x	219 813	197 783	241 843
X=56.0	y1= 467939.3-4353.1x	224 166	201 365	246 966
X=55.0	y1= 467939.3-4353.1x	228 519	204 941	252 097
X=54.0	y1= 467939.3-4353.1x	232 872	208 511	257 233

Note: N=number of value – sampling collection , t-test result : p <0.05= statistically significant
Source: STATISTICA 10 Software, Czech Statistical Office, Foreign trade database and Tariff Statistics

Table 5 : Pig meat Import Dependence on Self-sufficiency degree: Statistical characteristics.

N= 7	Absolute term	Regression coefficient (Beta)	p-value (absolute term)	p-value (independent variable)
y2 (Regression 2)	53 470 906	20 455 177	0.000988	0.000077
y3 (Regression 3)	2 838 408	1 038 730	0.000580	0.000055
	Equation of Regression		Prediction	-95%	95%
2011	y2=53470906+20455177x	217 112 319	197 154 531	237 070 108
2012	y2=53470906+20455177x	237 567 496	213 535 137	261 599 856
2013	y2=53470906+20455177x	258 022 673	229 798 098	286 247 248
2011	y3 = 2838408 +1038730x	11 148 247	10 203 825	12 092 670
2012	y3 = 2838408 +1038730x	12 186 977	11 049 742	13 324 213
2013	y3 = 2838408 +1038730x	13 225 707	11 890 092	14 561 322

Legend:
y2= dependent variable- pig meat import: kg, slaughter weight (natural value)
y3= dependent variable- pig meat import: thousand CZK
x= independent variable: time (2004-2010)
N= number of value – sampling collection, t-test result: p <0.05 = statistically significant
Source: STATISTICA 10 Software, Czech Statistical Office, Foreign trade database and Tariff Statistics

Table 6: Pig meat Import - main statistical characteristics, time series 2011-2013.

Hypothesis 1: Decline in self-sufficiency, respectively, with decreasing production of pig meat and stagnancy of its consumption, its imports will increase. Those are variables with high correlations.

Results of Regression Analysis, No. 1

Regression coefficient represents the rate of change of one dependent variable (y1 = pig meat import in tone: slaughter weight) as a function of changes in the other independent variable (x = self-efficiency in %); it is the slope of the regression line. The simple linear regression is counted by STATISTICA 10 Software. $R^2 = 0.961782$, R^2 is a statistic that will give some information about the goodness of fit of a model. In regression, the R^2 coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R^2 of 1.0 indicates that the regression

The task of regression No. 2 was to predict development of pig meat in the CR till 2013. Its results were confronted with the regression No. 1 and a degree of self-sufficiency was estimated from import values according to the prognosis No. 2. The starting point for prognosis of self-sufficiency rate was the prediction of MoA and IAEE for 2011 which sets up self-sufficiency in the height of 60.6 %. In connection with the value of self-sufficiency in height 60.6 % in the regression No. 1, a value of export was predicted which corresponds with a bottom border of estimation for the import value in the regression analysis No. 2. If this relation will be

s starting point also in next years, then an estimation of the bottom border of import from the regression No. 2 will be accepted. A self-sufficiency Value for this estimation from the regression is predicted in the height of 58 – 59 %. For the year 2013, a self-sufficiency value was set up in a similar way in the height of c. 54 %.

Regression 2 determinant coefficient R2= 0,961

Value of pig meat export in value expression:

Year 2011: interval: 10.2-12.1 mld. CZK

Year 2012: interval: 11.1-13.3 mld. CZK

Year 2013: interval 11.9-14.6 mld. CZK

If the values of annual agrarian import of the CR keeps the current long-term trend of height 140 – 150 mld., then the import of pig meat in 2013 would amounted as many as 9-10 % of expenditures to the total agrarian import- In 2010 it was 6.8 %.

2.2. Structural analysis of imports and price comparison

Before accession of the Czech Republic to the EU some of the items of foreign trade were in surplus. It was a cold meat in the following categories: whole and half pork, non-boned chilled rumps and front pig parts. In 2010, the positive trade balance reduced to the only item of pig meat: frozen whole bodies and halves (KN 02032110). The positive balance was only in the amount 19 mil. CZK. The biggest amount of chilled and frozen pig meat (KN 203) was in 2010 imported from Germany and

KN	TOP Export 2010	million tons	CZK/kg
2031110	Fresh or chilled domestic pigs carcases and half-carcases	14 062.574	39.027
2031955	Fresh or chilled boneless meat of domestic pigs	11 345.404	74.582
2032955	Frozen boneless meat of domestic pigs	2 800.133	49.825
2031190	Fresh or chilled non-domestic pigs carcases and half-carcases	1 151.411	38.880
2031990	Fresh or chilled non-domestic pigs meat : other meat	1 005.740	55.969
2031915	Fresh or chilled bellies "streaky" and cuts thereof domestic pigs	987.288	44.987
KN	TOP Import 2010	million tons	CZK/kg
2031955	Fresh or chilled boneless meat of domestic pigs	62 878.898	56.561
2031211	Fresh or chilled bone in, domestic pigs hams and cuts thereof	26 892.514	47.749
2032955	Frozen boneless meat of domestic pigs	25 432.944	43.551
2031110	Fresh or chilled domestic pigs carcases and half-carcases	23 522.619	40.663
2031915	Fresh or chilled bellies "streaky" and cuts thereof domestic pigs	13 121.483	45.946
2031913	Fresh or chilled loins and cuts thereof of domestic pigs	10 748.204	57.248

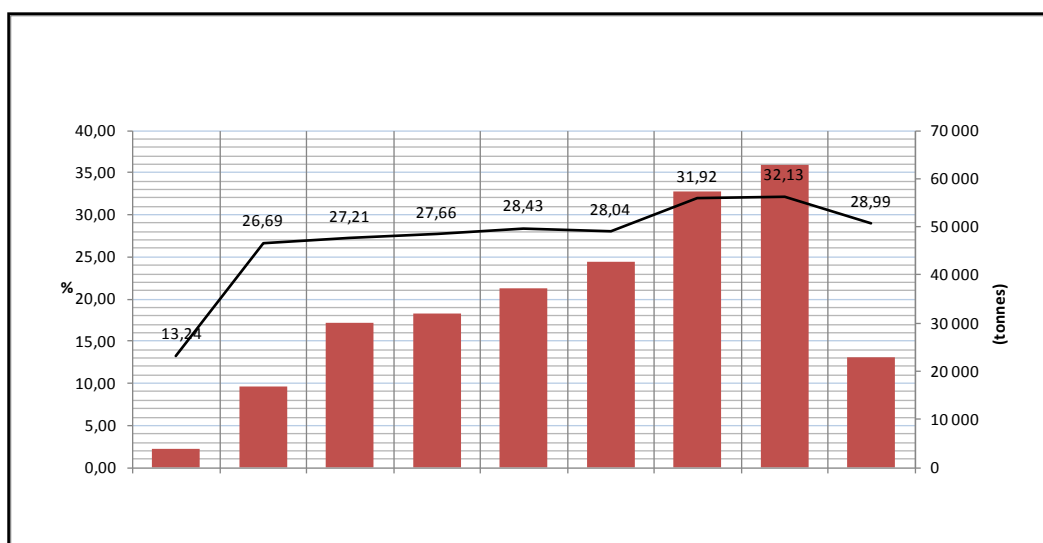Source: Authors according Czech Statistical Office, Foreign trade database
Note: non-domestic pigs: wild boar, barbirusa, peccary

Table 7 : Top export and top import – pig meat, combined nomenclature, export and import prices.

Poland. A share of expenditures for meat import from Germany amounted 49.8 % of the total expenditures for pig meat import last year. Till May 2011, this share created 48 %. The CR has the significant positive balance of pig meat trade only with Slovakia. In the reference period 2003 – 2011, the most represented kind of imported pig meat in the CR is the category "meat from domestic pigs other, chilled, boned (KN 020318955). It is dealt with low valuable parts of pig meat like skin, navels, dewlaps and others. Since 2003 to 2010, the representation of this meat category in the imported pig meat improved by 18.96 %.

Other important import components are qualitatively more significant categories of pig meat: rumps from domestic pigs, chilled, non-boned (KN 2031211) and meat from domestic pigs, chilled entire or halving (KN 2031110) (Table 7).

Less valuable pork meat is imported in the Czech Republic for further processing and it is certainly not a positive development that its percentage of the pork meat total imports steadily slightly increases in the period from 2004 to 2010 (Figure 2). It is positive that in the first five months of the year 2011, the observed value was 28.99 %, considering the
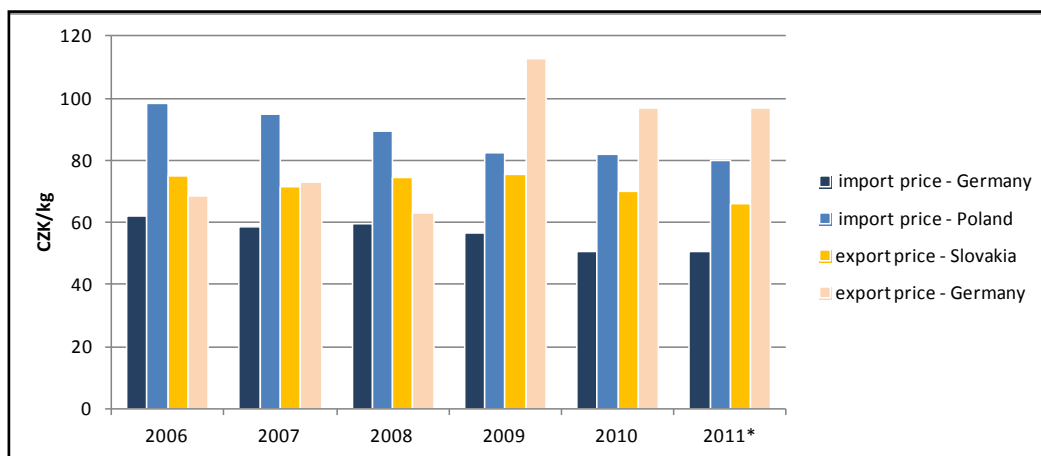

Source: Authors according to the foreign trade database of CSO
Note *) Date till 2011
Others = kind unlisted in customs statistics tariff (skin, navels, dewlaps)
Graph 2: Volume of import „other pig meat" and its ratio on the total imports of chilled and frozen pig meat in the CR in 2003 - 2011.

Source: Authors´ calculations according to database of foreign trade of CSO
Note *) Date till 2011
Others = kind unlisted in customs statistics tariff (skin, navels, dewlaps)
Graph 3: Export and import prices of meat from domestic pigs, other, fresh, chilled, boned– KN 203 19 55, CZK/kg.

N=25	Absolute component	Regression coefficient (beta component)	p-value of absol. component	p-value of independent variable	
y5	15603831	-163665	0,000004		0.001249
	Regression function		prediction	-95%	95%
x= 45	y5= 15603831-163665x		8 238 907	6944507	9533307
x=50	y5= 15603831-163665x		7420582	6536629	8304536
x=56	y5= 15603831-163665x		6602258	5917359	6959826

Note:
y4 = dependent variable: pig meat import in thous. CZK (the 1st quarter 2003 – the 1st quarter 2011)
y5= dependent variable: pig meat import in thous. CZK (the 4th quarter 2004-the 1st quarter 2011)
x= independent variable: price of meat import KN 0203 1955 from Germany in CZK/kg
N=number of values of selective collection (the 4th quarter 2004-the 1st quarter 2011)
Source: Statistica 10 software, data: customs statistics of CSO
Table 8 : Basic statistical characteristics of pig meat export from Germany in dependence of import price together with prognosis of import amount within change in price.

same period last year by 2.96 % lower. The largest number of the above-mentioned meat type KN 0203 1955 is imported from Germany. In the fourth quarter of 2010, 8958.4 tonnes were imported (49.2 % of the total imported "other pork meat"), in the first quarter of 2011 5564.2 tonnes were imported (44 % of the total imported "other pork meat").

A comparison of imports and export prices of this meat was carried out and it was stated: The import of "other pig meat" from Germany is realized under preferable price conditions thanthe import from Poland or meat export in Slovakia (Graph 3).

Hypothesis No. 2: High volumes of imports of less-quality and valuable parts of pig meat from Germany into the CR are influenced the most just by its low import price.

Results of regression No. 4 and 5

Regression No. 4 R= 0.59   R2= 35.77 %

The original selective collection contained 33 values (the 1st quarter 2003 – the 1st quarter 2011). Nevertheless, the model showed a statistical irrelevancy because the t-test results were not <0.05. Data in the model were adjusted and values of the year 2003, which showed a considerable variation from values in following years, were taken away. Only the values, which were influenced by the effect of the CR in the EU (the 4th quarter 2010 – the 1st quarter 2011), were used. Other t-test already confirmed that the model is statistically significant and its conclusions can be enlarged to data of the basic collection.

From the value of correlation coefficient and the determination coefficient it resulted that tightness of dependence among variables is slight because

R∈(0,3-0,5). The share of dispersion of variables was explained by regression from 33.10 % from possible 100 %. It means: An influence of one variable on the second was proved because if R2∈(25%-50%), the variability was significantly explained. Growing import of less valuable pig meat from Germany is from 33.1 % determined by the import price. The hypothesis No. 2 was confirmed. The variables influenced mutually, nevertheless, there is not the supposed strong interaction.

The import meat price KN 0203 1955 from Germany get at the level 56.7 CZK/kg over the May. If the import price of the considered kind of meat from Germany will keep this trend in the following quarters and will move in the interval 50 – 56 CZK/kg, the amount of import in values 7 420.582 - 6 438.593 tonnes over a quarter is predicted according to the regression function. So, the prognosis supposes a decrease and stabilization of amount of imports of the researched kind of meat according to the mentioned price development. Imports of this pig meat can correspond with imports from 2008-2009.

Discussion and conclusion

The situation in the area of pig breeding is serious and the results of the paper confirmed conclusions presented by Machek (2011). The work analyzes the problem of self-sufficiency in terms of pork meat, monitors its causes and predicts consequences of non-competitiveness in the area of foreign trade.

The scope of livestock breeding has greatly diminished since 2003. Compared with 2010, there was a decline in the number of pigs more than 43 % and the number of sows more than 53 %. The

Czech Republic cannot compete with Germany or Denmark in the numbers of bred piglets or daily gains of slaughter pigs or in the hygienic and health level, concentration and specialization of the breeds yet.

Self-sufficiency in pig meat production has decreased by 33,81% in the period 2003-2010.

On the basis of the original prognosis of MoA and IAEI, which states that the level of self-sufficiency in the sector of pork meat will reach 60.6 % in the year 2011, new prognosis of self-sufficiency development was made using confrontation of two own regression analyses. If the situation in the field of production and consumption of pork meat develops according to the trends researched, then self-sufficiency is predicted at 54 % for year 2013.

On the basis of the made prognosis of pork meat import development in the Czech Republic it was found out that the import value can reach 11.9-14.6 billion CZK in 2013 which is 9-10 % of the total agricultural import in the Czech Republic.

Of the 9675 billion CZK total imports of chilled and frozen pork meat in 2010 Germany has taken main share in importing for 5851 billion CZK (60.6 % of all imports). Above all, the share of lower quality pork meat grows year on year. Poor quality pork meat was in 44 % cases imported for favourable price conditions. The regression analysis has proved that the amount of imports is by 33 % influenced by its price. The price is important factor, still not decisive. Other important factors are: processors' needs to get one-at-time large amount supplies which the domestic farmers cannot produce, standardization of supplies, CZK/EUR exchange rate, and cost demands cause mainly by insufficient fodder base.

In the pork meat sector in the Czech Republic, there is insufficient support from the state. Subsidies are paid according to „Principles which set conditions for granting subsidies for the maintenance and utilization of genetic resources for food and agriculture from the resources of the Czech Republic" and with the participation of the EU Rural Development Programme. In the area of sensitive commodity market stabilization, the EU could allow re-introduction of price support.

In the light of increasing energy demand, decreasing fossil fuel resources, rising consumption and purchasing power of Far East nations, land purchases in areas with inadequate and uneconomic land use, the pressure to maintain self-sufficiency in food production will grow. Food import won´t be strategically and economically effective in the future.

Summary

The main goal of the paper is, according to listed data sources and methodological approaches, to analyze the impact of self-sufficiency on the imports of pork meat to the Czech Republic and to define factors that are significantly correlating with the growing volume of pork meat imports in period 2003-2011. Structural analysis of different types of pork meat in the reference period was carried out as well as a comparison of import and export prices of the most traded pork meat types in international trade and analysis of differential pricing causes. The paper made prediction of self-sufficiency and pork meat import rates development in the period 2011-2013. The basic methods were calculations of self-sufficiency degree and competitive advantage RCA. The research uses software Microsoft Excel and Statistica. The regression and correlation analysis was performed on the basis of these programs which proves or disproves the influence of factors affecting scale of pork meat import according to the set of hypotheses. The hypothesis No. 1 was confirmed: self-sufficiency in pork meat sector has decreased by 33 % in the period 2003-2010. The correlation between the dependent variable „self-sufficiency" and the independent variable „amount of pork meat imports" was revealed. The hypothesis No. 2 was confirmed: Regression analysis had proved a correlation between the amount of imports and its prices. The price is important factor, still not decisive. According to the pork meat import development prognosis the import of pork meat may increase up to 11.9-14.6 billions CZK until 2013 in the Czech Republic. The pressure to maintain self-sufficiency in the food production is important in the light of increasing energy demand, decreasing fossil fuel resources, rising consumption and purchasing power of Far East nations, land purchases in areas with inadequate and uneconomic land use.

Acknowledgement

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