



## Economic efficiency of local, merino and meat-type sheep breeds raised in Bulgaria without milking

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**Abstract.** *The goal of the present study is to perform an economic assessment of the local (autochthonic), merino and meat-type sheep breeds raised in Bulgaria without milking and under the conditions of a market economy and free commerce. We studied sheep from three herds, of the Srednostaroplaninska breed, Northeast Bulgarian Merino breed (NEBM) and the Île-de-France breed. The sheep from all three herds were under selection control. The results of the study indicated low economic effects for all three herds. Without subsidies, the local and merino breeds finished with negative values for profits and cost-efficiency of the income and expenses, and zero for the meat-types. The subsidy for the sheep of the Srednostaroplaninska breed made up 37.9% of the income, whereas the sold lambs and sheep culled for meat made up 60.7%. This indicated that the local mountain sheep cannot provide the necessary income for a farm's normal function without milking and without subsidies, under the present market situation. The efforts in this field should be directed towards organic production of meat and dairy products and a closed production cycle. The income from sold lambs and sheep culled for meat from the NEBM breed made up 66.8% of the total income, whereas wool accounted for merely 4.6%. The subsidy provided 28.5% of the farm's funds. Accomplishing an economic effect in merino breeds is possible only if prices for buying off wool were normalized, and the fertility of the ewes was increased. For the meat-type sheep of the Île-de-France breed, the income from selling meat and breeder lambs, as well as sold culled sheep made up 75.6%, and the subsidy – 22.7%. A higher economic effect for this breed could be achieved through selection towards fertility and more frequent births, i.e. 3 litters in 2 years. A significant productive and economic effect in the meat-type breeds could be achieved from ram breeding and conducting industrial crossbreeding in the stock part of the breeds.*

**Keywords:** income, expenses, profit, cost-efficiency of income, cost-efficiency of expenses, economic effect

### Introduction

Sheep breeding is the oldest and most traditional livelihood of the people inhabiting our lands, long before the founding of the Bulgarian state. Per the old tradition, all sheep in Bulgaria are bred in pastures and stalls, and also milked. During the years of transition from a planned to a market economy, milking was stopped in a part of the local (autochthonic), merino and meat-type breeds. Studies on the economic results of sheep without milking in our country, under the conditions of a free market, are quite insufficient. Some of the most typical representatives from each of the three types in the country, bred without milking are Srednostaroplaninska breed, Northeast Bulgarian merino (NEBM) breed and Île-de-France breed.

The Srednostaroplaninska breed is a Bulgarian local (autochthonic) breed of the Karakachan type, but bigger and with a longer body. This is a very typical representative of the mountain breeds, which are bred primarily for their meat. Maintaining selection is performed for the Srednostaroplaninska breed, in order to preserve its authenticity (Stankov and Panayotov, 2019).

After the changes in the country during 1989 related to the transition from a planned to a market economy, the interest towards the Bulgarian merino breeds by textile producers was reduced. Wool-processing ventures started to use imported wool (mostly Australian, which has better quality and is cheaper than Bulgarian wool). This led to a sudden drop in the number of merino and semi-merino breeds, and they were reduced from a leading branch in sheep breeding to a mere 1.7% (Stancheva et al., 2015). Hinkovski (2015) indicated that with Bulgaria's exodus from the "restrictive eastern market", the wool produced in the country became uncompetitive when compared to the imported wool. This led to a liquidation of merino and crossbreed sheep breeding, and thus the 1.5 million merino sheep in 1989 were reduced to under 30 thousand. Out of four merino and two crossbreed varieties, only the Northeast Bulgarian merino breed and about 150-180 of the Karnobat merino and the Stara Zagora type of the Thracian merino were left (Boykovski et al., 2011).

According to data by Hinkovski (2015), immediately after the creation of the NEBM work began on its improvement by

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“transfusing blood” from the Australian merino and Burula breeds. The goal was to improve the qualitative parameters of the wool and the breed’s fertility. Studies on the economic results the NEBM breed after its creation and through the stages of its improvement were conducted by Dimitrov (2006), Slavov and Mihaylova (2006), Slavov (2007), Boykovski et al. (2009, 2011), Stancheva et al. (2015).

During the stages of passing from a planned to a market economy, evaluations of the economic condition and organisational forms of Bulgarian sheep breeding were conducted by Georgiev (1991, 1995), Atanasova (1994, 2008) and Momchilov (2005). A profile of the sheep breeds in our country and their role in the food, textile, or leather industry was made by Tyankov et al. (1997, 2000).

Meat-type breeds have an important role in sheep breeding practice throughout the world. Apart from their pure state, a high economic effect can be achieved when industrial crossbreeding is done in the stock part of sheep from other types.

The studies by Bonev (1998), and Bonev and Kostadinova (2011) indicated that the introduction, adaptation and reproduction of imported animals were expensive and required a large scientific potential, as well as investments. Slavov (2006) considers it economically justified to use schemes for industrial crossbreeding of sheep from local, dairy and merino breeds with meat-type rams. It was found that in industrial crossbreeding of ewes from other types with meat-type rams, a heterosis effect was achieved as soon as the first generation, with a 20-25% gain in live weight, as well as slaughter and meat produce parameters (Bradford et al., 1999; Sharp, 2008).

Studies on the productivity and economic efficiency of sheep of the Île-de-France breed and its crossbreeds were conducted by Slavov and Mihaylova (2006), Laleva et al. (2007), Metodiev et al. (2007) and Stanev et al. (2007).

The goal of the present study is to perform an economic assessment of the local (autochthonic), merino and meat-type breeds raised in Bulgaria, without milking, under the conditions of a market economy and a free market.

## Material and methods

The objects of study were sheep from three herds of the Srednostaroplaninska, Northeast Bulgarian merino and Île-de-France. The sheep from the three herds were under selection control. They are conditionally represented in three groups:

*First group* – Srednostaroplaninska breed: The herd was kept within the territory of the town of Kalofer and exhibited the following parameters: number of ewes - 250; fertility - 108%; wool collected per ewe - 2kg; average live weight of ewes - 40kg. The sheep of this breed were raised in pastures and

stalls. The lambs were born at the end of winter and the onset of spring. In later spring, the ewes, alongside their lambs, were taken up to the mountain, where they were kept in pastures until late fall. The farm’s income was generated from sales of lambs for meat.

*Second group* – Northeast Bulgarian merino breed (NEBM): The herd was kept within the territory of the town of Targovishte, and had the following parameters: number of ewes - 220; fertility - 140%; wool collected per ewe - 6.5kg; average live weight of ewes - 65kg. The sheep of this breed had delicate merino wool of 64 and 60 degree, and high wool yield. The main problem in this type was the sale and low prices of the wool. The income was formed from sales of lambs for meat. The sheep were bred in pastures and stalls.

*Third group* – Île-de-France: The herd was kept within the territory of the village of Sabrano, Stara Zagora region, and had the following parameters: number of ewes - 250; fertility - 150%; wool collected per ewe - 4kg; Average live weight of ewes - 70kg. The sheep were kept in pastures and stalls. The herd had good fertility, yet gave birth to lambs only once per year. The farm’s income was formed from the sales of lambs for meat, as well as sales of female lambs for future breeding.

The sheep of the three breeds were fertilized in their usual oestrus season, for the merino and Île-de-France breeds in August, and for the Srednostaroplaninska breed in the second half of September and October. The herd replacement was 20%. During the stall period, the NEBM and Île-de-France were fed fodder produced at the farm. For the Srednostaroplaninska breed, some of the fodder was purchased.

The expenses and revenues were evaluated per the prices current at the time of the study. The profit and cost-efficiency of the income and expenses were calculated with and without selection control funding. All economic results pertain to a ewe. The data on income and expenses were derived from the farms’ financial statements.

The results were processed per the mathematical-statistical model and the Excel program.

## Results and discussion

The herd of Srednostaroplaninska breed sheep were typical representatives of the local autochthonic breeds. In the recent past, the breed could produce 40-50L milk per milking period. Nowadays it is mostly bred for meat, and spends the pasture period on the Stara Planina mountain, due to which they are no longer milked. The ewes are taken out together with the lambs to the mountain and are returned in late fall. Most of the lambs are sold in late fall as well. The data in Table 1 indicate that 55.75% of the income is formed from lambs sold for meat.

**Table 1.** Natural and value parameters of ewes of the Srednostaroplaninska, NEBM and Île-de-France breeds

Parameters	Srednostaroplaninska breed			Merino breed (NEBM)			Meat-type breed		
	Avg. price, BGN	kg/L	Total BGN	Avg. price, BGN	kg/L	Total BGN	Avg. price, BGN	kg/L	Total BGN
Sold lambs in kg from a ewe	4.20	28.00	117.60	5.00	33.60	168.00	6.20	38.40	238.08
Wool	1.50	2.00	3.00	2.00	6.50	13.00	4.00	1.50	6.00
Sold culled sheep (herd relative share)	1.50	7.00	10.50	1.50	13.0	19.50	14.00	2.00	28.00
Subsidy - BGN	80.00	-	80.00	80.00	-	80.00	-	-	80.00
Total			211.10			280.50			352.08

\*Breeds: Srednostaroplaninska (local) - 40kg live weight per sheep, 250 ewes, 108% fertility, sold in the spring and fall at 32kg, separated 20% replacement - deducted kg from ewes - 28kg left; Northeast Bulgarian merino breed (NEBM) - 300 ewes, 140% fertility - 65kg live weight, 20% replacement and Île-de-France - 350 ewes, 150% fertility, single birth, part of male and female lambs sold as breeders at higher price; 1 lev (BGN) = 0.975 €.

Subsidies for sheep under selection control make up 37.9% of the total income, which indicates that the farm would be unable to provide the necessary revenues without them and without milking. The larger part of the other autochthonic breeds in Bulgaria are also bred in a similar fashion. Merino and meat-type breeds are raised without milking.

The income in merino breed sheep is generated mostly from the sale of lambs for meat and the subsidy for selection control (Table 1). Unfortunately, the wool, which is a valuable commodity for the textile industry, is considerably underrated and does not bring profits to farmers. The income from sold lambs and culled sheep makes up 66.8% of the total revenue, while wool's contribution is only 4.6%. The subsidy for selection control makes up 28.5% of the herd's income. Even though merino sheep breeding is not a priority nowadays, it needs to be preserved. It is hoped that wool, through a resolution of the European Parliament, would cease to be considered a side product and receive recognition. Merino sheep breeding should direct its selection towards improving the fertility of ewes and the meat qualities of the litter. It is planned to unite the NEBM with the few remaining animals of the Thracian and Karnobat

merino breeds. To this end, a common breed programme for merino sheep breeds in Bulgaria was accepted in 2011 (Boykovski et al., 2011).

The Île-de-France breed within the examined herd generated relatively good revenue, which was due to the ewes' higher fertility and the greater live weight when lambs were sold for meat. The higher price per kilogram for a ewe was due to the sale of a significant part of the breeder lambs. Out of the lambs sold for meat, for breeding, as well as sold culled sheep, 75.6% of the farm's income was formed. Subsidies make up 22.7% of the total income. Apart from meat production, meat-type breeds have an important role among stock herds for industrial crossbreeding. This is of major importance in the proper internal structuring of the breeds.

The data in Table 2 indicate that the variable expenses of the farm with the Srednostaroplaninska breed make up 35.54% and were primarily fodder during the stall period. The largest relative share falls to labour expenses, respectively 64.13% of the total and 98% of the fixed expenses. The farm is family-run and the labour expenses apply to the family members, which provides them with salaries slightly above the country minimum.

**Table 2.** Production expenses for farm No. 1 with ewes of the Srednostaroplaninska breed

Parameters	Value, BGN	In % of fixed and variable	In % of total expenses
I. Variable expenses			
Total variables	51.70	100.00	34.54
Fodder	42.40	82.40	28.46
Veterinary medical services	4.10	7.93	2.74
Water, electricity	2.20	4.26	1.47
External services	2.80	5.41	1.87
II. Fixed expenses			
Total fixed expenses	98.00	100.00	65.46
Labour	96.00	98.00	64.13
Buildings	2.00	2.00	1.33
Machinery	-	-	-
All production expenses	149.70		100.00

\*1lev (BGN) = 0.975€

The data in Table 3 show that the total expenses in the NEBM breed herd amounted to BGN 276.80 leva. Variable expenses in this group have a greater relative share and were primarily related to the feeding of the animals. The sheep of

this herd are more demanding with regard to feeding and have a longer stall period. Among the fixed expenses, the primary share falls to labour - 43.35% of the total expenses. The herd is tended by hired caretakers.

**Table 3.** Production expenses for farm No. 2 with ewes of the Northeast Bulgarian Merino breed

Parameters	Value, BGN	In % of fixed and variable	In % of total expenses
I. Variable expenses			
Total variables	144.50	100.00	52.20
Fodder	126.50	87.54	45.70
Veterinary medical services	4.70	3.25	1.70
Water, electricity	6.80	4.71	2.46
External services	6.50	4.50	2.34
II. Fixed expenses			
Total fixed expenses	132.30	100.00	47.80
Labour	120.00	90.70	43.35
Buildings	2.70	2.05	0.98
Machinery	9.60	7.25	3.47
All production expenses	276.80		100.00

\*1lev (BGN) = 0.975€

Table 4 presents the data for the production expenses of farm No. 3, which raises sheep of the meat-type Île-de-France breed. The results indicate equal values of variable and fixed

expenses. Here, once more, fodder makes up for the main part of variable expenses, and labour – of fixed expenses. The herd is tended by hired contractual caretakers.

**Table 4.** Production expenses for farm No. 3 with ewes of the Île-de-France breed

Parameters	Value, BGN	In % of fixed and variable	In % of total expenses
I. Variable expenses			
Total variables	137.60	100.00	50.47
Fodder	119.50	86.85	43.83
Veterinary medical services	5.10	3.71	1.87
Water, electricity	6.70	4.86	2.46
External services	6.30	4.58	2.31
II. Fixed expenses			
Total fixed expenses	135.02	100.00	49.53
Labour	123.42	91.40	45.27
Buildings	3.10	2.30	1.14
Machinery	8.50	6.30	3.12
All production expenses	272.62		100.00

\*1lev (BGN) = 0.975€

The data for the mountain local breeds are typical for all Bulgarian autochthonic sheep breeds (Table 5). Even though they are mostly pasture-raised, the greater expenses and negative economic results are due to the more expensive fodders during the winter season, some of which are also purchased in the plain regions. Dairy and meat products of the

highest quality and healthiness can be produced from these sheep breeds. The sheep breeders' wish is to milk their sheep and produce organic products, yet the main problem remains the milk's buying off, as it is usually produced during the summer when the sheep are kept in hard to reach areas. That's where mini-dairies and mobile slaughterhouses are needed the most.

**Table 5.** Income, expenses, profits and cost-efficiency of production in autochthonic, merino and meat-type breeds

Ewe parameters	Farm No. 1 Srednstaroplaninska	Farm No. 2 NEBM	Farm No. 3 Île-de-France
Income without subsidy (Leva)	131.10	200.50	272.08
Income with subsidy (Leva)	211.10	280.50	352.08
Expenses (Leva)	149.70	276.80	272.62
Profit without subsidy	-18.60	-76.30	0.00
Profit with subsidy	+61.40	+3.70	+79.46
Cost-efficiency of income without subsidy	-14.19	-38.05	0.00
Cost-efficiency of income with subsidy	+29.10	+1.31	+22.56
Cost-efficiency of expenses without subsidy	-12.42	-27.56	0.00
Cost-efficiency of expenses with subsidy	+41.02	+1.33	+29.14

\* NEBM - Northeast Bulgarian merino breed; 1lev (BGN) = 0.975€

Merino sheep breeding is loss-incurring, even with the subsidies for sheep under selection control. A solution would be to recognize wool as a primary product and buy it off at fair prices, fitting for such a valuable commodity. For the meat-type breeds, represented by the widespread Île-de-France, the economic results are satisfactory. This is due to the demand for breeder male and female lambs, and the higher buying prices. This would be desirable for the animals sold for slaughtering, as these breeds have a proven high quality of their meat.

The results from the conducted study show that even the high-yield breeds would have difficulty generating income and have low profitability without the subsidy.

## Conclusion

The results from the study of the three sheep herds from different production types – local (autochthonic), merino, and meat-type, all without milking, indicate a low economic effect of breeding them. Without subsidies, the local and merino sheep finish with negative values for profit and cost-efficiency, while the meat-types are at zero. In order to achieve a better economic effect, the local breeds, which are predominantly raised in mountainous and unfavourable regions, should be oriented towards organic production of authentic dairy and meat products per the century-old traditional methods. The funding for this field should be directed towards providing resources for the construction of mini-dairies in proximity to the areas where the sheep are kept, and the production of authentic dairy products. For the merino breeds without milking it would be necessary for the European Commission to revoke wool's status as a side product. It is vital that wool is bought off at fair prices that cover the expenses of its production, and directing selection towards increasing the fertility and meat yield of sheep. The higher economic effect in meat-type breeds can be achieved by increasing their fertility via selection and more frequent births (three litters in two years).

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