CHALLENGES FOR SMALLHOLDER LIVESTOCK PRODUCTION IN CROATIA

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Abstract

Animal production in Croatia in recent decades has experienced significant structural changes in order to adjust to the environment and market conditions. This adjustment takes into account the local tradition of animal production, potential of the environment, consumer demands, economic integration and other influences. Consolidation of smallholders in smaller number is noticeable through an increased size of farms, introduction of modern production technologies and more productive breeds (*genotypes*). However, in Croatia small family farms still predominate, trying to meet market demands, modernize technologies, breed autochthonous breeds, profile their production towards specific added-value products and maintain direct access to the market. The biggest changes are noticeable in cattle, pig and poultry production, while the traditional production of sheep is less exposed to market pressures. From the past examples we recognize that industrialization of animal production is not the only approach that should be supported, as small and medium-sized family farms should also be preserved and developed. They are a vital part of the animal production system, important to keep traditions alive, while ensuring security of food production, vitality of rural areas, care for the rural landscape, etc.

Keywords: livestock, production, smallholder, Croatia, trends

General about animal production in Croatia

In order to better understand the position of small and medium-sized farm holders in Croatia, we briefly point to several general indicators concerning the structure of agricultural area, population, the proportion of urban and rural areas, and other indicators of current agricultural production. The Republic of Croatia encompasses 56,594 km^2 land area and 31,479 km^2 interior sea waters and territorial sea (SYRC, 2014). The Croatian territory can be divided into the Pannonian, mountainous and the Mediterranean agro-ecological regions. The plains of the northern Croatia have a mean annual temperature which ranges from 10°C to 12°C, while at elevations of more than 400 m above sea level the mean annual temperature is below 10°C.

The mean annual air temperature in the coastal regions ranges from 12°C to 17°C (SYRC, 2014). Mean annual precipitation total in the continental part of Croatia ranges from 700 mm to 1,000 mm. According to the model for the differentiation of Croatian rural areas for the purposes of monitoring the impact of rural development measures, 99.24% of the territory is defined as rural and intermediate, while only 0.76% as cities situated in urban clusters. The Republic of Croatia has 4,285,000 inhabitants, of which 24.9% live in cities situated in urban clusters and 75.1% live in rural and intermediate areas (SYRC, 2011). In the structure of agricultural holdings, 233,280 holdings are engaged in agricultural activities in Croatia, utilising 1,331,000 ha of agricultural land (*average agricultural holding in Croatia utilises 5.6 ha of agricultural land*). In 2012 the prevalent categories of utilised land were arable land and gardens (903,508 ha; 67.9%), permanent grasslands (345.561 ha; 26.0%) and permanent crops (78,183 ha; 5.9%). The arable land owned by most family farms is very fragmented and plots are often very distant from one another (*one reason underlying the inefficiency of agricultural production*). In 2011 the production of an average agricultural holding was conducted on 15 plots. In terms of the organizational structure, in 2011 most holdings functioned as family agricultural holdings (162,833; 97.4%). With regard to other organisational structures, 2,404 crafts (1.4%), 1,522 companies (0.9%), 307 cooperatives (0.2%), and 150 agricultural holdings with a status of another legal entity (0.1% of holdings) were registered (SYRC, 2014). Agricultural holdings in the category size under 2 ha (52.6%) predominate. In the period 2007-2011 an upward trend could be observed in the number of holdings from 20 to 100 ha (+36.24% increase) and from 100 to 750 ha (+62.5%), but these are still under-represented (SYRC, 2008-2012). Generally, at present agricultural holdings under 20 ha predominate in Croatia.

Of total gross domestic product (GDP), agricultural activity accounted for approx. 2.6% over the past five years (Ivanković et al., 2014). Milk production amounted to 15.2%, pork production 10.1%, beef production 9.07% and poultry production 8.0% of Gross Agricultural Output (SYRC, 2012). Ivanković et al. (2014) suggested that the adjustments of livestock production to the economic and market conditions in Croatia are evident in primary production (*intensification, specialisation, modernisation of technologies, concentration of production units*), processing of animal products (*broader range of products, compliance with new quality standards*) and market organisation (*market liberalisation, introduction of traceability, emphasis on product safety, new market labels, increasing interest in traditional products*). Although these processes have resulted in population decreases (*Table 1*), animal production has remained constant or decreased slightly (*Table 2*). The biggest changes have occurred in cattle and poultry production, showing population reduction by 46.7% and 45.6%, respectively. The decrease in the pig and sheep populations was more moderate (*29.4% and 17.4%, respectively*).

Table 1 Numbers of domestic animals in Croatia during the period 1990-2013 (‘000)

Year	Cattle	Pig	Sheep	Horse	Poultry
1990	830	1,573	751	39	17,102
1992	590	1,182	539	26	13,142
1994	519	1,347	444	21	12,503
1996	461	1,197	427	21	10,993
1998	443	1,166	427	16	9,959
2000	427	1,233	528	11	11,256
2002	417	1,286	580	8	11,665
2004	466	1,489	721	10	11,185
2006	483	1,489	680	12	10,088
2008	454	1,104	643	16	10,015
2010	444	1,231	630	19	9,470
2013	442	1,110	620	21	9,307

Source: Statistical Yearbooks of the Republic of Croatia (1991 – 2014)

In 2013 there was a total of 442,000 head of cattle. According to the Annual Report of Croatian Agricultural Agency (CAA, 2014) beef production in Croatia was 44,335 t, and dairy companies purchased 522.7 million kg of cow milk. Produced cow milk satisfies around 75% of the domestic demand (Ivanković et al., 2014). Out of the total of 194,629 carcasses classified at slaughter, veal calf carcasses accounted for 30.3%, and baby beef carcasses for 55.4%, while carcasses of older age animals accounted for 14.3% (CAA, 2014).

Table 2 Livestock production of animal food in Croatia

Year	Beef meat (*‘000 t*)	Pig meat (*‘000 t*)	Poultry meat (*‘000 t*)	Cows’ milk (*‘000 t*)	Eggs (*million pieces*)
1980	150	250	106	1,060	972
1990	117	254	115	917	1,020
2000	63	164	93	607	774
2002	68	189	93	696	761
2004	73	183	88	684	801
2006	80	189	126	848	846
2008	80	168	133	828	787
2010	82	178	113	794	704
2013	78	138	94	697	606

Source: Statistical Yearbooks of the Republic of Croatia (1980 – 2014)

In 2013, there were a total of 1,110 thousand pigs in Croatia. Pig farming is predominantly conducted on family farms with small production units of up to 10 sows (93.46%) and 10 to 50 sows (5.95%). To a lesser extent, pig farming is conducted in medium-sized production units (*50 to 100 sows; 0.23%*) and large production systems with full production cycles (*more* *than 100 sows; 0.36%*). According to SYRC data for 2013, pork meat production was 138,000 t. This level of production does not meet the domestic demand for fresh meat and processing industries (*the average self-sufficiency was 65%*).

The most important production in the poultry sector is production of chicken eggs, chicken and turkey meat. In 2013 there were a total of 9,307 thousand units of poultry. The production of poultry was 94 thousand t, still insufficient for the domestic demand as well as the demands of the processing industry. Egg production in 2013 was 606 million pieces. It was near the self-sufficiency threshold.

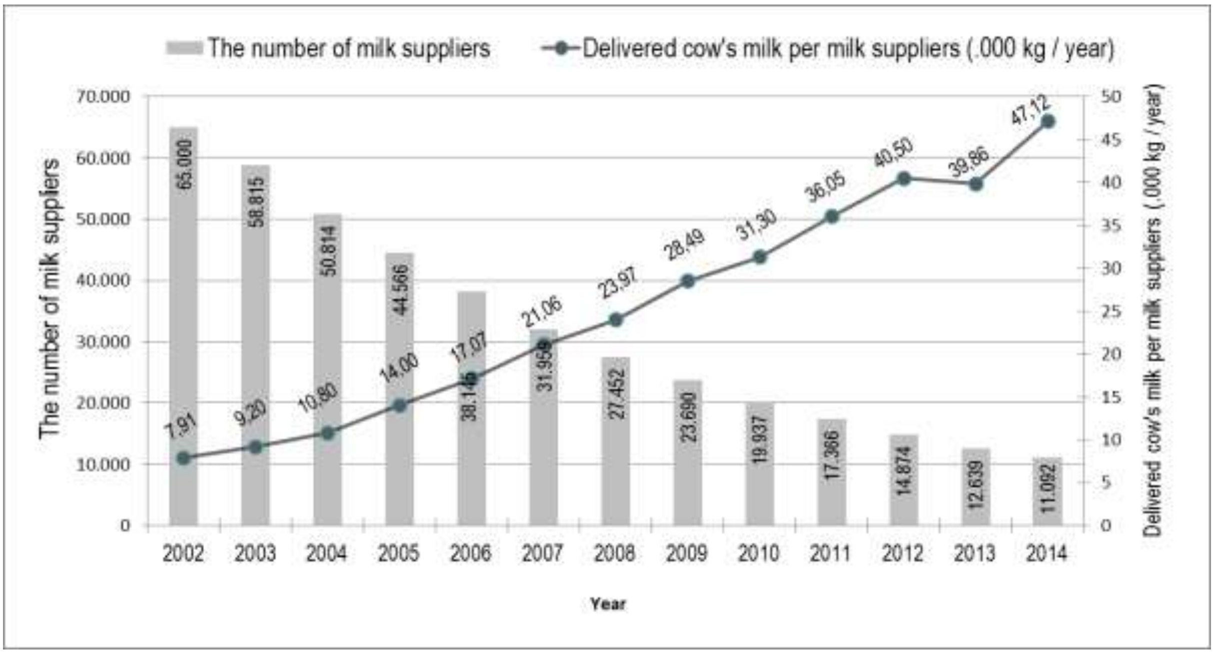
According to SYRC data for 2013, a total of 620,000 sheep was raised. Despite the registered positive trend, sheep production is still conducted in an extensive and traditional system without an organized market approach. A large share of sheep milk is processed by family farms. On average 484,000 sheep and 68,500 goats were slaughtered annually. The average domestic production of sheep and goat meat was 6,096 tones. Average self-sufficiency was about 80%.

In 2013 the number of registered horses was 21 thousand. The most numerous breeds in Croatia are autochthonous breeds: the Croatian Coldblood horse with 6,815 head, the Croatian Posavina Horse with 5,167 head and the Lipizzan with 1981 head (CAA, 2015). Next to the recreational and sport purposes, horses are bred for meat production. Since horse meat consumption in Croatia is low, it is primarily intended for export.

Position of smallholder livestock producers in Croatia

The position of smaller producers in Croatia is unique and requires their adaptation to the environment. The imposition of competitiveness as the primary criterion of sustainability for small and medium-sized animal producers is a challenge and they react in several ways: increasing the production capacity of their farms, intensifying and diversifying their production, switching to organic production, etc. However, there are some limiting factors that must be taken into account, e.g. strong competition from the common EU market, a lack of available agricultural land, an inconsistent land policy, unfavourable access to financial resources, a lack of support from the local community. Cattle production in recent years has undergone significant structural changes, particularly in the number and structure of active milk producers. In fact, since the beginning of the 21st century, there has been a significant decline in the total number of milk producers and an increased supply milk for manufacturers. In 2002 65,000 farms delivered 514 million kg of milk to dairies, with the average amount per farm at 7,910 kg/milk/year. In 2014 11,092 farms delivered to dairies 522.7 million kg of milk, on average 47,120 kg/milk/year (CAA, 2003-2015; *Figure 1*). Over the past twelve years about 53,900 family farms (*of small and medium capacity*) stopped delivering their milk to dairies. The reasons are primarily economic (*relatively low milk price, limited availability of financial resources*) and organizational (*lower availability of arable areas, lack of sufficiently skilled labour force and depopulation of rural areas*). Smaller producers of cow's milk tried to adjust to the new market environment through production diversification, direct sale of milk, establishment of units for milk processing, organic milk production, systematic meat production (*suckling cows, cow-calf, etc.*). Unfortunately, some milk producers, especially older ones, cease to produce milk.

Figure 1 Changes in numbers of milk suppliers and milk deliveries per farm in Croatia (source: Annual reports of the CAA, 2003-2015)



In 2014, the proportion of farms keeping up to 15 cows was 93.09%, and they possessed 52.9% of the entire cattle population (Figure 2). In the same year, the number of farms with 16 or more cows was 6.9%, accounting for 47.1% of the entire cattle population. Although in the period 2004-2009 some positive structural changes were observed, decreasing prices of milk and liberalization of the dairy sector led to the preservation of the unfavourable structure of cattle farms. Over the past decade, especially after the collapse of milk prices, interest of farmers in beef production has increased due to the favourable Simmental genotype that prevails in Croatia, a standardized production technology for high-quality beef, secure access to markets, and introduction of new production technologies (*suckling cows, cow-calf or organic production*). In this part of production smaller production units also predominate.

Ivanković et al. (2014) reported that 51% fattening beef farms had a capacity of up to 50 animals, and only 7% beef farms had a capacity of more than 1,000 animals.

Table 3 Changes in the structure of cattle production in Croatia

Year	2002	2006	2010	2014
Share of cattle farms by number of cows per farm (%)				
1 to 15 cows/farm	98.23	93.63	92.24	93.09
> 16 cows/farm	1.77	6.37	7.76	6.91
Share of Simmental and Holstein cows under milk recording (%)				
Simmental	74.15	72.29	65.95	63.50
Holstein	20.80	22.90	26.27	25.22
Milk production of Simmental and Holstein cows in standard lactation (kg)				
Simmental	4,426	4,552	4,990	5,030
Holstein	6,281	5,739	6,756	7,160

Source: Annual Reports of the Croatian Agricultural Agency (2000 – 2015; http://www.hpa.hr/)

Sheep production in Croatia is based on the traditional production technologies and indigenous sheep breeds, which account for over 65% of the total sheep population. Most of the sheep population (93%) is used exclusively for lamb production, while about 7% are used for milk production. Since sheep breeding is widespread in the Mediterranean and mountainous areas, those areas are not suitable for breeding larger animals (i.e. cattle). If we take into account the size of the herds under selection, only 8% herds keep more than 200 head, with herds from 25 to 100 animals predominating (CAA, 2014). In Croatia the tradition prevails to consume local lamb meat and dairy products (*mostly traditional cheeses*), which favours sustainability of the traditional sheep production on small and medium capacity family farms. Therefore, we assume that sheep production within farms of smaller and medium capacity is viable, particularly in the Mediterranean and mountain areas.

Pig and poultry production are also exposed to significant commercial pressures, which are partly reflected in a decline of production. A small number of pig farms have a year-round full production cycle. In production small family farms predominate, with those with the capacity up to 10 sows at 93.46% and those from 10 to 50 sows at 5.95%. Smaller farmers are exposed to market pressure due to liberalization of pork production, which leads to a significant reduction of meat prices. Some breeders to increase their competitiveness turn to organic farming, low-intensity technologies, recognizable meat quality and breeding of indigenous breeds, the Black Slavonian and the Turopolje pig.

Smaller producers in poultry production are also under severe market pressure. To meet market demands they are increasing farm capacity, introduce changes and implement new technologies and poultry genotypes, engage in organic production and breeding of autochthonous poultry breeds (*Hrvatica hen, Zagorje Turkey*) rare species (*geese, ducks and other poultry*).

In Croatia we have a predominance of smaller equine breeders (*horses and donkeys*), focused on sport, recreation or maintenance of pasture resources. In the total horse population (21,000) a share of coldblooded horses is 59% (*autochthonous Croatian Posavina and Croatian Coldblood horse which are primarily bred in extensive marginal pastures for meat production*). These breeds are indigenous and as such are covered by government subsidies. The share of warmblood horses is 37% of the total population of horses (CAA, 2015) and are primarily bred for recreation and sports. Although there are still a number of problems which prevent horse breeders from a more active approach (*small number of competition days, connections between associations and horse breeders*), there are positive developments in this segment of animal production. Donkeys are included in the everyday life of rural areas, especially in agro-tourism and leisure. Breeders of autochthonous donkey breeds are also trying to find their place in the market through milk and meat production, although the high cost of these products is a factor limiting their consumption.

Table 4 Parameters of organic production in Croatia

Year	2006	2008	2010	2012	2014
Utilised agricultural areas (ha)					
Number of organic producers	342	632	1,125	1,528	2,194
Arable areas	2,958	2,800	17,066	17,815	23,802
Meadows and pastures	2,620	5,603	2,452	7,634	16,403
Species (head)					
Cattle	345	5,813	9,796	5,640	7,308
Equine	19	417	452	507	291
Sheep	3,952	10,501	9,349	17,601	21,690
Goat	1,938	2,780	1,545	1,477	1,552
Pig	184	336	130	1,361	961
Poultry	1,180	3,597	1,137	1,947	2,540
Bees (number of beehives)	822	2,780	2,381	2,462	3,649

Source: Ministry of Agriculture Republic of Croatia (http://www.mps.hr/default.aspx?id=6184)

Organic animal production is relatively new in Croatia. A number of producers, especially in the areas with extensive crop and animal production, recognize the opportunity for increased recognition and survival in the market. An additional motivation for involving in organic production is an immediate provision of financial subsidies, development of rural tourism and growing interest in ″health″ and ″functional″ products (Ivanković and Kelava, 2013).

Changes in animal production in Croatia

To gain better insight into sustainability and opportunities for development of small and medium-sized farms in Croatia *SWOT* analyses for cattle and sheep production (*Table 5*) and pig and poultry production were preformed (*Table 6*). An advantage of small and medium-sized cattle farms is certainly connected with the experience and tradition of such production, although lifelong learning must also be involved. Smaller farms are trying to adapt to the market demands (*milk and meat production*) and prefer raising of the Simmental breed. To maximize the value of their products, some farmers build cheese processing units and sell cheese on the farm, or sell milk through milk vending machines. Also, using the available social networks, producers are trying to connect and provide immediate access to the market. The milk and meat market in Croatia prefers local and good quality food products that are delivered to customers via the system of quality control and traceability. However, in this way only a limited quantity of products can be placed on the market. Liberalization of the cow's milk market, low prices of milk, relatively high production costs and fragmentation of family farms are significant problems for farmers and some of them abandon this production method. Cattle farms of smaller capacity may be competitive only if they are properly organized and use available resources in an optimal manner, thus it is necessary to develop the knowledge and skills to use a traditional approach, consolidate arable areas and cooperate more effecitvely.

Table 5 SWOT analysis for sustainability of smallholder cattle and sheep producers in Croatia

Strengths	**W**eaknesses
• production tradition and experience [a, b] • meat and milk quality [a, b] • preference for domestic products [a, b] • production flexibility [a, b] • available lands for grazing [b] • support from the local community [a, b]	• exposure to pressures of the market [a] • low price for the product [a] • high production costs [a] • fragmentation and lack of arable area [a, b] • low investment potential [a, b] • unfavourable age structure of farmers [a, b]
Opportunities	**T**hreats
• use of traditional technologies [a, b] • milk processing into products [a, b] • direct sales of milk and meat [a, b] • production diversification [a, b] • transition to organic production [a, b] • use of autochthonous breeds [a, b] • awareness of product quality [a, b] • use of rural development measures [a, b] • maintenance of landscape [a, b]	• further market liberalization [a] • increased import of cheap milk & meat [a, b] • further decline of milk and meat prices [a] • poor "land policy" [a] • market disturbances (*diseases and other*) [a, b] • deterioration of global economic situation [a, b] • bad agricultural policies [a, b]

a - cattle production; b - sheep production

Sheep production is exposed to lower pressure of the market liberalisation , and is based on smaller farms that use traditional technologies and indigenous breeds. The market recognizes and appreciates these products, ensuring steady demand for these products. Although market liberalization is present in this type of production (*import of certain quantities of lamb meat*), producers of lamb meat and sheep milk sell their products at affordable prices.

Although in pig and poultry production holders of small and medium-sized farms benefit from a rich tradition, experience, environmental and market pressures are significant. Market liberalization facilitates import of pork and poultry meat, which has a significant impact on lowering of prices. Smaller and medium-sized producers with good quality meat and traditional meat products are trying to find their place on the market, using native breeds and modernising traditional production technologies. Increased interest in producers' association and a common approach to the market with appropriate marketing would surely promote sustainability of small and medium-sized pig farms. Pig production can be competitive with the use of modern genotypes and production technologies.

Table 6 SWOT analysis for sustainability of smallholder pig and poultry producers in Croatia

Strengths	Weaknesses
• production tradition [a, b] • quality of meat (*eggs*) [a, b] • recognition of the product [a, b] • preference for domestic products [a, b] • production flexibility [a, b] • support from the local community [a, b]	• exposure to the pressures of the market [a, b] • low meat prices on the market [a] • high primary production costs [a] • inappropriate genotypes [a] • low investment potential [a, b] • insufficient level of knowledge [a, b]
Opportunities	**Threats**
• promotion of traditional technologies [a, b] • meat processing into final products [a, b] • direct sales [a, b] • production diversification [a, b] • ecological production [a, b] • use of autochthonous breeds [a, b] • marketing (*presentation*) of products [a, b]	• further market liberalization [a, b] • import of cheap meat [a, b] • decline of meat prices [a, b] • market disturbances (*diseases and other*) [a, b] • deterioration of global economic situation [a, b] • ineffective agricultural policies [a, b]

a - pig production; b - poultry production

Horse breeding in Croatia has a long tradition and mainly smaller households are involved in their breeding. The average number of horses per farm is 3.75 (CAA, 2015). The dominant trend is breeding of coldblooded horses with lower market value (*indigenous breeds*), although breeding of warmblood horses for sport and recreation is increasing in importance. The relatively modest size of the warmblooded horse population in Croatia encourages users (*riders*) to import quality horses from other countries, which are a competition to breeding of warmblooded horses in Croatia.

Conclusions

In Croatia in the last two decades we have been observing considerable changes in the structure of animal production. In order to increase production competitiveness, merging and consolidation of farms, introduction of new technologies as well as animal genotypes are encouraged. Holders of small and medium-sized farms, especially those who did have a possibility of consolidation, were partly neglected. Today we recognize that animal production has other functions (*apart from milk, meat, and egg production*) that influence uniqueness of the landscape, biodiversity, life in rural areas and tradition (*traditional cuisine, folklore events, etc.*). Small producers still dominate in Croatia and show flexibility to meet the global market demands. Today, we are aware of the importance of small and medium sized producers. Their sustainability should be supported at the national, regional and local levels through measures of rural development, adjustment of traditional technologies, education and cooperation of stakeholders.

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