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Supply, Consumption and Trade Balance of Cattle and Pig Breeding in Serbia

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Abstract

The aim of the study was to analyze the situation in livestock production in the period 2010-2012. Special emphasis is placed on the balance of supply and consumption of cattle and swine in this period, with the estimated value for the 2013. Statistical data on the balance of cattle indicate a decline in the total number of cattle in the 2012 compared to 2010 for 5.98 %, and for 2013 it was estimated to decrease by an additional 0.76 % in relation to the 2012. The balance of supply and consumption in the pig breeding also decreased as the total number of pigs in the 2012 in relation to the 2010 was 7.40 %, and it is estimated for 2013 to decrease by an additional 0.76 % in relation to the 2012. The same trend (decreasing) is noticed in the case of supply and consumption of beef and pork. In the domestic market livestock (cattle and pigs) there were no significant fluctuations in price. Finally, there is a graph showing trends in average annual purchase price , with the price of cattle fattening in the 2012, which in relation to the 2010 increased by 35.38 %, ie. for 55.76 RSD and fattening pigs to 37.41 % , ie. for 51.03 RSD. The purpose of the research was to determine the tendency of livestock, meat, and the average annual turnover of purchase price. Sources of data are derived from relevant national literature, the database of the Statistical Office of the Republic of Serbia (SORS), and the official data of the Ministry of Agriculture, Forestry and Water Management of Serbia. The results of research are the basis for changes in the legal regulation of agriculture, but in the direction that encourage farmers to improve livestock funds.

Keywords: *supply, consumption, trade, trade balance, the purchase price*

JEL Classification: *Q11, Q13*

Introduction

Field crop and livestock productions are the most common agricultural productions in Serbia, with a share of about 40% each in total agricultural production, followed by fruit and vegetable production with a share of approx. 12%. Grains, primarily corn and wheat, are most often grown, almost on half of all available fields in Serbia every year. In the recent years, Serbia has become one of the 10 biggest exporters of corn in the world. Based on above mentioned general facts, it is obvious why in Serbia agriculture has traditionally been one of the major branches of the economy, and considering the natural resources and their potential, agriculture is actually one of the most important branches of economy in the Serbian strategy of development in future. But, it is also obvious that livestock production in Serbia is far from the potential and possibilities, concerning all available country resources for animal production, primarily feed availability. Actual share of livestock production (in 2012) in total agricultural production is 37.9%. This could be general indicator of relatively poor agricultural development in Serbia, if the criterion is considered that share of livestock production in general agriculture of below 35% indicates an underdeveloped agriculture as a sector in a country's economy. Additional information which also can confirm negative trend in agriculture development in general and livestock production particularly in Serbia, is number of livestock unit per ha of agricultural land in years 2007 and 2012, which was 0.31 and 0.28 respectively. Cattle and pig production are dominant and together make almost 80% of total livestock production in Serbia, 43 and 33% respectively in 2012 *(Lukić et al., 2013).*

Serbia is currently on the edge of self-sufficiency in production of meat, and covers the needs of its population from own production, but have low export surpluses. However, the projection of the trend in production and consumption of beef meat in Serbia shows that in next few years it will become import whether the trend of decrease of heads of cattle continues in future. Like in case of analysis of production of beef, it can be observed that production and consumption of pork in Serbia are almost equal and that very soon the country will become import dependant, which is especially unacceptable because the basis for fast and high development of this production is very strong *(Lukić et al., 2013).*

Research Methodology

Application of mathematical and statistical methods are illustrated with appropriate representations and conclusions derived from them, pointed to the balance of supply and consumption of cattle and pig meat, the trade balance and the redemption price for the period 2010-2012. Applications of mathematical and statistical methods were calculated in accordance with rates of change in the view of their movements. Data sources are diverse. Primarily, we used data from the balance sheet that have been published on the official website of the Ministry of Agriculture, Forestry and Water Management of Serbia, data retrieved from the database of the Statistical Office of the Republic of Serbia (SORS), the relevant literature of domestic and foreign authors and web pages whose content matches the theme and topics operation.

Results and discussions

Our country has a long tradition regarding animal husbandry, particularly cattle, and the production of milk and dairy products have rich heritage. The potential for livestock development depends largely on the specific environmental conditions, surfaces and structures utilized agricultural land, ways of organizing agricultural production, economic and social structure of the population and level of economic development. The production structure of agriculture and livestock production has a very important role, because without a stable and developed livestock production there is no developed agriculture. However, there is a multi-year downward trend in livestock production. According to some indicators in Serbia for the period 1985 – 2007, the number of cattle decreased by 41% and by 23% for pigs *(Arsić et al., 2010).*

Livestock production in Serbia is traditionally done on family farms with participation of 91.1%, as measured by the conditional heads of cattle. Generally, family farms, engaged in livestock production can be divided into two basic groups - small and commercial farms. Small family farms have historically dominated both in structure and in the resources of livestock production. The aforementioned family farms over the last three decades, have exhibited a clear trend of losing in importance. Commercial family farms comprise the group of holdings, incurred during the last two decades, whose owners maximize resources and capacities of livestock production, significantly more than the average small family farms. Over the last decade there has been a growth in the number of available resources and commercial family farms. It has contributed significantly to the process of vertical cooperation in certain segments of the food industry[1]. The remainder of livestock production takes place at nonfamily farms, which are mostly owned by companies that have bought them in the privatization process during the past year of transition. Basic characteristics of companies that deal with livestock production that usually offer more than 1,000 ha in the large scale are specialized in livestock production.

At the regional level, the capacity of livestock production are concentrated on farms in central Serbia - the mountainous region of production, with involvement of 71%, followed by the Autonomous Province of Vojvodina (APV) - lowland region of production with involvement of 29% in the last three decades of declining number of heads of domestic animals , as well as overall livestock production. The average level of participation in domestic animals, measured by the number of livestock units per hectare of arable land decreased to 0.31 in 2008. The largest category of livestock in Serbia, the calculated units of suspended animals, are cattle accounting with 53%, pigs with 29.5%, sheep with 10.2% and poultry with 5.8% *(Popović et al., 2010).*

According to FAO data, meat consumption in the world has larger growth rate than growth rate of human population, and that growth is especially expressed in developing countries, with the predictions that it is going to be even faster in the future. According to some researches and prognosis, in year 2050 human population in Earth will reach 9.2 billion people. Their need for food, mainly meat and meat products, due to growing trend, will be significantly greater than today when the number of people is about 6 billion.

Considering all the above, the main worldwide problem in near future will be production of enough quantities of nutritionally valuable and safe food. Also, the problem will be providing solid and functional connections between production and processing of meat, from the aspect of interest and quality. Solutions for overcoming these problems are restructuring of food production, creation of functional connections between certain production segments and connection of meat production and processing in unique agroindustrial complex that is based on strategically sustainable solutions. Meat industry has major role in all that, considering that it is an important factor of agricultural development and development of agro food industry, namely agro-industry, and thus domestic and world economy *(Sarić et al., 2010).*

The meat market today is faced with many challenges. These challenges are related to the fact that the way we produce and consume meat has changed. Technological evolution and revolution of information, changes in the food chain and in the environment, followed by increasing consumer interest in the way of food production and processing, have increased demand for better quality of products. Accordingly, the question is which way is the best. In traditional meat production it is necessary to apply the expensive laboratory analysis to determine the characteristics of the meat. However, it is necessary to create quality that consumers will recognize, as consumers decide where, when and what to buy or not *(Banović, 2011)*.

Cattle production is the basis of livestock. Only ruminants can utilize a high percentage of bulky food. In this regard, the Simmental cattle breed in Serbia has a significant contribution. With the quality of breeding and selection work throughout the year to improve production traits of cattle is an important ongoing development and application of new knowledge in this field. In addition, it is important to increase the number of dairy cows involved in the control of production which is the basis of systematic work on selection and cooperation with breeders *(Institute of Animal Science, 2010).* Cattle are the cheapest way of converting less valuable nutrients in the high-quality products for human consumption. Cattle represent also a very important sector of livestock in Serbia, with the production of high value products (meat and

[1] It is estimated that some dairies in the last decade, in order to ensure the quality of raw materials actively contributed to the development and specialization of approximately 10,000 commercial family farms.

milk), with significant influence on the development of agricultural production. Due to the structure of the organism ruminants feeding these animals is very specific. For high performance and greater economic return, in addition to forage, it is necessary to use concentrated mixture that will best meet the needs of the animals, which will result in cost-effective production of high value and high-quality products (http://www.imanuel.co.rs/goveda.aspx).

The main drivers of growth in the livestock production are: income growth in developing countries, population growth and urbanization. In the period after World War II until the mid-70s the number of cattle constantly increased. After this period there has been a continuous decrease. The average rate of decline in the number of cattle in the last three decades was 2.47% and the largest rate of decline among all species of domestic animals. In the past 10 years, the overall reduction in the number of cattle comes from the mountainous regions (Central Serbia) with a rate of 2.9%, while at the same time in the lowland region (APV) livestock production increased by 2.1%. The aforementioned trends by region resulted in the total number of cattle decrease to 1.85%. Cattle production in Serbia is mostly done on the family farms (93.8% of cattle). The remainder of the livestock production is carried out on a small number of non-family farms (6.2% of cattle). This points to the fragmentation of cattle production in Serbia, as the average family farms grow in 5 head of cattle in all categories. However, in the last 10 years a group of commercial family farms is coming up with 20 or more head of cattle breeding and are to a large extent specialized in cattle production. This group of agricultural holdings is numerous in APV *(Popovic et al., 2010).*

Pig is the most dominant form of livestock production in Serbia. Of all the products for human consumption, pork, according to use, ranks first. Under the terms of the production of pork, in the future, pork will be a very important commodity to the domestic and foreign market (http://www.imanuel.co.rs/svinje.aspx).

The following table (*Table 1*) indicates the balance of cattle and beef in three years period, giving the estimates for the year 2013.

Table 1. Supply and utilization of cattle and beef meat (2010-2013)

Orientation balance of cattle					
Supply					
Category	**Units**	**2010.[*]**	**2011.**	**2012.**	**Estimate 2013**
Head of beginning of year	Head	1.002.295	939.077	938.345	920.762
Cows and heifers in calf, begginig of year	Head	584.671	560.831	541.789	534.708
Number of livestock born	Head	461.908	458.792	434.573	428.889
Imports	Head	1.039	2.814	4.674	1.000
Total supply	Head	1.465.242	1.400.683	1.377.592	1.350.651
Utilization					
Exports	Head	73.606	80.584	55.955	55.000
Slaughter	Head	435.756	368.266	387.409	360.000
Losses	Head	16.803	13.488	13.466	12.500
Head at the end of year	Head	939.077	938.345	920.762	923.151
Orientation balance of beef meat					
Supply					
Domestic production	t	95.587	80.645	81.705	81.000
Imports	t	133	133	109	190
Total supply	t	95.720	80.778	81.814	81.190
Utilization					
Exports	t	3.824	1.631	1.500	1.500
Total domestic utilization	t	91.896	79.147	80.314	79.690
Total utilization	t	95.720	80.778	81.814	81.190

Source:
http://www.mpt.gov.rs/postavljen/137/Bilans%20goveda%20i%20govedjeg%20mesa%202013%20s%20novembar.xls; *http://www.mpt.gov.rs/postavljen/137/govedarstvo%20april%202012.pdf (10.01.2014)

The balance of supply and consumption of the available quantities of cattle in the 2012 compared to 2010. decreased for 5.98%, and the number of animals at the end of the year to 1.95%. The same situation exists in the supply and consumption of beef, where the 2012 in relation to the 2010 year, had register a decline of 14.53%. Assessment of supply and consumption of cattle in the 2013 compared to 2012 indicates an additional decrease of about 2% of the total available quantity of cattle and increase the number of animals at the end of the year to 0.26%. Declining trend has been evident in the estimated value of the supply and consumption of beef for 2013, where in relation to the 2012 the decline of 0.76% is evident.

Breaking years for the cattle were 2011 and 2012, resulting in significant fluctuations. The import of cattle increased from 2,814 in the 2011 to 4,674 animals in the 2012, with the percentage achieved growth of 66.10 %. Assessment for 2013 is about 1,000 of imported cattle. Also, the export of cattle recorded dynamic changes. Exports of cattle decreased from 80.584 in 2011 to 55,955 in 2012, while the achieved percentage declined to 30.56%. Assessment for 2013 was approx. 55,000 head of exported cattle. Imports of beef have decreased by 18.05% in 2012 as compared to 2011, and the exports by 8.03%.

Taking into account all the above it can be concluded that the balance of supply and consumption of beef and beef is accompanied with large fluctuations. In four years, there has been a decline in the total available head of cattle at the beginning and end of the year, as well as the available quantities of beef. Imports of bovine animals from 2010-2012 ranged upward (from 1,039 throats in 2010 to 4,674 in 2012), while exports fluctuated, indicating retention of cattle in Serbia in order to improve livestock. Quantities of imported beef in the period 2010 - 2011 ranged uniformly, with a decline of 18.05% in 2012 (during the period 2010 - 2011 it has been imported 133 t, and 109 t in 2012). The quantities of exported beef exert constant downward tendency in the four-year period, which means that the produced and imported beef was consumed in the domestic market.

The following table (*Table 2*) indicates the balance of pigs and pork in three years, giving the estimates for the 2013.

Table 2. Supply and utilization of pig and pork meat (2010-2013)

Orientation balance of pigs					
Supply					
Category	**Unit**	**2010.***	**2011.**	**2012.**	**Estimate 2013.**
Head of beginning of year	Head	3,631,013	3,488,738	3,286,900	3,138,508
Sows at beginning of year	Head	520,756	519,119	485,271	447,843
Number of livestock born	Head	6,236,605	6,161,916	5,805,424	5,642,822
Imports	Head	10,059	22,846	54,645	100,000
Total supply	Head	9,877,677	9,673,500	9,146,969	8,881,330
Utilization					
Exports	Head	41,890	35,650	31,728	31,000
Slaughter	Head	5,728,226	5,795,122	5,453,062	5,400,000
Losses	Head	618,823	555,828	523,671	500,000
Head at the end of year	Head	3,488,738	3,286,900	3,138,508	2,950,330
Orientation balance of pork meat					
Supply					
Domestic production	t	269,273	271,000	252,207	250,000
Imports	t	2,535	4,575	8,859	9,300
Total supply	t	271,808	275,575	261,066	259,300

Table 2 (cont.)

Utilization					
Exports	t	708	1,405	2,403	420
Total domestic utilization	t	271,100	274,170	258,663	258,880
Total utilization	t	271,808	275,575	261,066	259,300

Source: http://www.mpt.gov.rs/postavljen/138/Bilans%20svinja%20i%20svinjskog%20mesa%202013%20s%20novembar.xls; *http://www.mpt.gov.rs/postavljen/138/svinjarstvo%20april%202012.pdf (10.01.2014)

The balance of supply and consumption of the available quantities of pigs in 2012 compared to 2010 decreased by 7.40% , and the number of animals at the end of the year by 10.04%. The same situation exists in the supply and consumption of pork, which in 2012 compared to 2010, register a decline of 3.95%. Assessment of supply and consumption of pigs in 2013 compared to 2012 points to a further drop of 2.90% of the total available quantity of pigs and reduce the number of animals at the end of the year by 6%. Declining trend has been evident in the estimated value of the supply and consumption of pork in 2013, whereas in relation to 2012 a decline of 0.68% is evident.

The analysis of each observation point regarding the balance of supply and consumption of pigs and pork shows a tendency to decrease their value in the four-year period. Deviations from this thesis are visible only in the import and export of pigs and pork. The import of pigs in 2012 comparing to 2010 increased by 5.43 times, while according to the estimates for 2013 import expected to be 9.94 times higher compared to 2010, or 1.83 times higher compared to 2012. Exports of pig in 2012 in relation to 2010 decreased by 24.26% , and it is estimated for 2013 in relation to 2012 that an additional decline of 2.29% will be noticed. Imports of pork in 2012 in relation to 2010 increased by 3.49 times, while the estimates for 2013 expects to grow 1.05 times as compared to import in 2012. Exports of pork in 2012 in relation to 2010 increased 3.39 times, while estimates for 2013 expect a drop in exports of 82.52% compared to 2012.

Generally, the balance sheet of pigs and pork in all analyzed categories of supply and consumption reflect the trend of decline, except in the category of imports and exports. This thesis can be interpreted as a lack of pigs in Serbia is covered by imports, which directly reflects the state of pork, while the amount of pork that has not been spent on domestic consumption is redirected to export .

Market and trade balance of cattle and pig

Serbia is much larger exporter than importer of beef. *It exports* all kinds of meat and meat products: *meat with bones* (Italy, Montenegro, Macedonia), *boneless meat* (Montenegro and minor amounts of Macedonia), *lean meat* (Montenegro and Macedonia, and minor amounts of Albania, Russia and Germany), *processed beef* (Montenegro, Macedonia, Russia, Bosnia, Albania). In general it can be said that the Serbian export partners regarding all beef products are the same (Montenegro and Bosnia and Herzegovina). The unit value of *imported meat with bones* is greater than exported, and only import partners are Montenegro and Macedonia. Unlike meat with bones, boneless meat Serbia almost does not import. Serbia has a positive balance in *trade with dried meat*, and only import partners are Montenegro (95%) and Bosnia and Herzegovina. The positive balance of Serbia stands out in trade with *processed products of beef*, with the largest import partners BiH (over 80%), Russia, Montenegro, Hungary and Ukraine *(Grujić, Rajnović, 2012).*

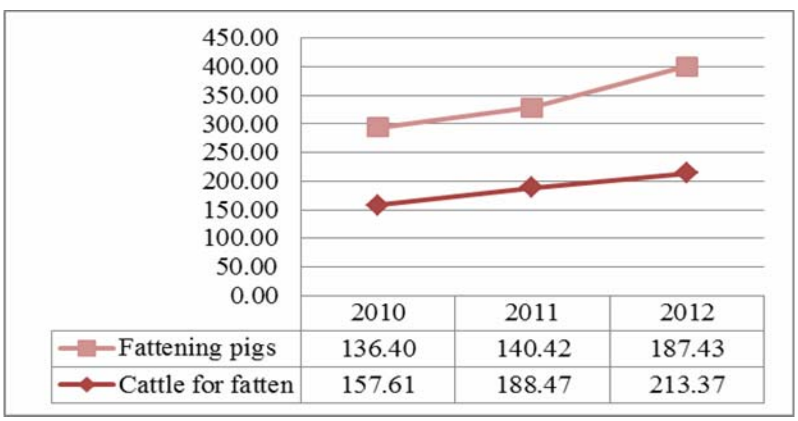
In 2010 and 2011 there were no significant changes. Price of beef cattle was stable in the period at about 200 RSD/kg. Price of beef meat at retail has slightly increased and currently stands at around 480 RSD/kg *(www.mpt.gov.rs)*. During the summer 2013 the offer was slightly lower, in order to normalize the autumn months. Price of beef cattle has increased slightly compared to 2012 and represents about 230 RSD/kg. In the next period it is not expected a significant change in the price category of cattle. During the summer and early autumn in 2013 there was a rise in the price of beef meat in retail at around 550 RSD/kg, up to 25 RSD/kg as compared to the spring 2013.

Analyzing the pig trade balance in Serbia the most exported are *pork carcasses* in Montenegro and Macedonia . The only constant positive balance Serbia has in *stored pork products (smoked pork)*, but in recent years imports have gradually increased toward Bosnia and Herzegovina, Croatia, Slovenia, Montenegro and Germany. There was a positive balance of trade, but this trend was interrupted *(Grujić, Rajnović, 2012)*.

Since the beginning of 2012 the pig *domestic market* exhibited no significant fluctuations in price. The average annual price of porkers in 2011 amounted to about 130 RSD/kg, with the lowest price at the beginning of the year - 120 RSD/kg, while at the end of the year it ranged from 130 to 150 RSD/kg. Price of pork at retail is usually somewhat lower than in the previous year, which is certainly related to the increased demand in this period, but it is not expected to diminish in the coming months. Price porkers in the *domestic market* in the 2013 increased during the summer months, the level as it was in late summer of 2012. The average price of fattened pigs during the summer and early autumn 2013 was 200 RSD/kg , and the rate of the piglets of app. 15-25 kg of weight was about 240 RSD/kg. Price of pork at retail, after decrease during the spring 2013, rose in early summer on the level between 454 and 464 RSD/kg. This is the level at the end of 2012. Piglets can expect pricing leaps in the future.

Since the fall in the price of feed a positive impact on the reduction of production costs are expected, which in the future should improve the competitiveness of manufacturers *(www.mpt.gov.rs)*.

In addition to the retail price, the average annual purchase price of cattle and pigs for fattening for the period 2010-2012 were analyzed (RSD/kg). *Purchase prices are the prices at which the authorized companies and organizations are purchasing agricultural products from private households and those do not include incentive premiums (SORS).*



Graph 1. Average annual purchase prices cattle and pigs for fatten in time 2010-2012 (RSD/kg)

Source: *Statistical Office of the Republic of Serbia*,
http://webrzs.stat.gov.rs/WebSite/public/ReportView.aspx (19.02.2014)

The observed three-year period reflects the average of annual purchase prices and the trend of continuous growth. In 2012 in relation to 2010, the annual average purchase price of fattening cattle increased by 35.38 % ie. 55.76 RSD and of fattening pigs by 37.41% ie. 51.03 RSD. Consequently, the farmer would be stimulated to engage in agricultural (livestock) production, if the purchase price is increased. Helping livestock production through premium subsidies (or other forms of stimulation) contributes to the improvement of standards of privately owned households, for today it is increasingly difficult to achieve positive market results.

Conclusion

Taking into account all the above it can be concluded that the balance of supply and consumption of beef is accompanied by large fluctuations. In four years, there has been a decline in the total available head of cattle at the beginning and end of the year, as well as the available quantities of beef. Imports of bovine animals from 2010-2012 ranged upward (from 1,039 throats in 2010 to 4,674 animals in 2012), while exports fluctuated, indicating retention of cattle in Serbia in order to improve livestock. Quantities of imported beef during 2010/2011 period ranged uniformly, with a decline of 18.05% in 2012 (in 2010/2011 period there has been imported 133 t, in 2012 109 t). The quantities of exported beef exert constant downward tendency in the four-year period, which means that the produced and imported beef has been consumed in the domestic market.

Analysis of each observation point in the balance of supply and consumption of pigs and pork shows a tendency to decrease their value in the four-year period. Deviations from this thesis are visible only in the import and export of pigs and pork. The import of pigs in 2012 in relation to 2010 increased by 5.43 times, while according to the estimates for the 2013 imports will be 1.83 times higher than in 2012. Exports of pig in 2012 in relation to 2010 decreased by 24.26%, and the estimate for 2013 in relation to 2012 indicates an additional decline of 2.29%. Imports of pork in 2012 as compared to 2010 increased by 3.49 times, while the estimates for 2013 are expected to be 1.05 times higher as compared to import 2012. Exports of pork in 2012 in relation to 2010 increased by 3.39 times, while estimates for 2013 expected to drop in exports by 82.52% compared to 2012. Overall, the balance sheet of pigs and pork in all analyzed categories of supply and consumption reflect the trend of decline, except for the category of imports and exports. This thesis can be interpreted as the lack of pigs in Serbia is covered by imports, which directly reflects the state of pork, while the amount of pork that has not been spent on domestic consumption is redirected to export.

Due to the importance of livestock production for the Republic of Serbia, it is necessary to identify all deficiencies, analyze the possibilities of change and define the strategy followed by appropriate policies that will be not of short-term but of long-term nature.

Intermediate goods producers, although with technology and farm size behind the larger companies and the total number of small producers, are the most important agents from the perspective of agricultural policy, because they have the highest production in all areas of meat production (MAFW, 2010).

Acknowledgments

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