RECENT TRENDS AND PROSPECTIVE EVALUATIONS ON THE PORK MARKET IN ROMANIA

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Abstract

The scientific paper had the purpose to identify and highlight specific trends of pork market both in Romania and in selected EU member states (Hungary, Bulgaria, Greece, Slovakia, Poland, Lithuania, Latvia). In the Romanian agri-food system, there is a correlation between pork production and purchasing power. Romania's pork consumption is still substantially below that of the European average of 46.4kg per capita. A positive aspect is the lifting of the ban on Romanian pork to the European Union. Therefore, it could be considered a boost of the food industry, as the trade system could be developed, satisfying local and overseas supply and demand. Taking into account the current tendencies for pork production and exchanges in European Union, one could find out that there is a reduction of livestock in the European Union. Pork production depends on country and it is linked to feed prices and reorganization. The analysis is based on statistical data regarding pork production, highlighting its evolution of pork production before and after our country's accession to the European Union, comparing pork production evolution at national level to the average one of other countries, during the period of time 2001-2012. There were also determined the adjusted values of the chronological series as well as the extrapolated ones for 2013and 2014.

Key words: *adjustment, extrapolation, pork production, time series, trend*

INTRODUCTION

One of the main food sources in human alimentation is represented by meat. Nowadays, worldwide meat market is threatened by consumers' active reactions against some animal diseases. Nevertheless, developing countries consume approximately 28 kilos of meat per capita, unlike developed regions where the consumption has a value of almost 77 kilos per capita. Although Romania holds the 52nd place within the global classification regarding pork production, at national level this sector is well valued, the meat being consumed in generous quantities.

After consulting Romanian statistical publications, one could observe a consumption of 32 pork kilos per capita during a year, the highest value of consumption being recorded around the winter holidays. A big quantity of pork for consumption is imported into European Union member states. In the agri-food system of our

country, there is a correlation between pork production and purchasing power. Hereby, it will lead to a significant pass, from the production intended for self-consumption to the commercial one.

Romanian swine farmers must adapt to consumers requirements of quality. These must correspond to those of the European Union, being necessary a refinement of pig population in order to improve pork quality.

During the six years before Romania's accession to the European Union, pork production fluctuated at national level, reaching the maximum value of 522,432 tons in 2003 and the minimum one in the next year, respectively 364,075 tons.

Although in the last two years before the accession, 2005 and 2006, the trend of production was an increasing one, recording a growth of 16 per cent, respectively 18 per cent, in comparison to 2004 (Table 1). Along with the accession, pork production followed a decreasing trend, with a maximum value of

447,310 tons in 2007. Opposite to it, the year 2010 had the lowest value of production, namely 363,109 tons (Table 2).

Table 1. Pork production in Romania between 2001-2006

Year	2001	2002	2003	2004	2005	2006
Pork prod. (thousand tons)	438.7	457.6	522.4	364.1	422.6	432.9

Source: Food and Agriculture Organization of the United Nations

Table 2. Pork production in Romania between 2007-2012

Year	2007	2008	2009	2010	2011	2012
Pork prod. (thousand tons)	447.3	383.4	381.9	363.1	398.4	386.2

Source: Food and Agriculture Organization of the United Nations

During the analyzed period, 2001-2012, the highest values of the pork production were registered in Poland, in 2003, almost 2,200,000 tons. As seen in Table 3, the lowest registered values were in Latvia, specifically at the beginning of the analyzed period, approximately 28,000 tons.

Table 3. Pork productions of selected EU Member States (thousand tons)

Year	RO	HU	BG	EL	SK	PL	LT	LV
2001	438.7	595.0	237.0	134.5	151.5	1.849.0	72.9	28.0
2002	457.6	596.3	61.8	108.6	151.7	2.023.3	97.7	28.0
2003	522.4	521.9	70.6	108.1	181.4	2.192.8	105.7	32.8
2004	364.1	530.3	78.3	105.6	160.2	1.949.8	113.0	33.5
2005	422.6	423.6	73.6	105.3	129.1	1.948.6	120.6	35.4
2006	432.9	445.2	73.3	101.3	113.1	2.129.7	112.9	33.3
2007	447.3	470.1	74.0	105.5	113.8	2.152.1	116.2	37.1
2008	383.4	458.7	72.8	104.7	97.8	1.866.9	103.5	41.9
2009	381.9	455.1	71.8	104.3	84.0	1.600.8	103.0	46.3
2010	363.1	410.5	69.2	103.0	101.5	1.739.9	106.0	49.5
2011	398.4	425.0	71.6	103.9	71.3	1.715.0	93.9	53.8
2012	386.2	384.3	72.2	103.7	67.8	1.611.1	98.6	52.1

Source: Food and Agriculture Organization of the United Nations.

Both the pork production in Romania and the average pork production of E.U. selected countries have had a resembling fluctuation over the analyzed period (Table 4).

Table 4. Comparison between pork production evolution in Romania and the average one of selected EU Member States[*]

Year	Romania (Thousand tons)	Average production of selected E.U Member States (Thousand tons)
2001	438.7	438.3
2002	457.6	440.6
2003	522.4	467.0
2004	364.1	416.8
2005	422.6	407.3
2006	432.9	430.2
2007	447.3	439.5
2008	383.4	391.2
2009	381.9	355.9
2010	363.1	367.8
2011	398.4	366.6
2012	386.2	347.0

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations.
[*]Romania, Hungary, Bulgaria, Greece, Slovakia, Poland, Lithuania, Latvia.

They both pitched in 2003, as following: Romania with a production of over 520,000 tons and the average production of EU Member States registered a slightly lower value (467,000 tons). Between 2004 and 2007, they both recorded an increase, after which they had a significant decreasing tendency throughout the next five years.

In this context, the present paper proposes by the use of statistical techniques to extrapolate the pork production in Romania, based on data released by Food and Agriculture Organization of the United Nations.

MATERIALS AND METHODS

As a purpose of this scientific research, one can identify the estimation of pork production trend evolution.

In order to achieve this aim, calculations were made through methods and
procedures for data adjustment, on the basis of chronological series.

Within a chronological series, one could identify the systematic components, as following: trend, cyclic and seasonal oscillations and residual variances (Antonescu C, 2002).

The main problem in the time series analysis is determining the trend. Therefore, cyclic, seasonal and residual oscillations will be eliminated and will be replaced with real terms that express the trend (Biji E.M. et al, 1999).

The adjustment can be made by mechanical methods, the most commonly used being: the average absolute change method and the average dynamic index method.

According to Lilea E. et al (2001), the absolute average change method is recommended when absolute changes with mobile basis are roughly equal or when the string of chronological series terms is similar to an arithmetic progression.

Thereby, variable's values are being modified relatively uniform and the chronological chart can be approximated by a straight line. The adjustment function for the absolute average change method is:

$$Y_t = y_1 + (t-1) \cdot \overline{\Delta},$$

where:

$t = \overline{1,n}$;

$$\overline{\Delta} = \frac{\Delta_{t/t-1}}{n-1}$$

or

$$Y_{t_i} = y_0 + t_i \cdot \overline{\Delta} ,$$

where:

$y_0 =$ the term chosen as a basis for the adjustment;

$t_i =$ the time variable in relation to the basis for the adjustment (the position that said term has compared to the term chosen as basis).

The method of average dynamic index is recommended if the dynamic indexes with mobile basis are roughly equal or if the string of chronological series terms is similar to a geometric progression.

The adjustment function for the average dynamic index method is:

$$Y_t = y_1 \cdot \overline{I}^{t-1},$$

where:

$$\overline{I} = \sqrt[n-1]{\prod I_{t/t-1}}$$

or

$$Y_{t_i} = y_0 \cdot \overline{I}^{t_i} ,$$

where:

$y_0 =$ the term taken as a basis for the adjustment;

$t_i =$ the time variable in relation to the basis for the adjustment (the position that said term has compared to the term chosen as basis).

In order to choose the optimal method of adjustment, one has to determine the deviation sum of empiric and theoretic values.

The adjustment process by which this sum is minimal is considered to be the best (Biji E.M. et al, 1998).

$$\sum_{i=1}^{n} |y_t - Y_t| = \min$$

The extrapolation models are:

- for the absolute average change method:

$$Y_{t_i}^{'} = y_0 + t_i^{'} \cdot \overline{\Delta}$$

- for the average dynamic index method:

$$Y_{t_i}^{'} = y_0 \cdot \overline{I}^{t_i^{'}}$$

where $t^{'} = \overline{n+1;n+k}$, k=forecast horizon.

Extrapolated values attend to errors generated by the following causes: future modification of influence factors; choosing the adjustment model.

Taking into account the hypothesis that factors influence is not being modified, extrapolation values are obtained by prolonging only the ones of time variable within the chosen adjustment model.

It is recommended that time horizon for which the extrapolation is determined not to exceed half of the analyzed series length.

RESULTS AND DISCUSSIONS

The data on pork production in Romania in the last six years before joining the E.U., and in the first 6 years after accession can be found in the Figure 1.
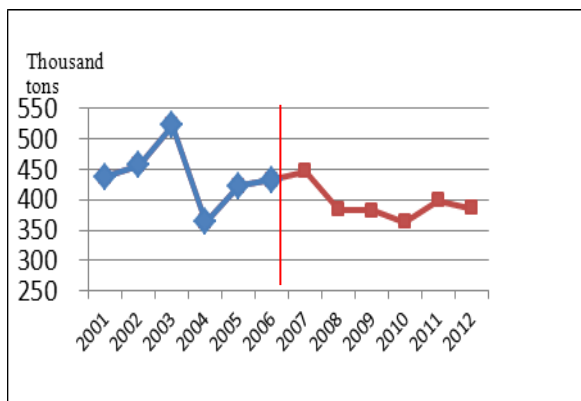
Fig. 1. The evolution of pork production before and after Romania's accession to the European Union
Source: Food and Agriculture Organization of the United Nations

We calculated the adjusted values using the absolute average change method in Table 5.
The results of the application of the average dynamic index method are presented in Table 6.

Table 5. The pork production and adjusted values calculated with the absolute average change method

Year	Production (thousand tons)	Adjusted values $Y_{t_i} = y_0 + t_i \cdot \overline{\Delta}$
2001	438.67	438.67
2002	457.62	433.89
2003	522.42	429.12
2004	364.08	424.35
2005	422.58	419.58
2006	432.86	414.80
2007	447.31	410.03
2008	383.40	405.26
2009	381.86	400.49
2010	363.11	395.71
2011	398.37	390.94
2012	386.17	386.17

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Also, for both methods, the deviations from the real values were calculated, as well as the sum of these deviations (Table 7).
This sum is necessary to determine the best method of extrapolation.

Table 6. The pork production and adjusted values calculated with the average dynamic index method

Year	Production (thousand tones)	Adjusted values $Y_{t_i} = y_0 \cdot \overline{I}^{t_i}$
2001	438.67	438.67
2002	457.62	433.62
2003	522.42	428.64
2004	364.08	423.71
2005	422.58	418.83
2006	432.86	414.02
2007	447.31	409.26
2008	383.40	404.55
2009	381.86	399.90
2010	363.11	395.30
2011	398.37	390.75
2012	386.17	386.26

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Table 7. The deviations of the adjusted values according to the absolute average change method and the average dynamic index method

Year	$\left| y_i - (y_0 + t_i \overline{\Delta}) \right|$	$\left| y_i - y_0 \cdot \overline{I}^{t_i} \right|$
2001	438.67	438.67
2002	457.62	433.62
2003	522.42	428.64
2004	364.08	423.71
2005	422.58	418.83
2006	432.86	414.02
2007	447.31	409.26
2008	383.40	404.55
2009	381.86	399.90
2010	363.11	395.30
2011	398.37	390.75
2012	386.17	386.26
Total	316.16	317.15

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

For the absolute average change method:

$$\sum_{i=1}^{n} |y_t - Y_t| = 316.16.$$

For the average dynamic index method:

$$\sum_{i=1}^{n} |y_t - Y_t| = 317.15.$$

The two amounts were compared and, according to the obtained result, the suitable method to extrapolate the values for the years

2013 and 2014 is the average absolute change one.

Thus, the model of extrapolation used in this case is:

$$Y'_{t_i} = y_0 + t'_i \cdot \overline{\Delta};$$

$$Y'_{t_{13}} = y_0 + t'_{13} \cdot \overline{\Delta}; \quad Y'_{t_{13}} = 376.62$$

$$Y'_{14} = y_0 + t'_{14} \cdot \overline{\Delta}; \quad Y'_{t_{14}} = 371.85$$

Table 8. Extrapolated values for 2013 and 2014

Year	Production (thousand tons)
2013	376.62
2014	371.85

Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations
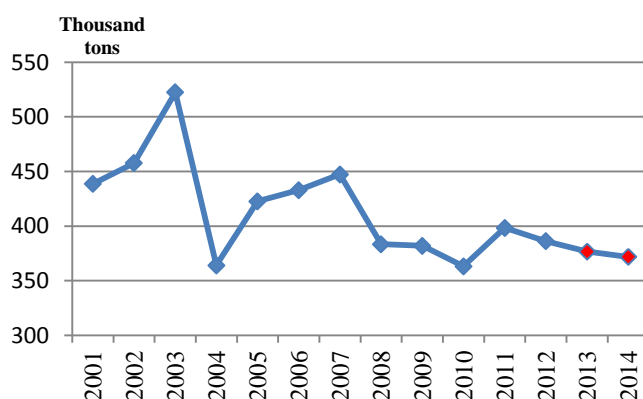

Fig. 2. The projection of the pork production in Romania for 2013 and 2014
Source: Own calculation based on the data provided by Food and Agriculture Organization of the United Nations

Figure 2 shows a visual interpretation of the extrapolated values in the evolution of pork production in Romania.

CONCLUSIONS

Romania's accession to European Union had a great impact on all the market branches, mainly for the agri-food one. Being known as a country with high agricultural potential, foreign investors were attracted by this sector. The opportunities given to Romanian farmers after the accession are huge. Even if there was a significant improvement in the food industry, much more must be done in order to restructure it so as meat market meet the European Union's standards concerning quality and safety.

Trade is well developed now, imports being an important part of the economic increase. Romanian market imports pork because pigs in here provide only a quarter from the intern meat necessary.

In order to record an economic increase, meat sector has to meet the increasing demands of consumers.

The main objective of pork market is represented by the expansion of industrialized production, along with vertically integrated value chains.

Therefore, during the six years before Romania's accession to the E.U., pork production fluctuated at national level, in 2005 and 2006, the trend of production was an increasing one, recording a growth of 16 per cent, respectively 18 per cent, in comparison with 2004.

Along with the accession, pork production followed a decreasing trend, with a maximum value of 447,310 tons in 2007. Opposite to it, the year 2010 had the lowest value of production, namely 363,109 tons.

Pork production in Romania and the average one of the selected E.U. member countries pitched in 2003, as following: Romania with a production of over 520,000 tons while the average production of E.U. member states registered a slightly lower value (467,000 tons).

The module sum of the adjusted values (AAC) is lower than the one of the adjusted values (ADI) (317.17 tons >316.16 tons) during the analyzed period. Using the established method as best suitable, the pork production values were extrapolated for the next two years 2013 and 2014.

If the factors that influence the series did not suffer a major modification in the next two years, then it is safe to say that the extrapolated production for the years 2013 and 2014 are quite accurate.

As a final conclusion, Romanian farmers should pay more attention to farm management in order to expand their own business, to increase profitability year after

year, by using the available resources in more efficient ways.

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