

Self-sufficiency of the Republic of Croatia in the production of beef

Grgić¹, I., M. Zrakić²

Original scientific paper

SUMMARY

Tendencies in cattle rearing are one of the indicators of agricultural development, and beef represents an important part of the diet of a significant share of inhabitants of the EU countries. The level of consumption is most influenced by the population's income, and much less by other factors such as dietary habits and traditions, religious, health and other reasons. Although the number of cattle in the EU is constantly decreasing, the Union is still one of the world's largest meat markets. In Croatia there is also a reduction in the number of cattle (by about 3% in the period from 2008 to 2013) as well as in meat consumption per capita, which is about 13 kg. The share of beef in total meat consumption has also been declining and is now at around 15% of total consumption.

The Republic of Croatia is not self-sufficient in beef: the degree of self-sufficiency is about 82%, and beef is mostly imported from other countries of the Union. However, local farmers can seize the opportunity that is offered in the unused pastures in the mountainous part of Croatia since there is significant demand for beef produced in this manner in the highly demanding European market.

Keywords: cattle, beef, Republic of Croatia, self-sufficiency

INTRODUCTION

Meat production makes a significant part of the total value of agricultural production in many countries, and given it is labour-intensive, meat production contributes to the increase in employment both on farms and in entire rural areas (Ažderski et al. 2011). Cattle rearing plays an important role in landscape conservation, particularly in the pasture based cow-calf production system.

In recent times particularly intensive meat production has been critically analysed. Various scientific and social observations express concern about emissions of nitrogen oxides, food safety, hygiene standards of keeping animals, animal management, other moral dilemmas, etc.

Meat production also features as a "social opportunity cost" because intensive cattle rearing competes with the production of food for people in the use of arable land. Instead of processing produced grain and oilseeds for human needs, these are used for livestock farming. Add to that the growing interest in biofuels production; the limitedness of agricultural areas affects the number of livestock species, production technology and ultimately the supply of meat and meat products. Today's intensive meat production in highly developed countries like the

USA, Brazil and China is characterized by systems based on highly developed rearing technologies, precise breed selection, great technical efficiency and intensive exploitation of natural resources. By contrast, the European Union, as a result of pressure from consumers, promotes organic farming through measures of rural development, which is one of the reasons of insufficient supply and significant import of beef.

Meat consumption per capita was often used as an indicator of development of livestock breeding and of living standards of the population of a certain state (Grgić 2000). A multitude of factors impact meat consumption, the most important being consumers' income, retail prices, availability of meat in the market, attitudes (e.g. vegetarianism), religious customs (halal, kosher) and the emergence of diseases in animals.

Although some theorists saw Croatia's accession to the EU as a turning point when setting the objective of self-sufficiency was to be considered, recent geopolitical events have again emphasized the need of individual countries for sufficient quantities of main agri-food products. The study of self-sufficiency that applies production-consumer balance proved to be a useful tool for the design of agricul-

¹ Prof. Ivo Grgić, Ph.D., Faculty of Agronomy of the University of Zagreb, Svetošimunska 25, Zagreb,

² Magdalena Zrakić, Msc. Agr. Econ. Faculty of Agronomy of the University of Zagreb, Svetošimunska 25, Zagreb

Corresponding author: igrgic@agr.hr

tural policy applicable in Croatia (Ministry of Agriculture in 2014), but also in the neighbouring countries, such as Austria³. The present study provides an overview of changes in the number of cattle and beef production in the period from 2000 to 2014 and projections for 2016. It is aimed at calculating the degree of Croatia's self-sufficiency in beef in the period from 2000 to 2012 and at forecasting self-sufficiency in 2016 thereunder.

MATERIAL AND METHODS

The study uses data from the National Bureau of Statistics of the Republic of Croatia, EUROSTAT and FAO. For time series analysis and projection to 2016 the trend method was used and that of the first and second degree polynomial. The method of balance sheet was used to calculate the degree of self-sufficiency. Production and consumption balance sheets were standardized in such a way that the processed products had been reduced to their primary equivalent (raw material) by the so-called vertical standardization procedure. Rates of extraction or technical coefficients used in the drafting of the balance sheet are used for backward conversion to the primary level by multiplying the volume of processed products and the reciprocal technical coefficient. For instance, quantities of beef and meat products containing beef (imported, exported, produced, consumed) are translated into the equivalent of beef⁴.

Table 1 Composition of the balance sheet and the trend equation for calculating the components of the balance sheet for the year 2016

Balance sheet elements	Explanation	Trend
Slaughtering (000 head)	Total cattle slaughtered in slaughterhouses and on family farms.	$Y = -5,9514X + 356,41$
Net weight of slaughtered animals (1 000 t)	Weight of cleaned carcass without hide, blood, head, viscera, forelegs to the knee and hind legs to the hock.	$Y = 0,3727X + 52,793$
Domestic meat production	The sum of the balance of slaughtering of livestock and foreign trade of animals intended for slaughter, i.e. slaughter plus export and minus import	
External trade (trade with the EU and non-EU countries)	Import of live animals	$Y = -0,0792X^2 + 1,347X + 10,156$
	Import of live animals from the EU	$Y = 0,623X - 0,4023$
	Export of live animals	$Y = 0,088X^2 - 0,5146X + 0,7117$
	Import of meat	$Y = -0,0212X^2 + 1,0155X + 1,4893$
	Import of meat from EU	$Y = 0,0964X^2 - 0,7265X + 2,9712$
	Export of meat	$Y = 0,015X^2 + 0,111X + 1,9414$
	Export of meat in EU	$Y = 0,0074X^2 + 0,0247X + 0,7459$
Net meat production	Domestic production plus import of live animals and minus the export of live animals	
Available resources	Net production plus import of meat.	
Initial stocks	Stored quantities on the first day of the reference period.	
Final stocks	Stored quantities on the last day of the reference period, and at the same time the initial stock of the subsequent reference period.	
Stock change	The difference between final and initial stocks	
Domestic consumption	Production plus import and minus export and stock changes.	
Human consumption	Quantities available to households for consumption during the reference period entering the market as meat or processed meat	
Degree of self-sufficiency (in %)	The ratio between domestic production and domestic consumption. If the amount is below 100, then production does not cover consumption, while the amount above 100 indicates that production exceeds domestic demand so certain amount of products is either stored or exported.	

RESULTS AND DISCUSSION

Tendencies in beef production in the EU and world-wide

In 2014, the world produced about 304 million tons of meat and the average consumption per capita was 42.8 kg. There are significant differences between countries in terms of the degree of their economic development: the average meat consumption per capita in developing countries was 33.4 kg, while in the developed countries it was twice as high (76.2 kg). That same year, the average consumption per capita in the EU was 65 kg, and in Croatia 63 kg. The world's largest meat consumer market is China (Delgado 2003), where about a quarter of the total world production is consumed (71 million tons) and which is constantly growing⁵.

There is a significant link between meat production and the agricultural areas engaged therefore. Although beef consumption accounts for less than 2% of total calories burned, almost 60% of world's agricultural land is used for this production. However beef accounts for 24% of total world consumption of meat and about 80% of total world agricultural land is used for this production.

According to FAOSTAT, the USA is the world leading producer of beef, followed by Brazil and the European Union, who together produce about 59 million tons, or around half of the total world production of beef.

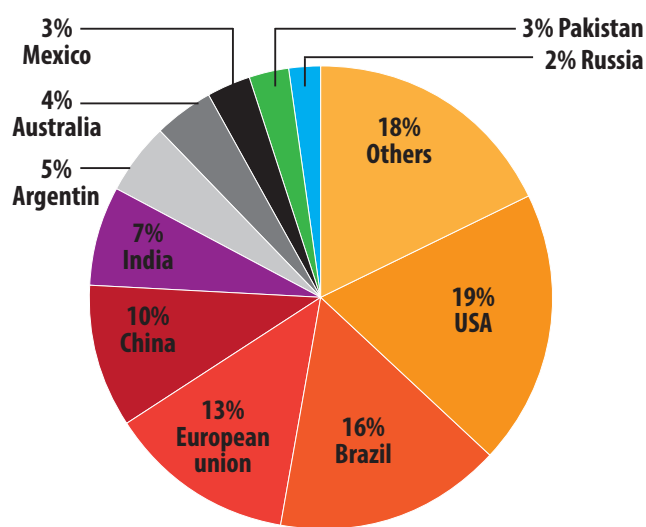


Chart 1 The structure of world beef production in 2014

Source: <http://www.indexmundi.com/agriculture/?commodity=beef-and-veal-meat&graph=production-growth-rate>

Uruguay, Paraguay and India have the highest growth rate of beef production in the world (Chart 2), and the FAO predicts that by 2050, total meat production will have increased to 455 million tons. World projections of supply and consumption of

³ http://www.statistik.at/web_en/statistics/agriculture_and_forestry/prices_balances/index.html

⁴ http://faostat3.fao.org/download/FB/*/*E

⁵ This is influenced by the increase of the population but even more so by the increase in GDP and the per capita income.

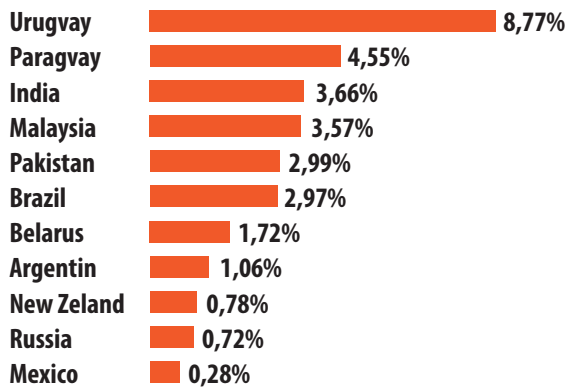


Chart 2 Countries with a positive growth rate in the production of beef in the world in 2014

izvor: <http://www.indexmundi.com/agriculture/?commodity=beef-and-veal-eat&graph=productiongrowth-rate>

meat and meat products are cautiously optimistic because a price increase is expected in the next decade.

Meat is an important part of the diet of most consumers in the EU. The most important types of meat that is consumed in the EU are beef and young beef, while pork, poultry and lamb are less used (EC, 2013). The European Union produces more than 808 million tons of food a year in which beef comes in the 17th place and accounts for about 0.99% of the total production of food products. Beef meat represents 8% of the total value of agricultural production of the Union with a total annual production of almost 7.7 million tons (average 2011-2013). In world exports of beef and young beef the EU accounts for 2% (volume and value), while in import it accounts for 5% of the total volume and for 9% of the value. The European Union exports about 3% of the production, its main export markets being Russia, Switzerland and Bosnia and Herzegovina. Although in 2011 and 2012 Turkey was the main export market, in 2013 export to Turkey was significantly reduced due to trade restrictions for exporters. Quantities delivered to Russia have been decreasing since 2010, and Russia has recently introduced an embargo on the import of beef offal from the EU⁶.

The production of beef is significantly (directly) impacted by the CAP (Common Agricultural Policy) through the dairy sector (related production) and (indirectly through livestock feed) through the production of grain and oilseeds. This latter effect has particularly been felt since a large part of beef has been coming from intensive

farming systems, wherein animal feed is based on a rich ratio of corn and other grains. By contrast, in countries such as the UK and Ireland a significant share of beef is grown in extensive farming systems.

Beef supply on the EU market is strongly interrelated with the size of the dairy herd or the number of calves that do not serve to rebuild the herd and the number of cows coming out of milk production (Hess et al., 2009). The number of cattle is declining and in 2016 it will be below 85 million head which is a decrease of about 8% compared to 2000. Compared to 2014 a slight decrease in beef production is expected (0.8%) as well as a total increase in consumption (0.9%) which will, due to a large increase in population, lead to a slight reduction in consumption per capita (0.1%).

When buying beef, consumers in the EU, in accordance with their relatively high incomes and high standards, require safe food. Different events on the market (BSE, grey beef market, irregularities during the transport of animals, etc.) have put beef under a magnifying glass especially by consumers, and the high requirements with respect to safety of such products are understandable given the relatively high price of beef compared to pork and chicken, (Banović and Ševarić, 2013). Current examples are the closure of livestock markets in Israel, Jordan and Libya due to the emergence of bluetongue in Romania and foot and mouth disease in Tunisia, along the ban on exports of dairy products to Russia.

Within the EU, there are significant differences between the developed and less developed states in the consumption of beef. Thus in 2011 the per capita beef consumption in France was 25.4 kg, 19.7 kg in Slovenia, 17.3 in Austria and on the other hand, 6.5 in Romania and 4.5 kg in Bulgaria.

In the last 20 years there have been significant debates in the EU about the need and the role of aids in beef production. Opponents of aids point out that meat production consumes a large amount of limited natural resources (land, drinking water) that would be "better" spent on crop production for human consumption or even for the production of bio-fuels, but also that the intensive cattle farming pollutes the atmosphere and water with methane and nitrates respectively. By contrast, the European Commission affirms that due to its multi-functionality, cattle rearing represents an opportunity for rural areas.

Table 2 Number of cattle, beef consumption in the EU from 2000 to 2014 and projections for 2016

	2000/07	2008	2010	2011	2012	2013	2014	2016
Cattle number, 000 head	92.127	90.408	87.832	87.054	87.297	87.619	87.600	84.933
Beef production, 000 tons	8.244	8.097	8.157	8.062	7.711	7.690	7.760	7.697
Consumption, 000 tons	8.353	8.321	8.236	7.976	7.762	7.780	7.840	7.910
Consumption per capita, kg	16,90	16,55	16,28	15,72	15,26	15,26	15,35	15,34

*) Until 2012 EU 27, and afterwards EU 28 due to Croatia's accession

Source: EUROSTAT and FAO, 2014

6 More at: http://www.komora.hr/index.php?option=com_content&view=article&id=291:copa-cogeca-pregled-stanja-na-tritu&catid=28:sposredne

7 <http://faostat3.fao.org/download/FB/CL/E>

In any event, projections (IERPC, 2008) foresee that the EU will remain one of the world's largest meat markets, but also a market with very high standards with respect to production and consumption, and certainly one of the most competitive markets in terms of price. The EU market will be under increasing pressure from major world exporters of beef, such as Brazil and Australia.

Tendencies in beef production in the Republic of Croatia

In the nineteen eighties Croatian cattle farming attained its biggest success thanks to the product known as baby beef or live young cattle, highly valued by foreign customers. Genetic basis for fattening was Simmental young cattle of excellent meat quality and high yield. Average export in

those years was about 19 000 tons of live animals, and most important markets were Italy and Greece. Record export of about 36 thousand tons was attained in 1988.

Also there was significant export of meat and meat products (about 13 000 tons a year or about 40 million US dollars), the highest share of exports being beef, the so-called. "Milan cut" (Milan's processing) to Italy with a share of around 70% of total exports (Kolega et al., 2003).

In the early nineties, under the influence of the ravages of war, disease incidences and the collapse of the domestic market, there was a sudden decrease in the export of live young cattle.

Since 2000, the number of cattle has continuously been decreasing and a smaller increase is projected only in 2016

Table 3 The number of cattle in Croatia from 2008 to 2013 and projections for 2016 (thousand head)

Year	Number of head at beginning of year	Calves born during year	Imports	Exports	Slaughtered	Losses	Number of head at end of year
2000/07	454	219	132	3	326	18	459
2008	467	201	173	16	349	22	454
2009	454	194	139	5	315	20	447
2010	447	188	140	9	299	23	444
2011	444	164	152	29	263	22	446
2012	446	159	120	33	220	20	452
2013	452	147	97	29	207	18	442
2016	466	144	145	34	241	25	455

Source: Croatian Bureau of Statistics and authors' calculation

as a result of a significant increase in cattle import. As before, the import will be mostly from the EU member states, particularly Romania, Bulgaria and Hungary. Croatia will primarily import animals intended for fattening because the tendency of decrease in breeding herds or cows will

continue. The reduction in the number of home-grown calves intended for fattening is influenced by high costs of animal feed and other inputs (Salajpal and Karolyi 2011).

Faced with negative tendencies, in the period from 2005 to 2010 the Republic of Croatia increased the state aids grant-

Table 4 Production and supply balance sheet of beef in Croatia from 2010 to 2012 and projections for 2016.

	2000/07	2008	2009	2010	2011	2012	2016
Slaughtering (000 head)	330,81	349,34	314,50	298,27	262,79	220,41	261,19
Average carcass weight (kg)	163,12	167,17	191,61	209,71	229,31	213,56	210,93
Net weight of slaughtered animals (1 000 t)	53,96	58,40	60,26	62,55	60,26	47,07	55,09
Balance sheet (1000t)							
Domestic meat production	40,58	47,21	47,30	50,61	51,27	43,95	58,67
Import of live animals for slaughter	14,23	16,02	14,43	15,11	17,39	12,94	11,43
- from EU	4,68	15,78	14,32	15,11	17,39	12,93	9,44
Export of live animals for slaughter	0,85	4,83	1,47	3,17	8,40	9,82	15,01
- in EU	0,00	0,00	0,01	0,01	0,00	0,00	0,00
Net meat production	53,96	58,40	60,26	62,55	60,26	47,07	55,09
Meat import	5,22	10,47	13,54	9,59	8,82	10,21	12,31
- from EU	1,88	4,49	8,62	7,00	7,66	8,65	9,57
Available resources	59,18	68,87	73,80	72,14	69,08	57,28	67,40
Meat export	2,66	3,81	5,48	7,55	6,11	3,36	7,56
- in EU	0,99	2,07	2,00	1,89	2,24	1,86	3,04
Initial stocks	0,53	0,56	0,60	0,36	0,40	0,22	0,24
Final stocks	0,52	0,60	0,36	0,40	0,22	0,24	0,36
Stock change	-0,01	0,04	-0,24	0,04	-0,18	0,02	0,12
Domestic consumption	56,53	65,02	68,57	64,55	63,15	53,90	59,72
Human consumption	56,53	65,02	68,57	64,55	63,15	53,90	59,72
- consumption per capita (in kg)	12,76	14,66	15,48	14,61	14,74	12,58	13,14
Degree of self-sufficiency (in %)	71,79	72,61	68,99	78,40	81,19	81,54	98,23

Source: Ministry of Agriculture 2014, projection calculated by the authors.

ed to livestock production whereby the aids for cattle rearing (dairy and beef) accounted for about 80% (Kralik et al. 2013).

Nonetheless, the number of cattle and livestock production did not increase as expected and the significant import of beef continued. However, at the same time the number of baby-beef producers increased. They produce more than 80% of the total production, and mostly export it to Italy, Bosnia and Herzegovina, Montenegro and Austria. Even though overseas markets (Australia and New Zealand) reopened in 2013, due to Croatia's insufficient quantity of baby-beef and those markets' distance, domestic exporters do not find them attractive enough and their offer is not cost-competitive either.

As baby-beef belongs to products of higher price categories, there is little demand therefor in the domestic market and it will thus continue to be placed on the EU market, but also in the growing markets such as Turkey, Israel and the Middle East, where it is competitive in quality and price and where it also meets the religious restrictions.

Balance sheet of beef in the Republic of Croatia from 2000 to 2012 and projections for 2016

Domestic production of beef during the analysed period fluctuated between 40 and 50 thousand tons, whereby the population's demand for fresh meat and the needs of the processing industry for high quality raw material were not met.

Although the number of slaughtered cattle declined in the period from 2000 to 2012, an increase in the number of cattle by about 19% and a significant increase in domestic meat production are expected in the period up to 2016.

The increase in domestic beef production will reduce the import of live animals for slaughter by about 11%. The expected increase in imports of the total number of cattle by about 30 thousand head (Table 3), mainly calves and a smaller number of cows, will significantly contribute to the increase in exports of live animals (by about 53%) and net production of meat is expected to increase by about 26%. These anticipated changes will lead to greater foreign trade activities of which the export of beef is expected to increase (25%) more than the import thereof (21%). Ultimately, due to lower growth of per capita consumption (about 18%), the degree of self-sufficiency will increase at 98.23%.

CONCLUSION

Although the globalization of production and marketplace has brought suppliers and consumers closer to each other, there is still the need for domestic production to meet most of the needs of its domestic market. This is especially true for the productions of longer cycles and for those which together with their complementary industries represent most of the agricultural production of a country. Beef is one of the most important agricultural products, nutritionally and in terms of price.

By reason of its economic significance (meat, milk and crop production as the basis of animal feed), cattle

rearing in EU, including Croatia, is under a significant influence of the agricultural policy promoting free-range and organic farming, which is one of the causes of the decline in the number of cattle.

Although the decreasing trend in the number of cattle is also present in Croatia, the degree of self-sufficiency in beef is increasing due to the rise in the import of live cattle, especially of fattening calves. The increase in self-efficiency is also due to the relatively low consumption per capita, which in 2016 will be slightly below the EU average, but well below the consumption in the EU economically developed member states.

Croatia's opportunity with regard to cattle rearing and in particular beef production lies in the currently abandoned natural pastures. Beef produced on these pastures would in the beginning be primarily intended for EU markets of higher purchasing power, and the development of cattle rearing would by itself boost the revitalization of the now abandoned and neglected rural areas.

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Received: 12.2.2015.

Accepted: 20.2.2015.