

REVIEW OF THE SHEEP SECTOR IN THE REPUBLIC OF NORTH MACEDONIA: DISTRIBUTION, FARM SIZE, BREED STRUCTURE AND MILK PRODUCTION CAPACITIES

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ABSTRACT

Sheep breeding has an important role in the country even if changes are present in the sector. The majority of the national farms in the country are farms with a size up to 50 heads (35.75%), the second most present farms (35.12%) are farms between 301-500 heads. The highest number of sheep are bred in the Polog region (20.04 %), the second most dominant regions are Eastern (15.97%) and Pelagonia region (15.35%), while in the rest of the country regions sheep are present with less than 15%. Highly represented in the breed structure of the sheep population in the country are the Ovcepolka (26.96%) and Sharplaninska pramenka (26.42%), highly dairy productive sheep breeds are present with less than 1% of the national flock. A high presence of different types of crosses is present in the national flock. Favourable structure of breeding categories is present in the national flock even if decreasing trend in a total number of sheep is detected. Variation in the number of milking sheep and average raw milk per milking sheep is noticed. Future activities in the sector should be oriented towards the improvement of genetic capacities, improvement of breeding and feeding strategies.

Keywords: sheep, farm size, breed structure, regional distribution.

INTRODUCTION

The agricultural sector is one of the most important sectors in the country's economy. Livestock accounts for 25% of the value of agricultural production (Economic calculation in agriculture. Favourable natural condition in the country (79% of its territory is mountainous there is approximately 751000 ha of pastures, 59.000 ha natural meadows) create appropriate conditions for the development of sheep breeding (National strategy for agriculture and rural development for the period 2014-2020). The ability to converse plants in high-quality food products for human populations gives special significance to livestock production. In the country, two main production systems are notable, half-nomadic extensive system and stationary breeding system. In the first breeding system starting from the end of May until the end of October sheep flocks are at the mountain meadows and during the winter period until the end of the spring sheep flocks are located in the winter pastures. In the stationary breeding system, sheep flocks are located at a certain location during the whole year, farmers are practicing sheep grazing and hand feeding. The production technology in the country is traditional, fully adapted to the natural resources and biological behaviour of sheep. The lambing occurs in January to February, lambs are weaned until March or April and ewes are milked until mid-July. Multiple purpose sheep production, i.e. meat, milk, and wool, is still very accepted by farmers. However, several factors, like traditional livestock breeding, farm size and breed structure, depopulation of rural areas, economic factors, climate change, and environmental conditions will determine the future development of the sheep breeding sector in the country. The main aim of this paper is to determine regional distribution, farm size and breed structure of sheep and production level in the country as main indicators which will serve to evaluate the production capacity of different regions in the country but also to recommend future activities for improving and increasing production from ruminants. Operational data from the Food and Veterinary Agency (FVA) in 2018 and State Statistical Office (SSO) are used to determine regional distribution, farm size, breed structure and production level in the sheep sector.

EU TRENDS IN THE SHEEP SECTOR

The Mediterranean area is dominated by indigenous breeds, of a less muscular constitution and of a greater proportion of internal fat compared to subcutaneous, having a long reproductive life and being perfectly adapted to the poor environmental conditions. The genetic potential of these breeds resulted in the application of two production systems: meat/milk production including suckling lambs slaughtered at very low trunk weight and age, and meat production from slaughtered slightly older lambs of smaller trunk (Alfonso et al., 2001). Dairy sheep production is usually based on local breeds, well adapted to the production areas that are in many cases less favoured. Sheep use natural resources of low interest for other species, helping the maintenance of ecological equilibrium and natural landscape. In addition, they contribute to the maintenance of economic activity and population in rural areas (Ugrante and Gabina, 2004). At the European level, sheep and goat breeding represent minor agricultural activity with 3.6% of the total value of livestock production in the EU-27. However, in certain Member States, sheep and goats farms occupy a significant part of the overall agricultural area: 31% in UK and 20% in Ireland, Spain, Romania and Italy. Sheep sector is characterized by a reduction of the quantity of sheep meat breeds (33% less reproductive sheep heads for meat production during the period 2000-2009), while the total number of sheep intended for dairy production has grown steadily (+43% number of milking sheep). Generally, a downward trend in the total number of sheep from 1990 (-1% per year) and slightly accelerated decline after 2005 (-3%) can be observed. The trend in most EU countries where sheep are milked is a rapid development of "productive breeds". In Spain it is Assaf breed, where this breed according to the national census exceeds local dairy breed Churra, while sheep breed Lacaune is considered to be represented by more than 200000 reproductive sheep heads. Similar is the situation in Greece and Slovakia where the Lacaune and East Friesian breeds are the only sheep breeds on the rise (de Rancourt and Carrère, 2011). From 2004 to 2008, the number of sheep in EU fell from 73 million to 68 million heads. However, there are differences between countries, so the number of sheep in Greece has been growing, while in France, Ireland, Italy and the UK it was declining. The current Common Agricultural Policy (CAP) foresees support for different autochthonous breeds of sheep and goat. These breeds are well adjusted to the local environment and play a substantial role in preserving biodiversity and natural balance in their habitat. Native breeds are much better adapted to local conditions and breeding environment. There are now 25 million fewer sheep than in the 1980s, and production has fallen by over 20% in the past 17 years. Sheep and goat meat consumption considerably decreased in the recent years, with a decline in sheep meat consumption from 3.5kg per person in 2001 to 2kg today, and this downward trend has continued apace in 2017, particularly among young people. The sheep and goat sectors account for 3% of European milk and 9% of European cheese production, and together they employ 1.5 million people in the European Union (A8-0064/2018). In 2015, the quantity of milk produced in EU farms was approximately 168 million tonnes, of which 97% was cow's milk and only 3% was milk from animals other than cows (ewes, goats and buffalo). The bulk of the milk produced was delivered to dairies (71% of sheep's and goat's milk) and the remainder was used on the farms to process, consume, or to sell directly to consumers. Almost all of the sheep's and goat's milk (92%) was produced in only five countries: Greece (24%), Spain (23%), France (1%), Romania (14%) and Italy (12%). Almost all of the milk produced is used for cheese-making, on the farm or in industrial dairies. In 2015, EU cheese production from ewe's, goat's or mixed milk totalled about 850 000 tonnes (9% of total cheese production). It was concentrated in several countries: Spain, Italy and France produced 93% of total EU production of cheese from ewe's pure milk, France alone produced half of total EU production of cheese from pure goat's milk, and Greece and Spain produced 77% of total EU production of cheese from mixed milk (Rossi, 2017). Since 2000, the number of sheep meat and milk producers has declined in the EU by 50%. Sheep meat and milk production are still very important farm enterprises in Europe and neighbouring countries. In Europe, there are 85 million sheep on 830 thousand farms and in Turkey, there are 31 million sheep on 127 thousand farms. But these numbers are only half as high as they were 20 years ago. In order to reinforce the attractiveness of the sheep sector, it is fundamental to increase productivity in a sustainable way. For meat sheep, 'productivity' refers to the number of lambs reared per ewe and for milk sheep the number of milking ewes (EIP-AGRI, 2017). Sheep and goat sector production constitutes just a small share of the output of the EU livestock sector as a whole, but this farming activity's importance is much broader in terms of its social and economic contribution to remote rural areas, not to mention the environmental contribution it makes through the provision of public goods such as landscape and biodiversity

conservation. Economic and structural difficulties do not help the sector's growth and this means that the EU is not self-sufficient but relies on imports to top up supply to its market for sheep and goats. The EU's sheep and goat population totalled 98.6 million heads in 2017, of which sheep represented 88%. In 2017, almost half of the EU's sheep were in the UK (28% of the total) and Spain (19%), while over half of the EU's goats were in Greece (31%) and Spain (25%). After a constant decline registered in recent decades, mainly due to the outbreak of animal diseases (such as bluetongue or foot-and-mouth) and policy changes (especially the decoupling of EU subsidies from production), numbers have remained quite stable in recent years. In certain areas, sheep and goat flocks are threatened by attacks from large carnivores (such as wolves, bears, lynx and wolverines), and the coexistence of the various concerned species is problematic, especially where endangered species of large carnivores have returned after a long absence. Finally, although sheep and goat meat production and the output value (754 450 tonnes and €5 843 million respectively in 2017) represent a tiny share of overall EU meat production, they play an important role in some Member States, such as the UK and Ireland for sheep meat and Greece for goat meat production. The situation is the same with the other products, such as the production of cheese from ewe's, goat's or mixed milk, which is mostly concentrated in Greece, Spain, Italy and France. Sheep and goat farms and farmers in the EU take place mostly on pastureland in remote and disadvantaged rural areas, often on common land, where it plays a key role in delivering public goods in terms of landscape and biodiversity conservation. In 2013, there were about 850 000 farms rearing sheep and 450 000 rearing goats, with more than 1.5 million people working on farms specialized in raising sheep and goats. The average number of sheep and goats per farm varies significantly throughout the EU (higher in the UK for sheep and higher in the Netherlands for goats). The share of farms with sheep and goats also varies, being higher in the UK and Greece, respectively. Generally, sheep and goat farming provides low remuneration. On average, EU farms specialized in sheep and goat rearing have lower incomes compared with the average for all EU farms, and their receipts are more dependent on the EU's direct payments, compared with other farming sectors. The EU is not self-sufficient in terms of sheep and goat products. Imports are based on a system of annual import quotas with allocations negotiated with the EU's main trading partners, which for the sheep and goat market are New Zealand (for more than 80% of overall EU imports) and Australia (about 11%), being by far the world's top exporters in this sector. The UK is the destination market for the largest share of the EU's imports, followed by the Netherlands and Germany. The EU's export of sheep and goats is still marginal and directed mostly to Libya, Hong Kong, Israel and Switzerland. It consists mainly of live animals originating from Romania and Spain. Sheep meat consumption in the developing countries is expected to grow over the coming decade, but a greater presence of the EU as an exporter would have to cope with the strong competing power of the main exporting countries. The EU's internal demand for sheep and goat products, especially meat, is expected to remain stable. This weak preference for sheep and goat meat by EU consumers does not help to boost internal production levels (Rossi, 2018).

SHEEP BREEDING – COUNTRY PROFILE

The numerous advantages (favourable climatic conditions, the mountainous nature of the terrain, the ability to maintain economic capacities of the rural population, as well as the tradition of sheep breeding) are ideal for development of the sheep sector in the country. Sheep breeding system similar to the Mediterranean pool is present in the country. Sheep breeders often have a dual direction of production (excluding wool-low interest and low price), where milk production participate with two-thirds of the income while the rest of the income is a result of meat production. The significant part of the income to the farmer is sheep milk, marketed as white cheese on the local markets. The current price of this cheese is between 5.0 and 8 euro per kg, depending on its quality and regional origin. The lamb meat production is targeted mainly to the external markets for the Easter and Christmas holidays. The lambs (carcass weight of 7-8 kg) marketed for Christmas achieve a 30 percent higher price than those for the Easter holiday season. The sheep milk, at least until now, is mainly intended for domestic market and it is the raw material for processing of different types of cheeses and other dairy products. Totally produced sheep milk is affected by the number of breeding sheep in the country, genetic capacity and farm practice. Extensive semi nomadic system is dominant production system in the country, but the production of sheep milk generally distinguishes six systems that are based on the length of suckling period.

REGIONAL DISTRIBUTION OF NATIONAL SHEEP FLOCK

According to the operational data of FVA in 2018, highest share of sheep population in the country is bred in the Polog (20.04%), followed by Eastern (15.97%) and Pelagonija region (16.9%). In other country regions the percentage of sheep heads ranges from 8.09% (Southeast) up to 13.26% (Southwest). Skopje region is characterized with the least sheep heads (5.70%) (Figure 1), (FVA, unpublished/operational data, 2018).

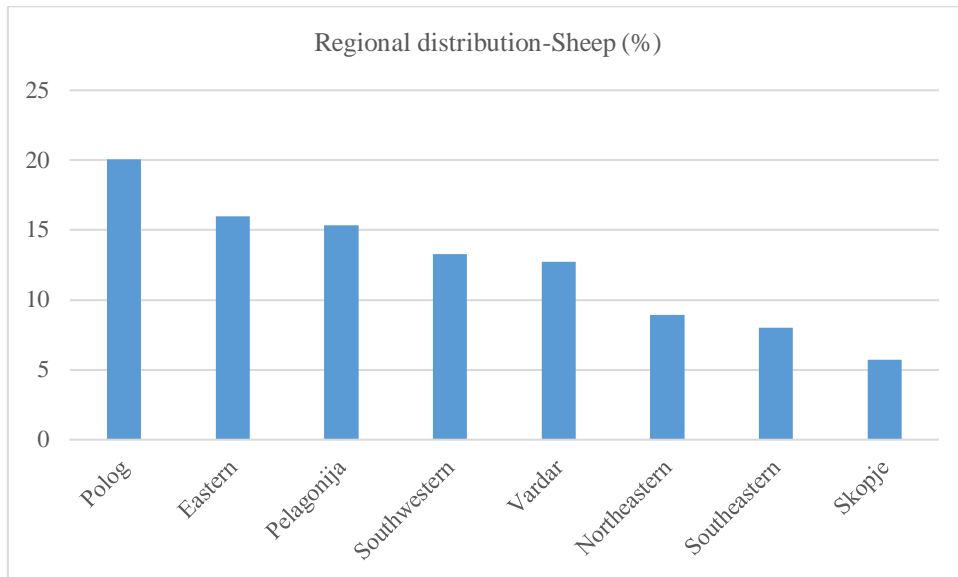


Figure 1. Sheep distribution in country statistical regions

NATIONAL SHEEP FARM SIZE

Regarding the farm size two predominant sheep farms are present in the country. Sheep farms up to 50 breeding heads (35.75%) and farms that are breeding 101 up to 300 sheep heads (35.12%) are the most prevalent sheep farms. Sheep farms with 51 up to 100 breeding heads are present with 18.05% of total sheep farms. Herds with a significantly higher number of sheep per farm are represented by a smaller percentage (Figure 2), (FVA, unpublished/operational data, 2018).

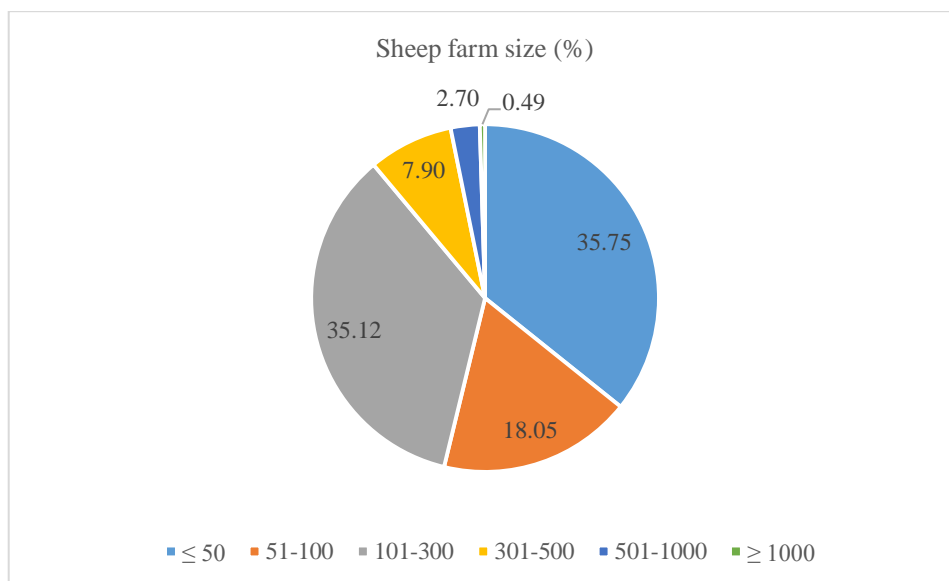


Figure 2. Sheep farm size at country level

There are total 4926 registered sheep farms in the country in 2018 (FVA, unpublished/operational data, 2019). The Eastern (22.81%) and North-eastern region (16.52%) are characterized with highest number

of sheep farms, followed by Southwestern (13.54%), Pelagonija (12.18%) and Polog region (10.96%). In the rest of the country regions (South-eastern, Vardar and Skopje region) sheep farms are less than 10% from total number of sheep farms in the country (Figure 3), (FVA, unpublished/operational data, 2018) .

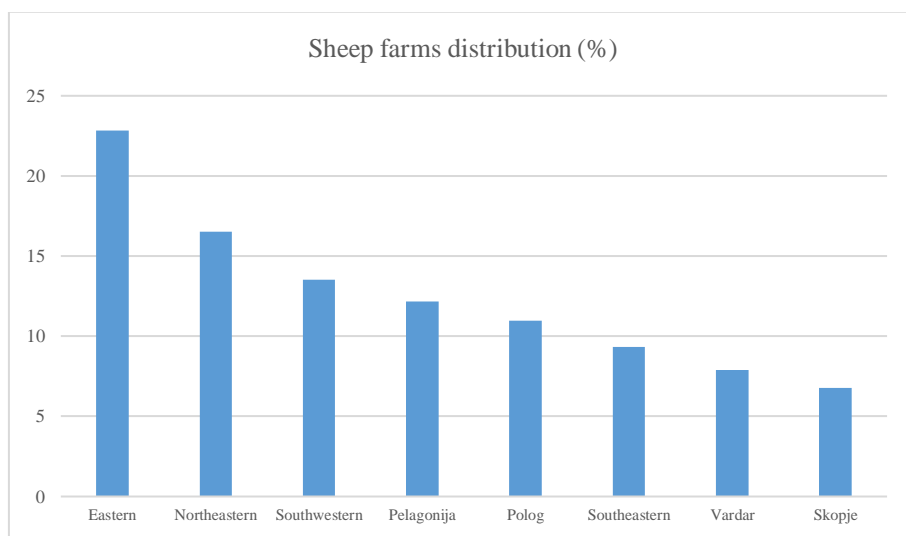


Figure 3. Sheep farm distribution in country statistical regions

The most of sheep farms are located in the Eastern and North-eastern region, sheep breeding in these regions is characterized with presence of sheep flocks with less than 50 heads per flock. Most favourable sheep flock size distribution is notable in Vardar, South-eastern, Polog and Pelagonija region. In these regions most common are sheep farms with flock size form 101 up to 300 breeding heads (Figure 4), (FVA, unpublished/operational data, 2018).

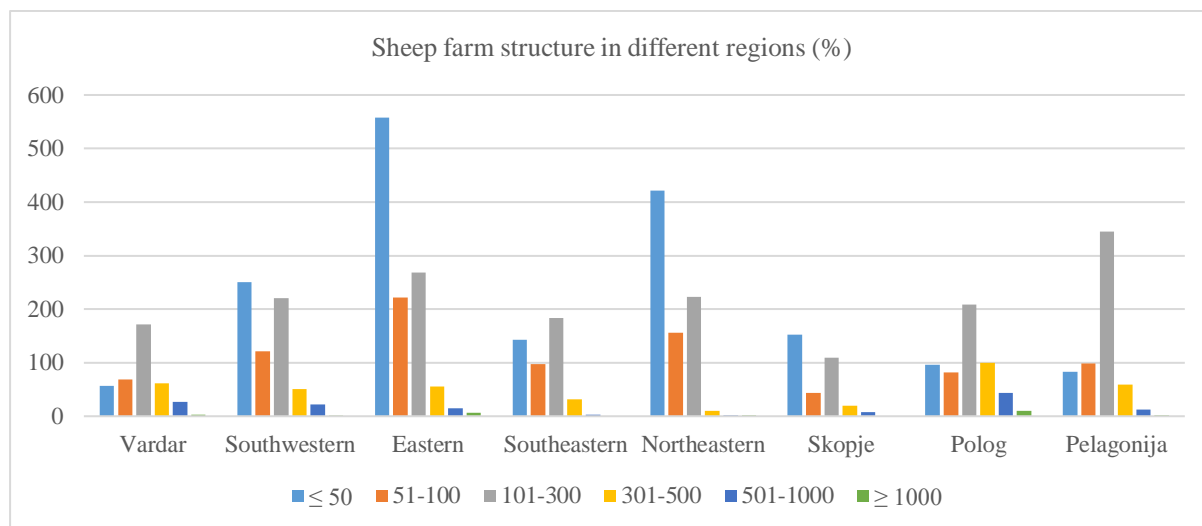


Figure 4. Sheep farm structure in different country statistical regions

SHEEP BREEDS DISTRIBUTION

The most frequent sheep population in the country is Ovchepolian (26.98%), and Sharplaninian (26.42%) pramenka, with their usual concentration in the regions were these populations originated (Figure 5). Crosses of different breeds are present with 19.39% and Wirtenberg crosses are present with 12.58% of total sheep number at country level. Pure breed Wirtenberg and Awassi are present with 9.94% and 2.82% respectively. All other sheep breeds in the country encompass less than 2% (Figure 5), (FVA, unpublished/operational data, 2018).

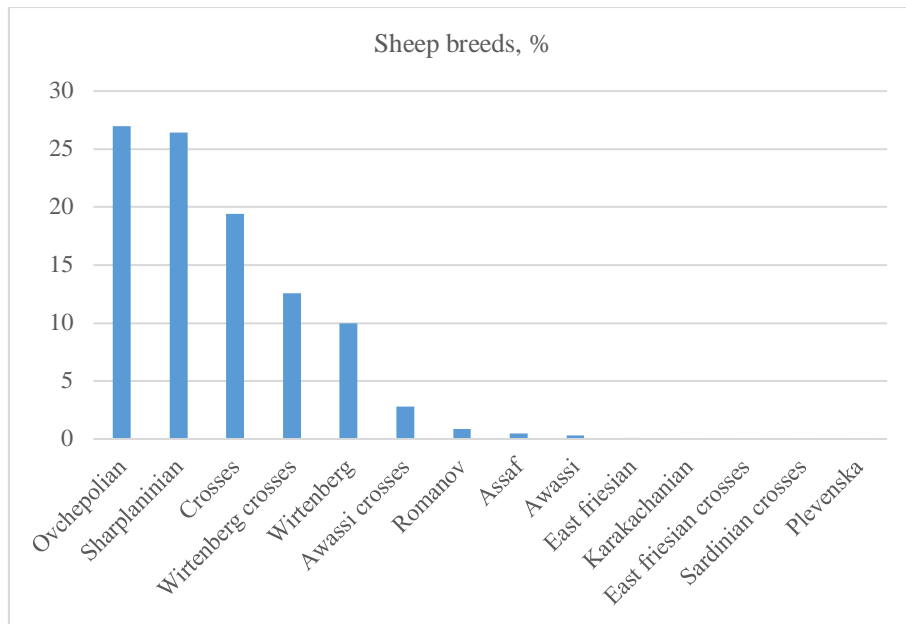


Figure 5. Sheep breeds present in the country

Differentiation of breed distribution between country regions is present. In the Vardar and South-eastern region most prevalent sheep breed is Ovchepolian sheep breed. The highest concentration of crosses was observed in the North-eastern region, while the Sharplaninian breed was the most dominant breed in the Polog region. The highest occurrence of Wirtenberg sheep breed was noted in the Skopje region while the Wirtenberg crosses are predominant in Pelagonija region. Dairy sheep breeds as Awassi, Blackhead Plevan, East Friesian and Sardinian sheep breed are insignificantly present in analysed country regions (Figure 6), (FVA, unpublished/operational data, 2018).

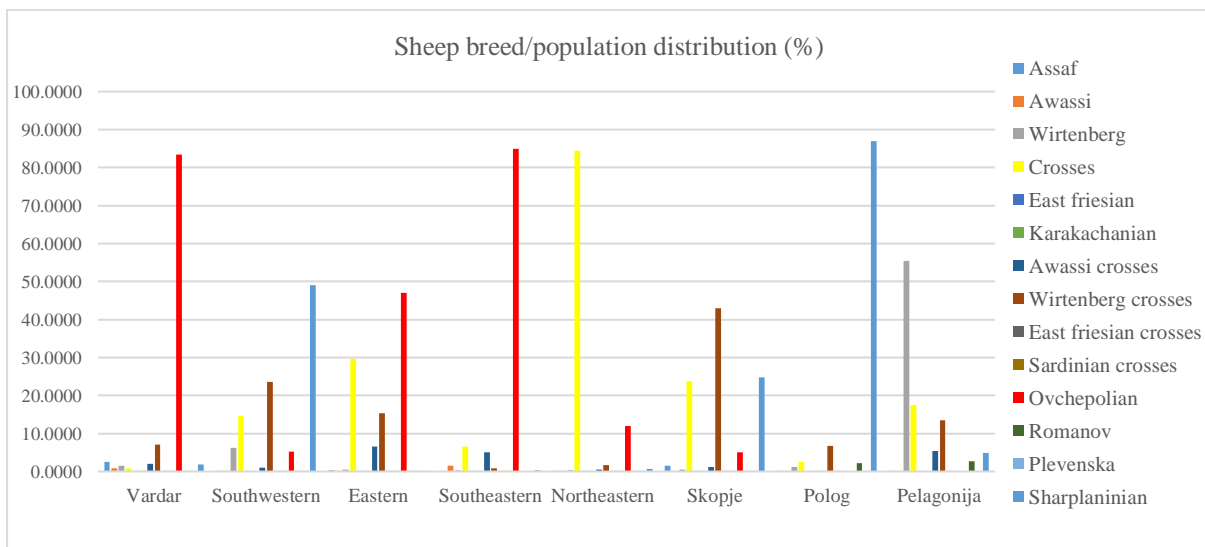


Figure 6. Sheep breed distribution in country statistical regions

SHEEP BREEDING CATEGORIES

Distribution of sheep adult/breeding categories in the country regardless the sheep breed is shown in Figure 7. The highest percentage of the total number of sheep in the country as well as the total number of female breeding sheep and male breeding heads belong to the production category from 6 months up to four years old. Generally the data indicates favourable age structure of the national sheep herd (FVA, unpublished/operational data, 2018).

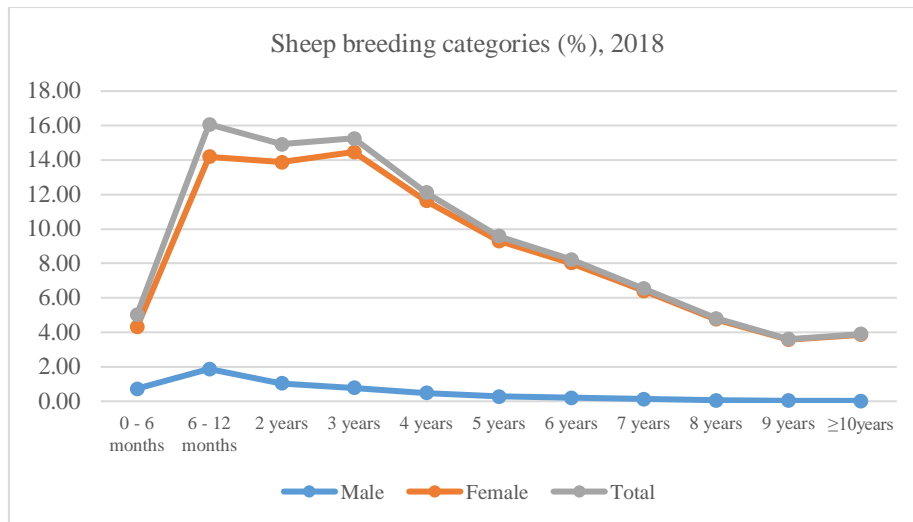


Figure 7. Sheep adult/breeding categories in the country

Total number of sheep in the period 2009-2018 according to the State Statistical Office (SSO, 2009-2018) is shown in Figure 8. According to the official data there is a continuous decline in the number of sheep in the country since 2010. Sheep number in the country according to the organizational structure of sheep breeders is presented in the Figure 9. Majority of sheep in the country are bred in individual holdings (more than 95%), while the rest of the sheep are bred in the agricultural enterprises and cooperatives (Figure 9).

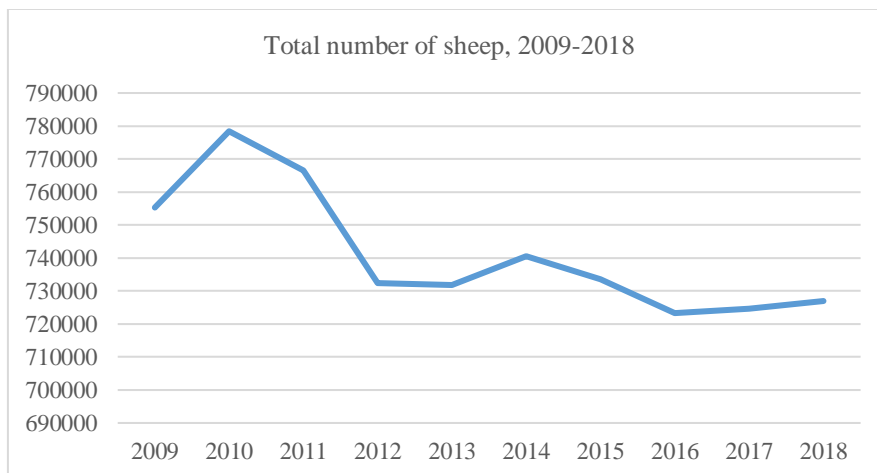


Figure 8. Total number of sheep in the country

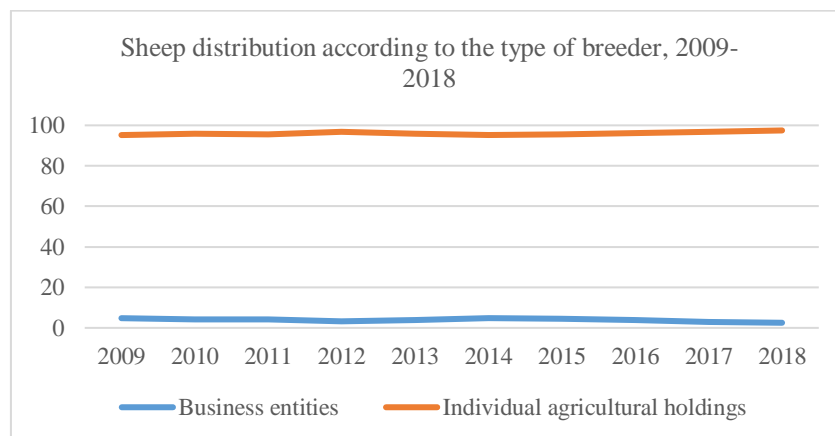


Figure 9. Sheep distribution according to the breeder organizational structure

The total number of dairy sheep in the country has a decreasing trend in the period between 2010 and 2014. Since 2015, the number of dairy sheep is increasing (Figure 10). The highest number of milking sheep is noted in 2018 (541286 heads). Most of the milking sheep in the country (more than 98%) are bred in individual holdings. Regarding ownership structure, the highest percentage (97 to 98%) of the total milk production in the past period belongs to the individual farmers (SSO, 2011), while the rest amount of milk production belongs to the large agricultural enterprises and cooperatives. The main producers of raw sheep milk in the country are individual holdings which produce more than 99% of the total raw sheep milk (Source: SSO, 2009-2018).

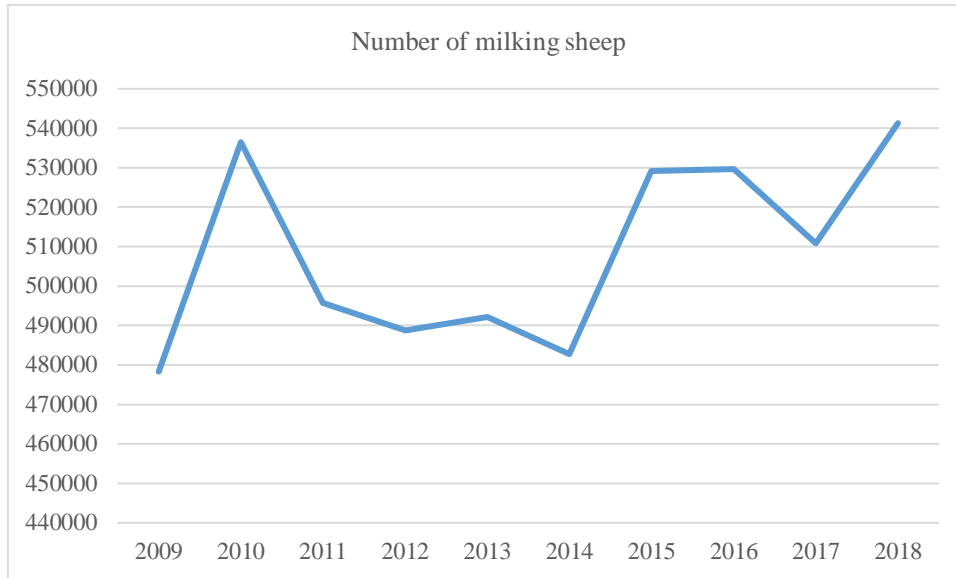


Figure 10. Number of milking sheep in the analysed period

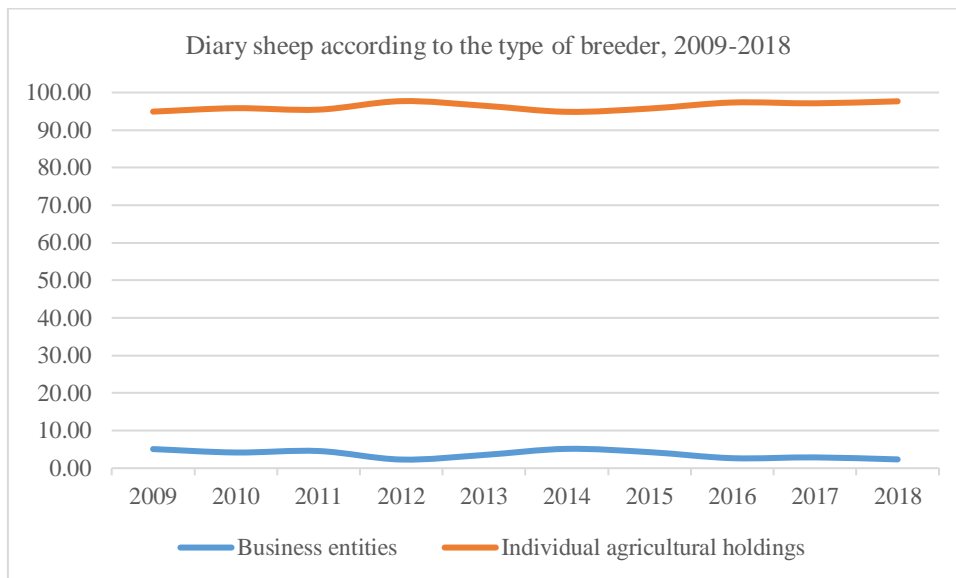


Figure 11. Dairy sheep national flock ownership structure

Sheep milk production is characterized with significant oscillations. Considering the characteristics of sheep breeding technologies, several factors (climate, economic characteristics and farm size, as well as the technology of breeding) significantly affect the volume of sheep milk production. The average raw milk yield per milking sheep (in the period 2009-2018) is 69.42 litres in the analysed ten year period, with the highest average raw milk production per dairy sheep in 2012 (79 litres) and the lowest noted in 2011 (51.2 litres). In the analysed period, there was a decreasing trend of average raw milk yield per milking sheep in the period 2009-2011, and since 2012 it was increasing until 2016. Second decreasing trend in annual raw milk production was noted in 2017 and 2018 (Figure 12).

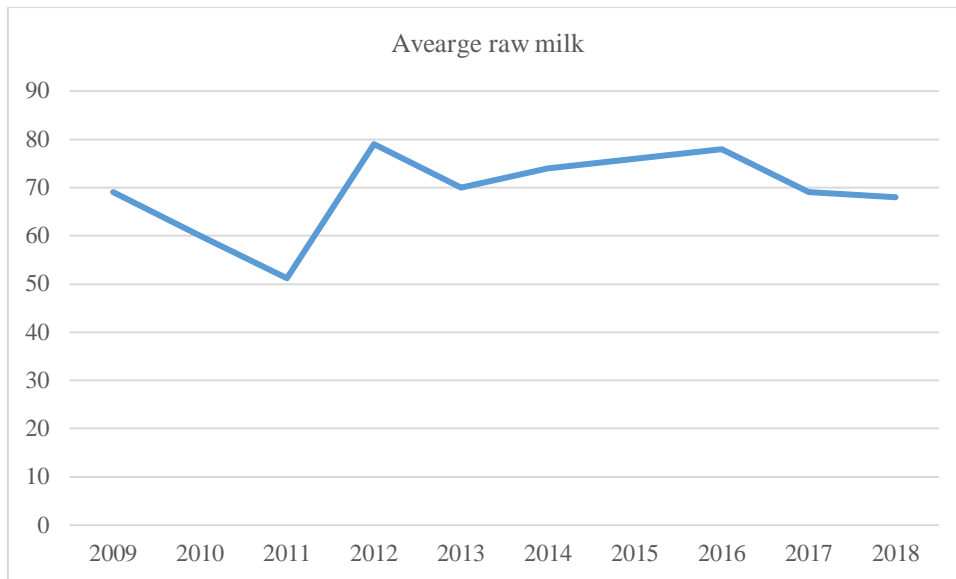


Figure 12. Average raw milk production

Highest number of dairy sheep in the period 2011-2015 is noted in: Vardar, East, Southwest and Pelagonija region. Continuous grow of milking sheep can be detected in the Southeast region of the country. The smallest share of dairy sheep flock is present in Polog, Northeast and Skopje regions (Figure 13).

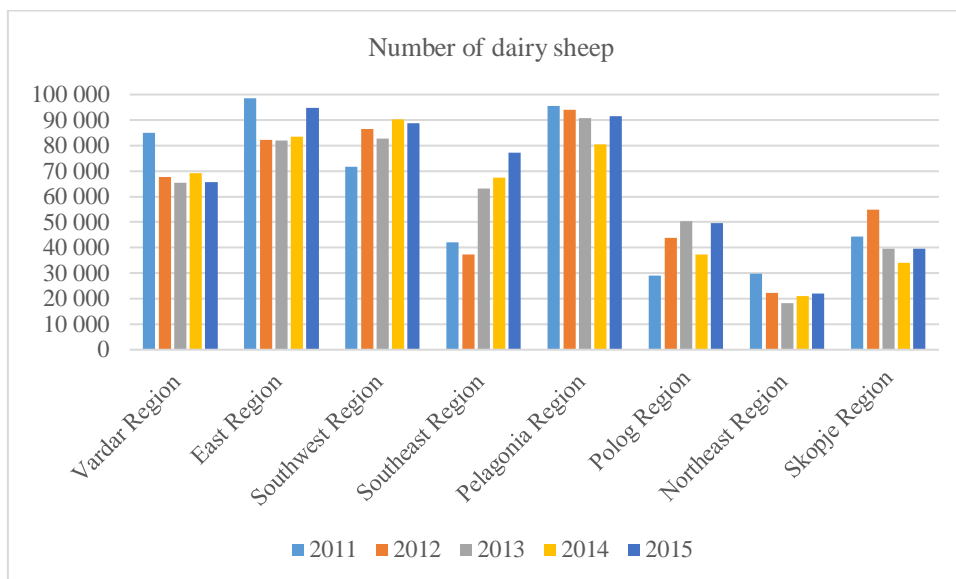


Figure 13. Dairy sheep number (2011-2015)

Total raw sheep milk production in the period 2011-2015 is shown in the Figure 14. Country regions are characterized with different trends in raw sheep milk production. Continuous growth of the total raw milk production can be noticed in the Southeast region. In Skopje and Southwest region raw milk production shows variations in the analysed period, these two regions are the leading regions in raw milk production in 2015. Decreasing tendency of total raw milk production is noted in Pelagonija and Northeast region (Figure 14).

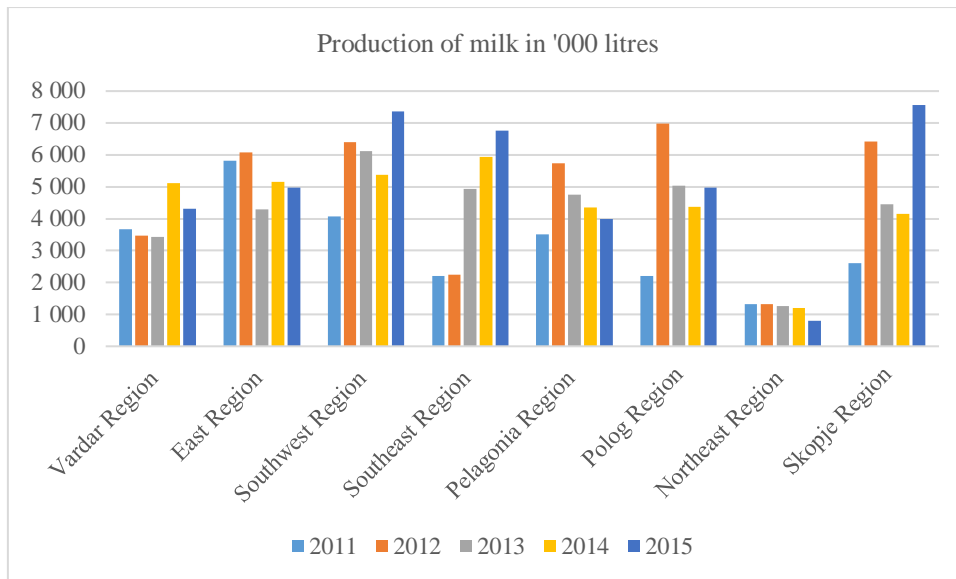


Figure 14. Raw sheep milk production in '000 litres

Different trends in average raw milk production per milking sheep was detected in different country regions. Increasing tendency was present in Vardar, Southwest, Southeast, Polog and Skopje regions, while in the East, Pelagonija and Northeast regions average raw sheep milk production per milking sheep has decreasing tendency (Figure 15).

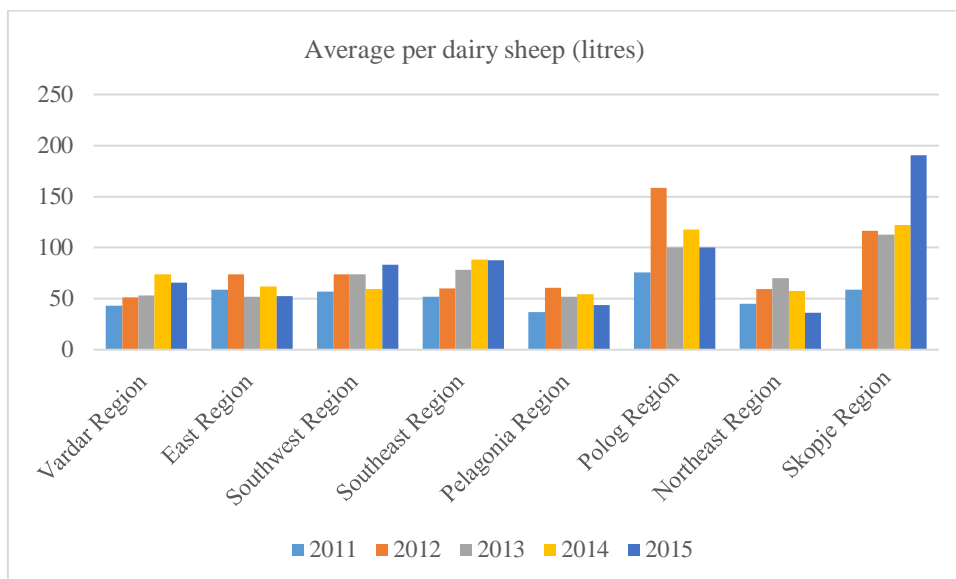


Figure 15. Raw sheep milk average production per dairy sheep

CONCLUSIONS

The main characteristic of sheep breeding in the country is preponderance of small family farms and medium-sized farms. Unequal distribution of the national sheep flock can be observed in the country, with more than 51% of total sheep present in three country regions. High difference in the number of sheep farms as well as sheep flock size per farm between country regions is noticed. Two different groups were identified, in the first group are Southwestern, Eastern, North-eastern and Polog regions with flock size up to 50 breeding heads while in the second group are the Vardar, South-eastern, Polog and Pelagonija regions with flock size between 101 up to 300 heads. Regarding the breed structure, the national flock is characterized by a very small distribution of dairy breeds and their crosses, high presence of autochthonous domestic breeds and their crosses with meat-wool sheep breeds. Favourable distribution of sheep categories was detected in the country, but continuous decreasing trend is notable at national flock between 2009 and 2018. Decreasing trend of the number of dairy sheep in the country

stopped in 2014 and their number is growing in the following years with exception to 2017. Average raw milk production has an increasing trend from 2011 until 2016 while in the following years (2017 and 2018) slight decreasing trend is noted. Skopje region is leading region in average raw milk production per milking sheep even if the dairy flock in this region is smaller compared to other regions. Variation in raw milk production between country regions is present. The development of sheep sector should be orientated towards increasing farm specialization and farm size, application of modern production technologies in dairy farming, improvement of breed structure on farms, improvement of feeding techniques, and breeding dairy sheep breeds. Regarding the indigenous sheep populations, their further development should be directed towards pure breeding and their genetic improvement.

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