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Efficiency of fattening lambs from Bulgarian dairy synthetic population and its F1 crosses with meat sheep breeds

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Abstract

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The purpose of this study was to estimate economic efficiency of fattening to a different live weight of lambs from Bulgarian Dairy Synthetic Population and its F_1 crosses with meat sheep breeds.

The experiment was conducted at the sheep farm of the Agricultural Institute in Stara Zagora, Bulgaria. Subject of the study was a total of 27 lambs of which: 9 lambs of Bulgarian Dairy Synthetic Population (SPBM) and 18 lambs crosses of SPBM ewes with Mouton Sharollais and Ile de France rams. After weaning, three groups of lambs were formed by the method of analogues with 9 animals each: first group – SPBM lambs, second – F1 lambs of SPBM ewes and Ile de France rams, and third – F1 lambs of SPBM ewes and Mouton Sharollais rams.

When reaching a 22-23 kg before-slaughter live weight, 3 male lambs of the three groups were slaughtered to determine the parameters of the carcass and quality of meat. The study continued and the remaining lambs were reared as described, until a pre-slaughter live weight of 34-35 kg was achieved.

For the economic analysis of the obtained results, the "Benefit-cost analysis" method was applied, and the synthetic indicator "rate of profitability" was used for determination of economic efficiency. Revenues and costs were evaluated at current market prices.

It has been found that: revenues of fattening at both levels of slaughter were at the highest in F1 lambs crosses of SPBM ewes and Ile de France rams, followed by SPBM lambs; the highest production costs for fattening were reported for SPBM lambs, followed by the Mouton Sharollais crosses; the highest economic efficiency was calculated for the fattening of the F1 Ile de France lambs crosses, followed by the F1 Mouton Sharollais crosses, and the lowest – in lambs of Bulgarian Dairy Synthetic Population.

Key words: lambs; fattening; slaughter; economic efficiency; inputs; costs
Abreviations: SPBM – Bulgarian Dairy Synthetic Population; MS – Mouton Sharollais; IF – Ile de France

Introduction

In Bulgaria, the share of dairy sheep according to the Ministry of Agriculture and Food data as of 01.11.2016 is 75.4%, and of meat sheep – 7.55%, with a trend of more intense increase of the meat breeds – about 11% for a year (Agriculture report, 2017).

Bulgarian Dairy Synthetic Population (SPBM) occupies the largest share of the total number of sheep in the country. In their studies, Harizanova-Metodieva et al. (2014), Mihailova-Toneva (2011, 2016), Slavova et al. (2015), Popova et al. (2007) analyzed the economic efficiency in flocks of the population.

In Bulgaria, the main meat sheep breeds are Ile de France and Mouton Sharollais. They were used extensively for

crossing with local sheep to increase meat production. They have high growth and relatively low consumption of feed (Anev, 2009; Anev et al., 2009). Popova et al. (2013) studied the economic efficiency of sheep, crosses with meat breeds.

Slavova et al. (2006) conducted researches to determine the efficiency of breeding and fattening lambs of the Thracian merino and Ile de France breeds, and Popova et al. (2007) of Ile-de-France, Thracian merino and Stara Zagora breeds. The authors found that the lowest production costs and the highest profit and profitability referred to the Ile de France breed.

Pajor et al. (2009) studied the average daily gain and economic efficiency of fattening Merino lambs and their crosses with Ile de France and Suffolk.

Petrovich et al. (2016) found that crossbred lambs of three breeds had the highest pre-slaughter weight.

Shiller et al. (2015) analyzed the growth and feed conversion in pure-bred lambs Merinofleisch and crosses with 5 meat breeds, including Ile de France and Mouton Sharollais. The authors established that crosses with Ile de France and Texel were of the highest economic interest for intensive fattening.

The purpose of this study was to estimate the economic efficiency of fattening to a different live weight of lambs from Bulgarian Dairy Synthetic Population and its F1 crosses with meat sheep breeds.

Materials and Methods

The experiment was carried out at the sheep farm of the Agricultural Institute – Stara Zagora. The subject of the study was a total of 27 lambs of which: 9 lambs of Bulgarian Dairy Synthetic Population and 18 lambs crosses of SPBM ewes with Mouton Sharollais and Ile de France rams. After weaning, three groups of lambs were formed by the method of analogues with 9 animals each: first group – SPBM lambs, second – F1 lambs of SPBM and Ile de France, and third – F1 lambs of SPBM and Mouton Sharollais. Animals were fed ad libitum (+5 to 10% residue) according to a ration, consistent with their age and including concentrate and alfalfa hay. Based on the amount of feed provided and its residue on the next morning, daily feed consumption was determined.

When reaching a 22-23 kg before-slaughter live weight, 3 male lambs of the three groups were slaughtered to determine the parameters of the carcass and quality of meat. The study continued and the remaining lambs were reared as described, until a pre-slaughter live weight of 34-35 kg achieved.

For the economic analysis of the obtained results, the „Benefit-cost analysis“ method was applied, and synthetic indicator “rate of profitability” was used for determination of economic efficiency. When identifying costs, the costs of lambs until weaning were also taken into account, because the animals were being included in the experiment at different ages.

Revenues and costs were evaluated at current market prices: per kg of live weight – BGN 5.50, per kg milk – BGN 1.20, per kg of concentrates – BGN 0.38 and per kg alfalfa hay – BGN 0.28. The remaining costs (for labor, treatment and others) were distributed per animal depending on the duration of the fattening period.

Results and Discussion

Table 1 shows the mean values for the traits age and live weight at the beginning and end of each experiment.

At the beginning of the experiment, the SPBM lambs were the youngest – 62.44 days, followed by the Ile de France crosses – 40.00 days and the crosses with Mouton Sharollais – 37.33 days. The animals of Bulgarian Dairy Synthetic Population had the highest live weight – 14.86 kg, followed by the 14.11 kg F1 crosses with Ile de France, and the 13.80 kg F1 crosses with Mouton Sharollais.

The value of the trait average daily gain, at the first level of slaughter, was 11.11% higher in F1 crosses with Ile de France compared to SPBM lambs, whereas the differences in the val-

Table 1. Age and live weight of lambs

Indicator	I slaughter level n = 9			II slaughter level n = 6		
	SPBM ±S	SPBMxIF ±S	SPBMxMS ±S	SPBM ±S	SPBMxIF±S	SPBMxMS±S
Duration of the period, days	28			84		
Average live weight at the beginning of the experiment, kg	14.86±1.78	14.11±1.57	13.80±1.97	14.69±1.86	13.63±1.58	13.30±2.23
Age at the beginning of the experiment, days	62.44±6.86	40.00±8.75	37.33±10.17	65.33±6.06	42.33±7.34	36.00±9.57
Average live weight at the end of the experiment, kg	22.47±2.34	22.60±1.60	21.12±3.86	35.00±4.78	38.77±3.65	34.83±5.77
Age at the end of the experiment, days	90.44±6.86	68.00±8.75	65.33±10.17	149.33±6.06	126.33±7.34	120.00±9.57
Average daily gain, kg	0.27±0.05	0.30±0.06	0.26±0.08	0.24±0.04	0.30±0.05	0.26±0.05

ues for the indicator between SPBM and F1 crosses with Mouton Sharollais are minimal, respectively 0.27 and 0.26 kg/day.

This was due to the high growth rate in meat sheep breeds as a result of the heterozygous effect. Such is the opinion of Moreno et al. (2010), according to whom specialized meat sheep breeds have a high average daily gain that allows them to be weaned and slaughtered earlier.

At the end of the experiment, at the second level of slaughter, we reported that Ile-de-France crosses reached the highest value of 38.77 kg, followed by the animals from SPBM – 35.00 kg and the crosses with Mouton Sharollais, respectively 34.83.

Regarding the average daily gain at the second level of slaughter, we found that crosses with meat sheep breeds had a higher growth rate than lambs from Bulgarian Dairy Synthetic Population. Average daily gain was at the highest for the Ile de France crosses – 0.30 kg, followed by 0.26 and 0.24 kg, respectively for the crosses with Mouton Sharollais and SPBM, as the Ile de France crosses surpassed the SPBM lambs with 25%.

The results obtained for the average daily gain corresponded to the results of other studies in this field – Stancheva & Staykova (2009, 2010), Slavov et al. (2005), Laleva et al. (2007) Ivanov et al. (2015).

Table 2 represents the production costs for the fattening of animals from both groups. In the first group /first level of slaughter/, the highest cost for feed was reported for the SPBM lambs, followed by F1 crosses with Ile de France, and F1 crosses with Mouton Sharollais. At the first slaughtering level, their relative share was at the highest in SPBM lambs – 47%, and in Ile de France and Mouton Sharollais crosses – 44.67% and 43.27%, respectively. At the second level of slaughter, the share of feed costs was at the highest in Ile de France crosses – 55.48%, as a result of the highest average daily gain over the experimental period (25.20 kg) and the highest feed consumption, followed by SPBM lambs – 54.36% and Mouton Sharollais crosses – 52.76%.

The production costs for fattening of a SPBM lamb are higher by 4.55% than of Ile de France crosses and by 7.19% of a Mouton Sharollais crosses, at the first slaughtering level. At the second level of slaughter, the production costs in Ile-de France crosses were higher than in SPBM lambs and Mouton Sharollais crosses, respectively by 2.51% and 6.1%.

On Table 3 the economic results of fattening are presented. The highest revenues of fattening at both slaughter levels were achieved in F1 Ile de France crosses, followed by SPBM lambs, as a result of the higher live weight at slaughter. The highest production costs for the entire period up to the slaughter were those for SPBM lambs, which was mainly due to the higher costs until weaning /at the oldest age, compared to the crosses with the two meat breeds and the lowest growth rate. The highest profit at both levels of slaughter was estimated for the Ile de France crosses, followed by the Mouton Sharollais crosses. The lowest profit was realized in the SPBM lambs. At the first

Table 2. Production costs for fattening animals at both levels of slaughter, BGN

Indicator, BGN	I slaughter level			II slaughter level		
	SPBM n=9	SPBMxIF n=9	SPBMxMS n=9	SPBM n=6	SPBMxIF n=6	SPBMxMS n=6
Feeds, incl.	104.6	94.93	89.68	180.87	189.23	169.62
concentrate	78.90	71.41	68.51	147.75	153.22	140.40
hay	25.70	23.52	21.17	33.12	36.01	29.22
Salaries and insurance	81.56	81.56	81.56	106.87	106.87	106.87
Medical treatment	30	30	30	38	38	38
Other costs	6	6	6	7	7	7
Total costs (TC)	222.16	212.49	207.24	332.74	341.1	321.49
TC per ewe	24.68	23.61	23.03	55.46	56.85	53.58

Table 3. Economic indicators for fattening animals at both slaughter levels, per lamb, BGN

Indicator, BGN	I slaughter level			II slaughter level		
	SPBM	SPBMxIF	SPBMxMS	SPBM	SPBMxIF	SPBMxMS
Revenues	123.58	124.30	116.16	192.50	213.23	191.56
Total costs, incl.	101.28	85.91	82.13	156.74	142.76	135.71
Until weaning	76.6	62.3	59.1	76.6	62.3	59.1
I experiment	24.68	23.61	23.03	24.68	23.61	23.03
II experiment	-	-	-	55.46	56.85	53.58
Profit	22.3	38.39	34.03	35.76	70.47	55.85
Profitability, %	22.02	44.69	41.43	22.81	49.36	41.15

slaughtering level, the profit of fattening of one Ile de France cross lamb was higher compared to Mouton Sharollais cross lamb and SPBM lamb, respectively by 12.81% and 72.15%. At the second slaughtering level, these differences are 26.17% and 97.06%, respectively.

Pajor et al. (2009) found that the profit of fattening of the Hungarian Merino lambs was 11% lower than of the F1 Ile de France crosses and 9% of the Suffolk crosses.

The profitability rate is a generic economic indicator that characterizes the efficiency of production. At both levels of slaughter, the animals with the highest rate of profitability are the Ile de France crosses, followed by the Mouton Sharollais crosses, and the lowest profitability was estimated for SPBM lambs.

Conclusions

The highest revenues of fattening at both levels of slaughter were established in F1 crosses between Bulgarian Dairy Synthetic Population ewes and Ile de France rams, followed by SPBM lambs.

The highest production costs for fattening were reported for SPBM lambs, followed by the Mouton Sharollais crosses.

The highest economic efficiency was calculated for the fattening of the F1 Ile de France lambs crosses, followed by the F1 Mouton Sharollais crosses, and the lowest – in lambs of Bulgarian Dairy Synthetic Population.

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