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ECONOMIC ASPECTS OF DIFFERENT SHEEP PRODUCTION SYSTEMS IN BULGARIA

Bulgarian sheep husbandry is the most traditional occupation that helped people earning their living for thousands of years. It has laid the foundations of the crafts and industry in our country. The manuscript presents information on the measures taken by the European Parliament (EP) for the sheep husbandry development during the next decades. Detailed data on the state and development of sheep farming in Bulgaria for a period of 118 years are presented and recommendations are made in line with the theses from the EP resolution. The results of the study show that the sheep population in EC countries are declining by 2% annually. Compared to the 1980s, their number has decreased by 25 million. Sheep meat consumption in the EC has declined by 3.5 kg at 2 kg per capita. For the same period, a drastic decrease in the number of sheep and their products has occurred in Bulgaria. Compared to the 1980s, the number of sheep in the country was reduced by over 9 million. The total sheep meat production has decreased about 23 times, and that of sheep milk – 4.5 times. Consumption of sheep meat in Bulgaria decreased to 1.5 kg per capita. Sheep wool, which before the transition was a leading source of income, was removed from the group of main products and included in the by-products group.

From this part, it may be concluded that Bulgaria has a substantial natural resource of pastures and cultivable land for the development of a significantly larger scale of livestock husbandry as it had been at all stages of country's development. Raising animals on pastures could be a good source of revenue for people, providing higher added value and contributing to the revival of rural areas.

The next part of the paper presents information on the main economic indicators of dairy ewes and local autochthonous sheep breeds. The influence of the farming system on the ultimate economic results in the farms: extensive in the mountainous areas; semi-intensive in semi-mountainous areas and intensive for the plain regions of the country was studied. For this purpose, three of the most typical Bulgarian sheep farms with 300 ewes, 60 replacement female yearling sheep and 7-8 rams were selected. All natural and economic indicators were reported per one ewe.

Sheep subject of the study was from the Bulgarian Dairy Synthetic Population, which is the most typical representative of Bulgarian dairy sheep husbandry (65.9% of the population). The second breed is the indigenous Srednorodopska sheep – a most typical representative of autochthonous sheep farming with a relative share of 26.59%. Both breeds account for 90% of the national sheep population.

The results from the investigation of the three flocks reared under different geographic and technological conditions evidence a relatively poor economic effect. Sheep reared indoor all year round whose feeding was balanced, showed better economic performance.

The sheep breeds and farming systems, subject of the present study provide sufficient objective information for the present state of Bulgarian sheep husbandry. The results allowed making important conclusions on the future development of the branch and proposing directions for its successful development.

JEL: Q1; Q12; Q13

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Introduction

Bulgarian sheep husbandry has been always present regardless of historical perturbations. For centuries it has played a leading role in people's life and livelihood, laying the foundation of the first crafts and industry in Bulgaria. Sheep husbandry marked the beginning of trade with other countries occupying a significant share of export goods produced in the country.

Sheep husbandry in Bulgaria had a leading role in all subsequent stages of the development of the state as seen from numerous documents and research studies (Law for promotion and breeding of sheep with quality wool in the Principality of Bulgaria, 1892; Savov and Totev, 2013; Stankov et al., 2003, 2005; Tyankov et al., 1997, 2000).

Sheep farming products were widely popular in our country and apart from direct consumption and for everyday life, provided raw materials for the industry (Breeds of livestock animal species in the Republic of Bulgaria, 2013; Stankov et al., 2007; Slavov, Stankov, 2013; Panayotov et al., 2005; Stankov and Radev, 2007; Yordanov et al., 2017).

During the transition from a planned to a market-oriented economy, the number of sheep and sheep products have markedly decreased. Some of the cultured breeds created with the efforts of the best Bulgarian selectioners were liquidated. Now the number of sheep and the genealogical structure of available breeds is at the critical threshold, which requires undertaking measures for the preservation of the most traditional livestock branch in Bulgaria.

The economic performance in sheep and goat farming at this stage, despite the subsidisation, is not good. This applies to all productive areas and categories of sheep and partly goats (Ivanov et al., 2020). The reasons for this are the disintegrated sheep farming, the poor realisation of the products, namely the lack of sufficient markets, low purchase prices (often below the cost of the products), the lack of guarantees from producers to buy milk throughout the lactation period and markets for late lambs and culled ewes. These reasons may be regarded as objective, but there are other very important and purely subjective reasons. In this group, poor performance on sheep well below the genetic background of animals production has the most significant influence on poor economic performance and low profitability of sheep husbandry. This is due to the mean selection, inadequate nutrition depending on the physiological condition, the still primitive rearing technologies, the lack of qualified personnel, the inadequate professional training of farmers etc. (Tyankov et al., 1997, 2000; Ivanov et al., 2020).

The elimination of the first group, identified as objective reasons, depends to a large extent on the state authorities and the active assistance of the professional branch organisations. The second group is mainly within the competence of non-governmental organisations, legally supported by the state bodies.

The economic results in sheep from the Bulgarian Dairy Synthetic Population were published by Mihaylov (1995), Mihaylova-Toneva (2011), Popova et al. (2007), Iliev (2011 a,b), Slavova et al. (2015). The authors found that the highest relative share was that of

remuneration and social security, between 42-46% and feed – about 40%. Revenues were about 60% of animal sales and 40% of milk sales.

All studies show a low or negative cost-effectiveness.

Similar conclusions about the low economic efficiency of sheep husbandry were made previously by other authors – Georgiev (1990), Ivanov (1990), Momchilov (2003; 2005), Stankov et al. (2003), Bashev (2003), Tyankov et al. (1997). Despite the numerous recommendations, strategic guidelines and regulations, significant economic results have not yet been achieved. Unfortunately, there is still no recognised Bulgarian dairy breed in Bulgaria, despite the attempts and schemes to create one (Dimov, 1995; Hinkovski et al., 1984; 2008; Tsvetanov, 1989).

Studies on the productive and economic performance of local sheep breeds were carried out by Atanasov et al. (2010), Stoykova (2004), Kuzmanova (2006), Odzhakova (2017) and on Pleven Blackhead sheep - by Stoykova (2004). The results of the surveys showed relatively good productive indices for Bulgarian local breeds and opportunities for their improvement. There is a potential for increase of economic performance, a challenge to future selection. Autochthonous sheep breeds, reared mainly I mountainous and semi-mountainous regions in extensive farming systems, are very adapted for the production of organic milk and dairy products.

Of interest is the information on high-mountainous autochthonous breeds presented by Odzhakova (2017). The data show that the Srednorodopska sheep are small, adapted to the harsh mountainous conditions and very tough. The author believes that this breed should not be subject to aggressive selection, but preserved in its authentic form as a local genetic resource.

The purpose of this study is to present information about the development of Bulgarian sheep husbandry from the Liberation of Bulgaria from Ottoman ruling to present days. Along with this, it aimed to monitor and analyse the current state of productivity and the main economic indicators of three groups of sheep, including two dairy and one from the most typical autochthonous breeds, reared in different geographical conditions and production systems.

Material and methods

The first part of the study presents information about the current state of sheep husbandry in EC member states and the prospects for its further development. The same part presents the state of Bulgarian sheep husbandry. Data on the number of sheep and produced products for the period embedded by the official statistics are presented in graphical form.

The materials will serve as proof of the traditional nature of sheep husbandry. This is an important requirement in the work of the European Commission for Agriculture and Food to the European Parliament in determining the incentives to support traditional activities and protect the national dairy and meat products of member states. For Bulgaria, sheep

husbandry plays a significant role in the revival of rural areas and the maximum use of available national natural resources.

The second part of the analysis provided a discussion of productivity and economic results of the commonest productive types of sheep. These are the autochthonous Srednorodopska and the Bulgarian Dairy Synthetic Population (BDSP).

The flocks included in the study were allotted into three groups and reared in the three possible geographical areas in Bulgaria, namely: mountainous, semi-mountainous and plain. Each group is represented by 300 ewes, 60 replacement yearling females and 7-8 rams. The three flocks were not included in the selection control and only received a subsidy from top-up payments.

The first group, designated as Srednorodopska, is reared entirely extensively in a pasture-indoor system and is mainly served by workers from the family. During the lambing campaign and the lactation period, an additional worker is employed to take care of the lambs and participation in the milking of ewes. Milking was done twice, manually. The majority of the lambs are sold on the retail market during the Easter and Saint George's Day holidays.

The second group is from the Bulgarian Dairy Synthetic Population (BDSP) reared in the Strandzha region under semi-mountainous conditions. The farm is also family-owned and served mainly by the family and one additional worker during the season. The milking of ewes was also twice daily with milking dumplings. For most of the year, sheep grazed on pasture with a shepherd. The realisation of the lambs was similar to that of the first group.

The third group, also from BDSP breed, were reared in the Varna region. Over the last two years, ewes were reared entirely indoor with mechanised feeding and milking with DIO 4 A. Milking at the beginning of lactation was three times per day, after which it became twice daily. The lambs were also sold on the domestic retail market.

The three farms sold the milk to different processing enterprises from March to the end of August. During the last two months of the milking campaign, there were serious problems with the purchase of milk, so farmers were often forced to process it at home and to sell dairy products on the farmer markets or freely.

Ewes were fed self-made fodders with protein additives to concentrate feed.

The first and second flocks grazed on pastures, leased from the municipal fund. Some of them were hardly utilisable being located in different and remote areas.

Costs and revenues were valued at current prices. The calculated profit was in BGN and the profitability – in percents. Revenues and costs were relative to one ewe and the effect of one ewe was sought on this basis. The information was collected from the accounting data of the respective farms.

The data were processed using mathematical and statistical modules of an MS Excel.

Results and discussion

Analysis of sheep husbandry's condition in Europe and Bulgaria

The European Parliament resolution of May 2018 (2017/2017 (INI) presents the actual state and prospects of sheep and goat husbandry in EC member states. The facts on the state of sheep husbandry in the EC are exceptionally disturbing. Compared to the 1980s, the population of small ruminants has decreased by 25 million. Sheep meat consumption in the EC declined from 3.5 kg per capita to 2 kg per capita. Sheep husbandry was outlined with the lowest cost efficiency in the agrarian sector, and sheep farmers – with a lowest income. No interest in the sheep husbandry from the part of young people is available.

Alexandrova (2020) outlined that in December 2019, a total of 82.54 million sheep were reared in EC member states, which was by 1.59 million fewer compared to 2018. The decrease vs the previous year was by 2%, and vs 2016 – by 4%. The number of sheep in countries with traditionally developed sheep husbandry as Spain, France, Italy, Greece, has decreased. The only increase was demonstrated in Ireland by 2.9% and Romania – by 0.6%. The expectations are that sheep flocks in the EC after Brexit will decrease by one quarter compared to pre-Brexit levels.

The EP resolution has drawn the following more important conclusions: the decrease in sheep and goat population to their full absence in geographically disadvantaged areas results in impairment of their ecological sustainability and landscape preservation, impairs biodiversity and erosion control.

Insufficient production of sheep meat in EC countries requires import from third countries, where quality standards, regulatory and environmental requirements are not as stringent. This undermines the competitiveness of European products during the most sensitive periods of the year for sheep husbandry (Easter and Christmas), as well as during the rest of the year.

- Brexit could lead to major changes in the trade of sheep and goat meat in the EC, as this country is the largest producer but also importer of such meat. The United Kingdom imports about half of its market quota from New Zealand and almost two-thirds from Australia and has an EU commitment that cannot be given up.
- An additional factor influencing the low income of European sheep farmers is that wool is not approved as an agricultural product in line with Appendix I to the Treaty on the Functioning of the European Union, but is classified only as an animal by-product as per Regulation (EC) № 142/2011.
- Sheep and goat farmers have to face the heavy bureaucracy and administrative burdens arising not only from the CAP but also from other EU rules, such as the rules on the processing of animal by-products not intended for human consumption.

At the background of the pan-European problems, which also apply to our country, the position of national sheep husbandry, which has long traditions and has formed a significant part of both the produce and consumption of products, is even worse in the EC, as could be seen from the following facts:

- Compared to the 1980s, the number of sheep and goats in Bulgaria has decreased by over 9 million (compared to 25 million in EU countries)
- The consumption of sheep and goat meat by Bulgarian citizens – traditional consumers of this meat is less than 1.5 kg. per capita (vs average of 2 kg for EC countries).
- The purchase of sheep husbandry produce – sheep and goat's milk, of culled animals, wool and skins is extremely unsatisfactory. The problems with the horizontal integration between the sheep farmers and the vertical one between producers, processors and traders are overtly expressed.
- Severe regulatory, purely bureaucratic veterinary requirements, which artificially increase the costs in the sector have been imposed and demotivate sheep and goat farmers which in addition to the year-round hard work etc.

Sheep husbandry in Bulgaria is now represented by the dairy industry and local (autochthonous) breeds. A small part of sheep are represented by the Ile de France and Mouton Charolais breeds imported from France. Almost all created merino and semi-merino sheep breeds were liquidated. According to Bobeva (2019), during the census of livestock in 1905 and 1910 in the Kingdom of Bulgaria, 2 sheep per capita were available. In the years 1980-1984 this number was already 1.3 sheep and goats per capita, holding the 4th and 5th place in the world with regard to the number of small ruminants per 100 ha managed area (after Australia, New Zealand, Argentina and Uruguay). Now there are 0.19 sheep per capita, which is the average in the EC countries, but many of them had no tradition in sheep farming (Figure 1).

Figure 1

Sheep population in Bulgaria

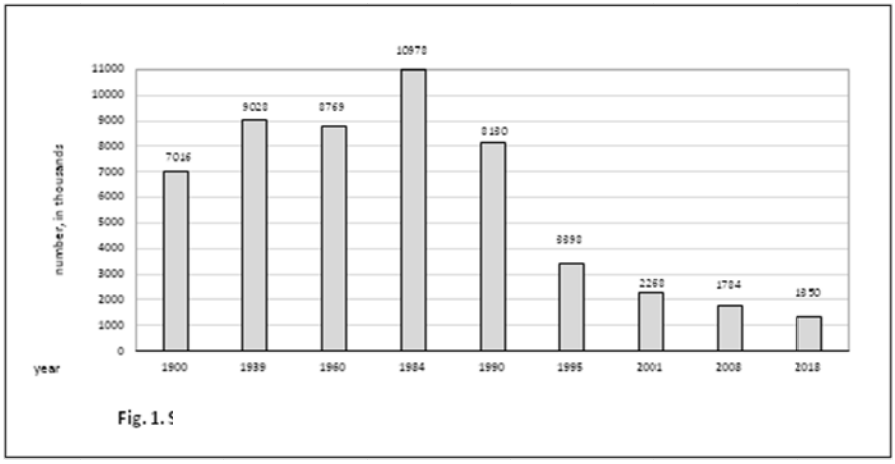


Fig. 1.9

The reasons for the catastrophic reduction in the number of sheep in Bulgaria is the wrong concept of a market-driven economy and the free market without creating the necessary prerequisites for this. The strict regulations related to environmental protection,

transportation and animal welfare, identification and traceability of ready products from the farm to the fork increase costs by at least 10% (Bulgarian Farmer, 2014).

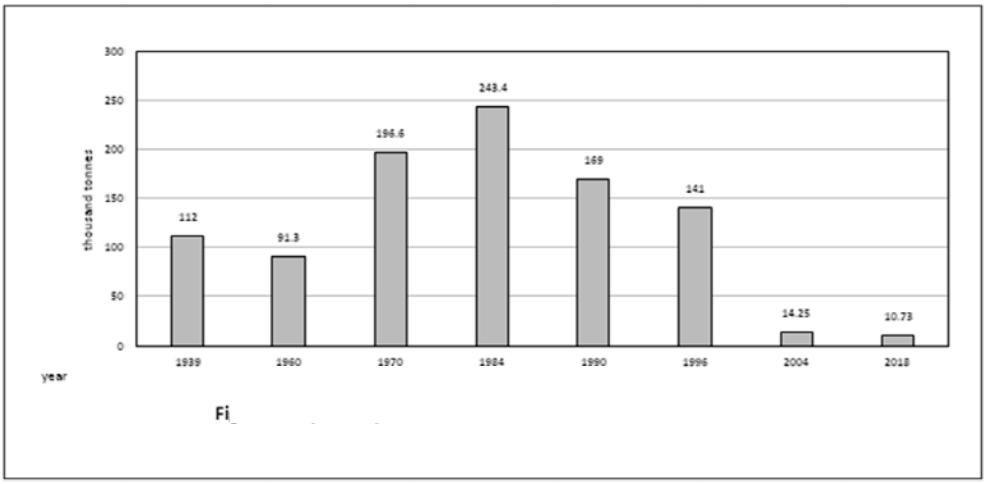
As products are concerned, leading positions were either lost.

There is convincing evidence about the high nutritional value of mutton and lamb meat, and recently, about functional qualities of young animals' meat. Apart being a nutritious and healthy food, mutton is tightly linked to religions, both Christianity and Islam.

The collapse of mutton production in our country is substantial – from 169 thousand tonnes at the beginning of the transition to 10.73 thousand tonnes in 2018 (Figure 2). The average slaughter weight has dropped from 20.8 kg to 11 kg. This is explained by the substitution of heavier merino and crossbred lambs and yearling sheep with lambs from lighter dairy and local breeds and by predominant sales of lower-weight dairy lambs. The practice of fattening lambs and yearling sheep intended for export mainly to the Arab countries' markets, has also been discontinued. The reduction in mutton production is about 23 times.

Figure 2

Sheep meat production



In the 1980's to the early 1990's our country was one of the largest exporters of live small ruminants and meat from sheep and goats in the world. For the period 1980-1984 annual export of yearling sheep from Bulgaria was over 1 million animals, reaching a peak in 1980 – 1.3 million. The average slaughter weight was 20.8 kg.

The countries to which fattened yearling sheep were exported were Libya, Lebanon, Saudi Arabia, France, and of lambs: Greece and Italy. In terms of small ruminants export, Bulgaria held the third place in the world in 1978, and 5th place in 1982-1984 (Stankov et al., 2002).

During the last two decades, a considerable reduction of consumption of natural authentic products produced from sheep and goats has occurred. Young consumers are not aware of the true taste of these dairy products.

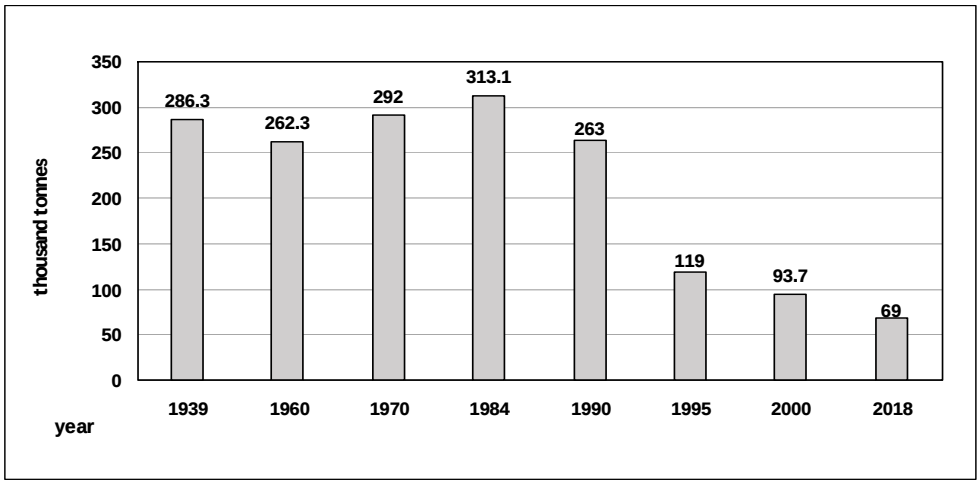
Milking sheep and producing unique dairy products is an old centuries-old tradition. The main dairy products from sheep milk, which can be defined as national, are the Bulgarian white brined cheese, the Balkan yellow cheese and sheep butter. These are products with a long history considered to be primary foods for the people of our lands. Of particular interest are some dairy products from sheep, which are unique, but produced in limited amounts: such as katak, krokmach, goatskin cheese (Tulum), green cheese, yellow cheese with marigold starter culture etc. The production of some of these products is banned as according to the European standard, dairy products must be produced from pasteurised milk, but if they are pasteurised, the product will not be in its natural form. It is inexplicable how some EC member states produce unpasteurised dairy products without any restrictions, and in our country, this is not allowed. Sheep dairy products are produced in a similar way in neighbouring Balkan countries. Obviously, legislative changes and opportunities should be sought to protect these products in the EC, because they will disappear, along with centuries-old traditions of their production.

The most valuable food is yogurt, including that produced from sheep and goat milk. The high-fat content of sheep milk is at the expense of the beneficial, defined as anticarcinogenic linoleic acid. In 1905, the evidence provided for Lactobacillus bulgaricus, which determines the unique taste of yogurt, Bulgaria became known throughout the world and Bulgarian dairy products set foot on 4 continents.

During the transition to market economy, sheep milk production has declined about 4.3 times, despite the orientation to dairy sheep farming (Figure 3). The causes are the lower population of sheep, low level of selection and reproduction, hence insufficient milk yields.

Figure 3

Sheep milk production

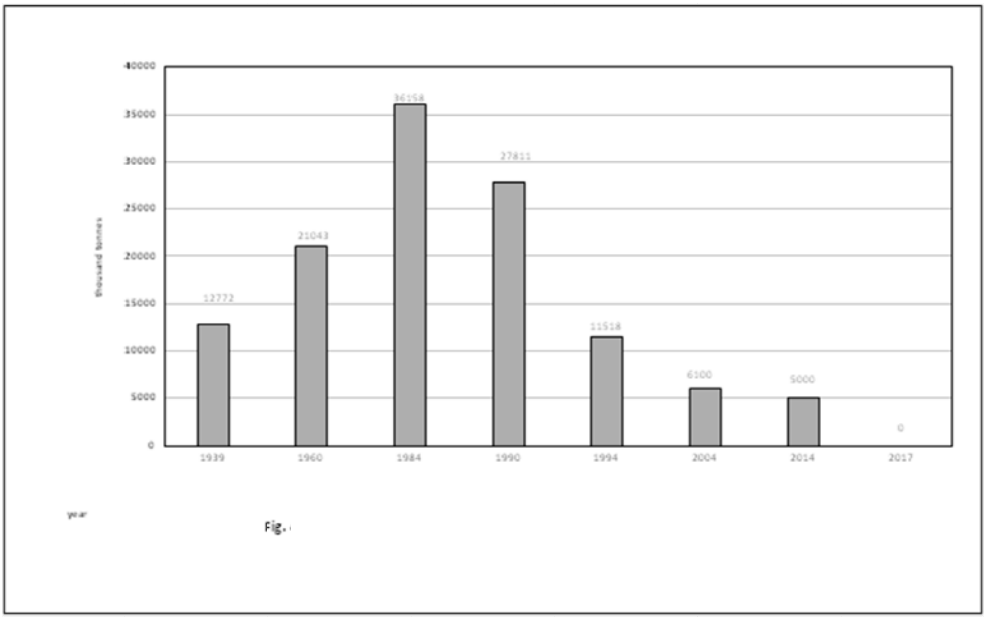


These facts are very serious prerequisites for change in the attitude during production and especially, processing of sheep dairy products.

Figure 3 presents the wool production in Bulgaria for the years during which statistics on this indicator are kept. In recent years, there is no information on purchased quantities of wool. Data for the last year in which reports for the purchased amount of wool is available to show that the reduced production is 7.2 times compared to the 1980s. This is a consequence of shrank consumption, reduced demands and low wool prices on the national and international market. According to Regulation № 142/2011 and Appendix I to the Treaty on the Functioning of the European Union, wool is not recognised as an agricultural product and is classified as an animal by-product. The activity of the wool textile enterprises, which for decades had processed sheep wool produced in the country and have provided employment to many Bulgarian citizens and added value from this extremely valuable product, has been greatly reduced. All this puts sheep farmers at a disadvantage compared to other livestock farmers and due to the fact that wool is subject to stricter transport requirements compared to recognised agricultural products, as well as due to the impossibility of carrying out market interventions for wool through a common market organisation. All this had a detrimental effect on the economic results of sheep farms in our country and especially on those of the wool-producing branch and has greatly contributed to an enormous reduction in the population of merino and semi-merino sheep breeds.

Figure 4

Sheep wool production



Regardless of the productive type and productive performance of the sheep, they produce wool. Farmers are obliged to shear the sheep and sell the wool. At the current purchase prices, the paradox is that they pay a higher price for shearing the sheep, compared to the amount of money they receive from the sale of the wool.

It is necessary to insist through the European Commission on amending Regulation (EU/ 1069) 2010 and Regulation EU/142/2011 on the processing of animal by-products, in the case of sheep wool, which is not a product intended for human consumption. It is also necessary to insist that sheep wool and skins should be included among the products that meet the requirements for funding and support.

In the conclusion of this part, it can be stated that the EP's recommendation to the EC member states is to analyse the condition of sheep farming and to develop medium- and long-term strategies for improving the sector. For better support of sheep farming, the share of coupled production and direct aid to young farmers and new entrants in the industry has to be increased. Important recommendations are the creation of new commercial breeds and the conservation of indigenous genetic resources, and the introduction of innovative methods and technologies to enhance competitiveness.

For Bulgaria, where dairy sheep farming is a priority, the recommendation for production of processed products and obtaining maximum added value is of essential importance. The creation of short or local food chains and direct sales of sheep products is a good opportunity to increase the income of direct producers, but in strict compliance with hygiene and health standards. It is proposed for discussion and decision to include wool in the group of main products. The removal of heavy bureaucratic and unnecessary restrictions and the opening of market prices outside the EU is an important prerequisite for improving economic performance and increasing the competitiveness of sheep production in EC member states. The data from the study on the historical development of sheep husbandry show that this is a traditional occupation for Bulgaria and there is potential for successful and competitive sheep breeding.

Analysis of the economic state of main branches in sheep husbandry

The main goals of economic research are related to the analysis of data to support people engaged in production to develop policies for the development of the respective branch. For Bulgarian sheep farming, which is experiencing a crisis, this is absolutely necessary.

The present study performs an analysis of data on the leading branches in sheep husbandry, namely dairy and local (autochthonous), which make up over 90% of sheep in Bulgaria.

Based on the data reported in the respective reports, the natural and value indicators per ewe for each of the flocks were determined (Table 1).

The data showed that the purchase price of milk varied from 1.30 for the Srednorodopska ewes to 1.40 for the BDSP rearing indoor. For the latter, produced and sold milk was significantly more than that of the other two farms and the national average. This was due to indoor rearing with constant access to feeders and drinkers, and balanced nutrition with respect to energy and protein. The three-fold milking during the first two months of

lactation was also important. In the second and third flocks, the purchase price of milk averaged over the period was higher, which was also due to the better quality of milk at milking and storage until its purchase.

Tables 1

Natural and value indicators of the farm (revenue)

Indicators	Srednorodopska ewes			BDSP (Bulgarian dairy Synthetic population) – indoor–pasture			BDSP (Bulgarian dairy Synthetic population) – indoor only		
	kg	average price	total BGN	kg	average price	total BGN	kg.	average price	total BGN
Milk for lactation period	45	1.30	58.50	82	1.35	110.7	128	1.40	179.20
Marketed lambs in kg from one ewe	25.3	5.0	126.50	30.1	5.0	150.5	31.02	5.0	155.1
Wool	2.5	1.50	3.75	3.2	1.50	4.8	3.1	1.5	4.65
Culled sheep sold (relative share from the flock)	13.83	1.5	20.75	18.75	1.50	28.12	12.1	1.5	18.15
Subsidy for 2018	-	-	39.60	-	-	39.60	-	-	39.60
Total	-	-	249.10	-	-	333.72	-	-	396.7

In the first farm, the value milk had a relatively low share from revenues – 23.5%, while that of meat was 50.8%. The other percentages came from wool that was nearly priceless, sold adult and young animals for meat and breeding, and subsidy. The subsidy per animal constituted 15.9% of the income of ewe. The fertility of this flock was 1.15 lambs per ewe on average, realised at an average weight of 22 kg or a total of 25.3 kg average live weight per ewe.

In the third group, in which the ewes were reared indoor all year round, the milk yield was relatively higher – 128 kg and accounted for 45.2% of the farm's revenue. The fertility was 1.32 lambs and a total weight of 31.01 kg sold. The relative share of sheep meat was 39.15 and the subsidy was 10.5%. The data showed that milking in indoor rearing had a stronger impact on farm income.

The data in the Table 2 showed that variable costs represented 55% and fixed costs 45%. The largest relative share was that of forage – 44.5% of the total costs and labour, 37.3% respectively. Revenues from the produce with the subsidy were 249.10 BGN per ewe, the costs were 220.84 BGN or the profit was 28.26 BGN. Without the subsidy, the revenues were 209.5BGN, or the losses from a ewe were 11.34 BGN. The high feed costs are explained by the fact that a considerable part of the concentrate and additives during the indoor period were purchased.

Table 2

Production costs of farm # 1 under mountainous rearing conditions

Indicators	Value, BGN	I% of variable and fixed costs	% of total costs
I. Variable costs			
Total variable costs	121.46	100.00	55.0
Feed	98.18	80.8	44.5
Veterinary services	4.50	3.7	2.0
Water, electricity	7.20	5.9	3.3
External services	11.58	9.6	5.2
II. Fixed costs			
Total fixed costs	99.38	100.00	45
Labour	82.39	82.9	37.3
Buildings	3.24	3.3	1.5
Machinery	13.75	13.8	6.2
Total production costs	220.84		

Table 3 shows the production costs of sheep from the semi-mountainous areas, which were mainly reared on the pasture. During the winter, sheep were housed indoor, fed self-made fodders, supplemented with protein and other feed additives needed to feed the sheep indoor.

Table 3

Production costs of sheep from the semi-mountainous areas

Indicators	Value, BGN	% of variable and fixed costs	% of total cost
I. Variable costs			
Total variable costs	169.5	100.00	54.5
Feed	143.1	88.4	46.0
Veterinary services	3.6	2.0	1.2
Water, electricity	8.3	5.0	2.7
External services	9.8	5.8	3.2
Civil contracts	4.7	2.8	1.5
II. Fixed costs			
Total fixed costs	141.5	100.00	45.5
Labour	128.1	90.5	41.2
Buildings	1.1	0.8	0.3
Machinery	12.3	8.7	4.0
Total production costs	311.00		

The data in the table showed approximately similar results to those of the first group. A different element in this group was the payment of civil contracts for additional services and higher labour costs. The farm was of a family type, but the length of the milking period was longer, which also increased the costs of paying the additional employee.

Revenues from the sold produce were 333.72 BGN, expenses were 311 BGN. With the received subsidy the profit was 32.72 BGN, and without the subsidy a loss of 15.59 BGN was realised.

Table 4 shows the production costs of the sheep flock reared indoor all year round. The area was intensive, with a very good forage base. All the necessary feed were provided for the needs of the flock. Bulky feeds were provided in the form of haylage with constant access to feeders. Concentrates were self-made, with protein and vitamin-mineral supplements.

Table 4

Production costs of farm # 3 – indoor rearing

Indicators	Value in BGN	% of variable and fixed costs	% of total cost
I. Variable costs			
Total variable costs	189.0	100.00	57.1
Feed	171.4	90.7	51.8
Veterinary services	2.6	1.4	0.8
Water, electricity	8.9	4.7	2.7
External services	6.1	3.2	1.8
II. Fixed costs			
Total fixed costs	142.0	100.00	42.9
Labour	123.5	87.0	37.3
Buildings	1.9	1.3	0.6
Machinery	16.6	11.7	5.0
Total production costs	331.0		

The data in the table showed that feed accounted for the largest share of variable costs. This is normal because costs with the highest relative share are for labour. In addition to the owner, two other sheep breeders were involved in the farm, employed year-round. Revenues from the production in 2018 for the flock amounted to BGN 386.7 per ewe, costs BGN 331. Profit along with the subsidy per ewe was BGN 65.7 and without the subsidy it was also with a positive sign, only at this farm: 17 BGN.

Our data about BDSP ewes were similar in terms of the relative proportion of costs to those reported by Popova et al. (2007) and Slavova et al. (2015), but differed significantly as the rate of return was concerned.

The analysis of the three farms using different production technologies, but approximately the same farm organisation showed that without the subsidy, production was losing. Only with indoor rearing, self-produced feeds and the direct involvement of the owners in the production process, there was, though, a small positive result without subsidisation.

Profitability is one of the most important economic factors because it shows how much investment in production produces profit and, accordingly, what the profitability of the production activity on a given farm is.

The data in Table 5 show that in all flocks studied, the profitability of revenues and costs were positive, albeit with low subsidy per ewe values. Following the exclusion of the subsidy, the profitability of the first two flocks reared in extensive and semi-intensive conditions was negative. The only exception was the flock raised intensively all year round. This is explained by the higher milk productivity and fertility, as well as the better purchase price of the milk. All of these flocks cannot be looked for as breeding effect since they were at the same level of selection beyond selection control.

Table 5

Profitability of the income and expenditure of the farms studied.

Indicators of ewes	Farm №1 Srednorodopska	Farm №2 BDSP semi-intensive	Farm № 3 BDSP indoor
Income	249.10	333.72	396.70
Costs	220.84	311.00	331.00
Profit with subsidy	28.26	32.72	65.70
Profit without subsidy	-11.34	-15.59	17.00
Profitability of revenue with subsidy	+11.34	+9.80	+16.56
Profitability of revenue without subsidy	-4.55	-4.67	+4.2
Cost-effectiveness with subsidy	+12.80	+10.30	+19.83
Cost-effectiveness with subsidy	-5.13	-5.01	+5.14

Conclusion

Sheep farming is the oldest traditional livelihood of the people who lived in our lands. It laid the foundations of the first crafts and industrial production in Bulgaria. At present, sheep breeding in our country is at the critical threshold in terms of the number of animals, breeds, level of selection and production technologies. This requires rapid measures for revival of sheep husbandry in Bulgaria and its transformation into a modern and dynamic branch of the Bulgarian economy, based on scientific progress and innovation. Bulgaria has a huge natural resource of pastures and cultivable land, which through animal husbandry will provide a livelihood for people, produce add value and revive Bulgarian villages. A good precondition is the recommendation and commitments of the European Commission for stimulation and further successful development of sheep husbandry, providing the European market with the missing products produced in the Union – this is an important and integral part of Bulgarian traditions, economy, history and culture.

The results of the study of the three flocks reared under different geographical and technological conditions showed a relatively low economic effect. Minimum profit and positive profitability have been established by including the subsidy per animal within the identification system. Better economic indicators were shown by animals kept indoor all year round, whose nutrition was balanced and complete.

An important result from the present study was the fact that there were possibilities for intensive dairy sheep husbandry developing through the implementation of innovations and technological update. Along with this, organic rearing systems, towards which there is increasing interest, may operate on the basis of the conserved local autochthonous sheep breeds.

The study allowed making useful conclusions for family-scale sheep breeding practices and some recommendations, the most important of which are:

- The economic effect and consequently higher profitability of sheep farms can be obtained if the selection is improved and modern methods of reproduction are implemented. Success can only be guaranteed by higher productivity of sheep.

- Better integration between producers, resellers, processors and traders is imperative, to ensure the purchase of products throughout the entire production cycle at a cost-effective and profit-oriented price.
- Professional organisations and producer groups in which all sheep breeders should be involved, can play an important role. This will allow pooling of resources, provision with the necessary technical means, construction of small and mobile dairies, and slaughterhouses and direct sales of goods.
- Reducing the administrative burden and relieving sheep breeders of non-core activities is essential and a guarantee of success.
- Increasing the knowledge and skills to use modern technical means and technologies is absolutely essential.

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