



Original article

Comparative Study of the Performance in Ewes of Bulgarian Dairy Synthetic Population and Their Crosses with Lacaune

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Abstract

The aim of the study was to compare the milk yield in ewes from Bulgarian Dairy Synthetic Population and their crosses with Lacaune. “Blood introduction” of Lacaune breed with F1 cross ram was carried out on 40 purebred ewes of Bulgarian Dairy Synthetic Population (BDSP). The ewes were equal in the sequence of lactation, genealogic line and milk yield. The object of the present study were 32 ewes on first lactation – purebred BDSP (n=16) and crosses of the breed with Lacaune (n=16). The ewes were reared in the experimental farm of the Institute of Animal Science- Kostinbrod, Bulgaria. The milk yield for the control day was determined after the AC method of ICAR as the standard 120 d milking milk yield was determined. The fertility was determined as a ratio of the number of the lambs born alive to the number of the experimental ewes. The content of fat, total protein, dry fat-free residue and dry matter were measured in each control of 20 ml of individual sample for each of the animals, using milk analyser Ecomilk, Bultech. The data were evaluated through the Data Analysis statistical package of Excel 2016, Microsoft. The effect of the crossbreeding on the examined traits was assessed through one way ANOVA. No effect of the “blood introduction” from Lacaune was observed on the milk yield and fertility of the ewes. No significant difference between the mean milk yield for a standard 120 period of first lactation was found (79.47 l and 81.83 l, respectively for the purebred ewes and the crosses). The percentage of the fat and the dry matter of the first control in the Lacaune crosses (5.27% and 16.64%) was significantly lower ($P<0.01$; $P<0.05$) when compared to the purebred BDSP ewes (6.21% and 17.32%).

Keywords: Dairy Breed, Pure Breed, Crosses, Sheep Milk Production.

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INTRODUCTION

Since 2005 a specialised dairy sheep breed called Bulgarian Dairy Synthetic Population has been recognised with a national patent. During its existence so far, instead of being consolidated and to achieve significant genetic progress in the major trait that is milk yield, the breed is in poor condition due to the sporadic crossbreeding in the last decade. Farmers are interested in breeds such as Awasi, Asaf, Lacaune and Chios. Therefore, in the different regions of the country, phenotype differences among animals are observed. In the Institutes of the Agricultural Academy there are projects for development of specialized lines with participation of the introduced foreign breeds (Stancheva et al., 2014; Ivanova et al., 2015).

During the years, a wide range of studies have been carried out and the performance parameters of the sheep from Bulgarian Dairy Synthetic Population have been determined (Stancheva, 2003; Ivanova & Raicheva, 2008; Hinkovsky et al., 2008; Raicheva & Ivanova, 2011; Ivanova, 2013; Angelov et al., 2014; Zhelyazkova et al., 2014; Boikovski et al., 2003; Raicheva et al., 2004; Ivanova & Raicheva, 2013; Stancheva et al., 2014).

The aim of the study was to compare the milk yield in the ewes from Bulgarian Dairy Synthetic Population and their crosses with Lacaune.

Material and Methods

“Blood introduction” of Lacaune breed with F1 cross ram was carried out on 40 pure breed ewes of Bulgarian Dairy Synthetic Population (BDSP). The ewes were equal in regard to the sequence of lactation, genealogic line and milk yield. The object of the present study were 32 ewes on first lactation – purebred BDSP (n=16) and crosses of the breed with Lacaune (n=16). The ewes were reared in the experimental farm of the Institute of Animal Science - Kostinbrod, Bulgaria.

The milk yield for the control day was determined after the AC method of ICAR according to the Instruction for control of the performance traits (2003). The standard 120 d milking milk yield was determined as the individual quantity of milk of each milking control was measured in volume (ml). The milk yield of each ewe for the control day was calculated by multiplying the quantity of the obtained milk of the individual control in the morning by a coefficient of the herd, determined for the control day by the ratio between the amount of the morning and the evening milk and the morning milk in double milking. The milk yield of the ewes for a standard 120 d milking period was calculated as a sum of the milk yields from the individual control periods.

The fertility was determined as a ratio of the number of the lambs born alive to the number of the experimental ewes.

The content (%) of fat, total protein, dry fat-free residue and dry matter were measured in each control of 20 ml of individual sample for each of the animals, using milk analyser Ecomilk, Bultech.

The data were evaluated using the Data Analysis statistical package of Excel 2016, Microsoft. The effect of the crossbreeding on the examined traits was assessed through one way ANOVA, the significance of the effect was determined by F-criterium, while the significance of the differences between the studied groups – through t-criterium of Student.

Results and Discussion

The study on the effect of the “blood introduction” from Lacaune breed in BDSP on the 120 d milking milk yield of the ewes at first lactation did not show any significant influence of the factor on the variation of the trait (Table 1). No considerable differences were found in regard to the mean values of the 120 d milking milk yield as the experimental crossbred animals showed certain advantage over the purebred (3%), as presented in Figure 1. In both experimental groups, the milk yield for 120 d milking period did not reach the selection limits which might be explained by the influence of non-genetic factors.

Table 1. Effect of the crossbreeding on the 120 d milking milk yield of the ewes at first lactation, n=32

ANOVA			
Source of Variation	df	MS	F
Between Groups	1	44.60874	NS
Within Groups	30	444.0722	
Total	31		

Note: Significance: NS – non-significant

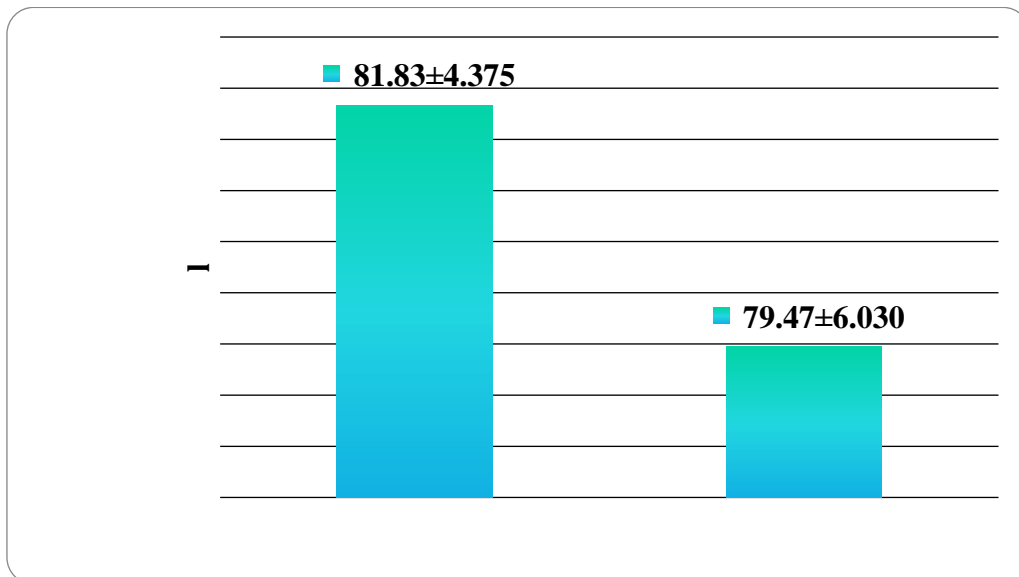


Figure 1. 120 d milking milk yield, l

In a similar experiment with “blood introduction” from Awasi, Ivanova et al., 2015 reported close values of the milking milk yield, however with advantage for BDSP over the crosses (respectively 80.02 l и 78.49 l). Ivanova & Raicheva, 2008 found that the mean 120 d milking milk yield of the ewes at first lactation (68.139 l) was lower than the reported in the present study, and in early fertilized ewes at first lactation higher mean value of the trait was obtained (90.75 l) (Ivanova & Raicheva, 2010). In a study on crosses – East Friesian and Lacaune, Thomas et al. (2000) showed similar results for the milk yield of the crosses (88.3-104.0 l). In Slovak Lacaune, Oravcova (2007) registered variation in the milking milk yield within the range of 156.0 – 189.2 l, which was considerably higher than what we observed. Stancheva et al. (2014) reported about higher 120d milking milk yield (95.41 l) in BDSP ewes at first lactation.

The lactation curves of the milk yield for the control day of the ewes from both groups are presented in Figure 2. Unusual shape of the curves was observed. In all the four controls, milk for the control day of the animals (experimental and control) did not differ significantly.

Raicheva et al. (2004) determined the milk for the control day in BDSP from first to fourth milking control within the range of 1.011 l – 0.409 l, while in the present study the variation was within a narrower range 0.891 – 0.539 l.

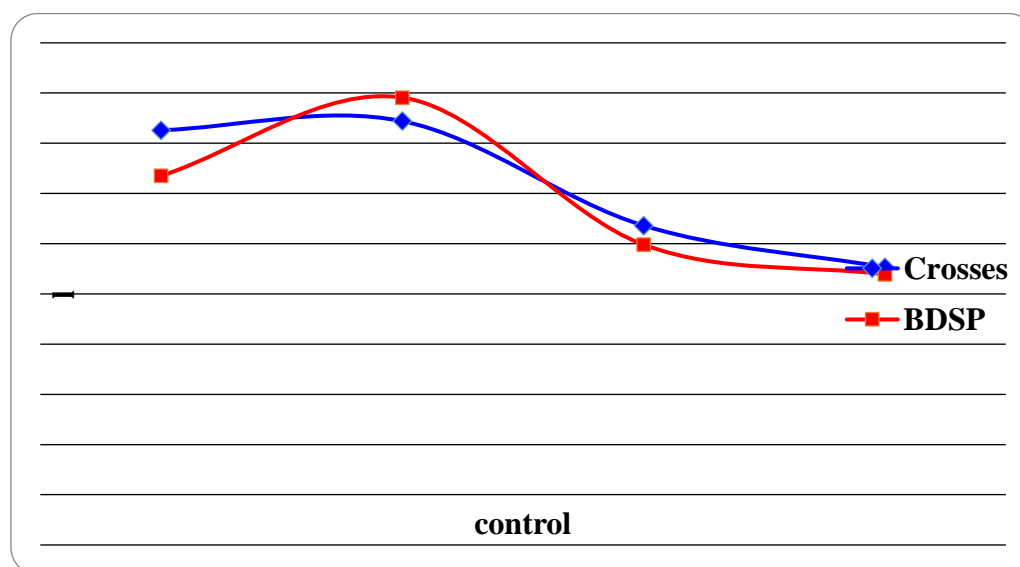


Figure 2. Curve of lactation, 1

Table 2 shows the chemical composition of the milk in both groups. The values respond to the requirements of the sheep milk composition and content, and their changes were normal for the lactation course. Significantly higher ($P<0.01$) fat content at the first control, as well as higher ($P<0.05$) dry matter content in the purebred ewes were observed.

Similar results about the composition of the milk were shown in a previous study with “blood introduction” from Awasi, as only the fat content was different and significantly higher in the crosses (Ivanova et al., 2015). Stancheva (2003) reported the following composition of the milk in BDSP ewes at first lactation – fat 7.324%, protein 5.428% and dry matter 17.914%, which are near our results. While studying the parameters related to the milk yield of early fertilized ewes, Raicheva & Ivanova (2011) found similar mean values of the traits regarding the chemical composition of the milk (fat 7.31%, protein 5.69%, dry matter 18.58% and dry fat- free residue 11.27%). In Lacaune sheep, Oravcova (2007) recorded fat and protein content of the milk during the milking period respectively 6.47-7.85% and 5.46-5.85%, while in another study (Oravcova et al., 2007a) – 7.08% fat and 5.58% protein, as these results corresponded to the ones that we showed above. Similar results for the fat and protein contents in months of lactation have been shown by Fava et al. (2014) in Lacaune sheep.

„Introduction of blood” from Lacaune did not lead to significant effect of the factor on the fertility (Table. 3). Low fertility in the studied groups was found, which probably was due to the effect of non-genetic factors (Figure 3). The BDSP ewes showed only 6% higher fertility in comparison to the crossbred animals.

Table 2. Chemical composition of the milk

Traits	BDSP, n=16				Crosses, n=16				Sign.
	I control	II control	III control	IV control	I control	II control	III control	IV control	
	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	
	1	2	3	4	5	6	7	8	
Fat, %	6.21±0.221	6.66±0.254	7.78±0.343	8.05±0.300	5.27±0.213	6.86±0.256	7.92±0.372	8.28±0.423	1>5**
Protein, %	5.73±0.103	5.96±0.037	6.04±0.094	5.09±0.104	5.94±0.120	6.08±0.060	5.96±0.090	6.30±0.128	NS
SNF, %	11.11±0.137	11.38±0.050	11.45±0.109	11.20±0.106	11.36±0.134	11.53±0.070	11.34±0.111	11.72±0.146	NS
Total Solids, %	17.32±0.154	18.04±0.225	19.23±0.407	19.25±0.353	16.64±0.263	18.39±0.259	19.26±0.337	20.01±0.505	1>5*

Note: Significance * - P<0.05; ** - P<0.01; NS – non-significant

Table 3. Effect of the crossbreeding on the fertility, n=32

ANOVA			
Source of Variation	df	MS	F
Between Groups	1	0,03125	NS
Within Groups	30	0,139583	
Total	31		

Note: Significance: NS – non- significant

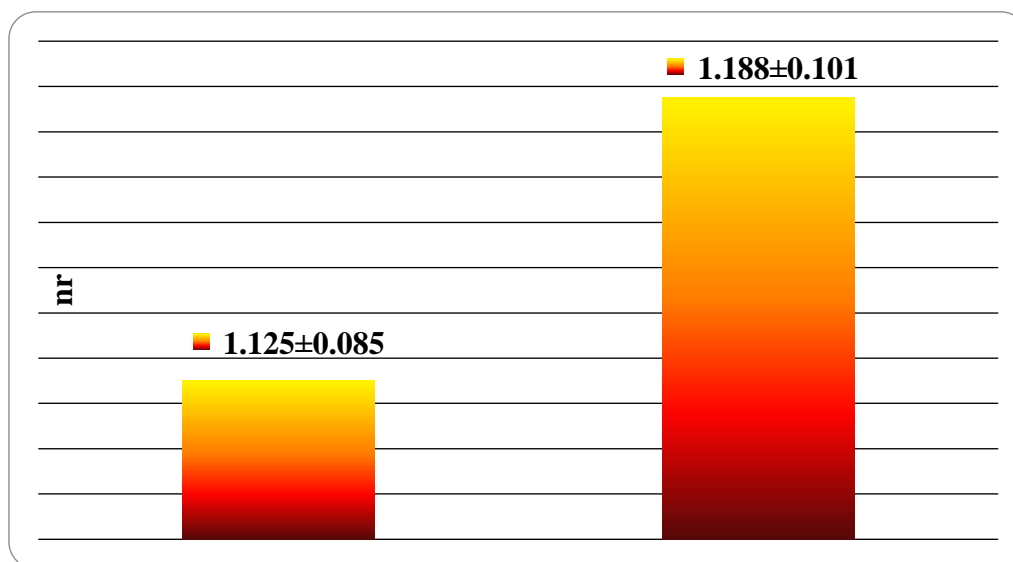


Figure 3. Fecundity, number

Ivanova et al. (2015) in an identical experiment with Awasi observed similar results for the fertility. Hinkovsky et al. (2008) when analyzing the results of biological fertility of the studied herd reported mean fertility of 1.24-1.3. At examining the reproductive traits of the BDSP ewes from the same herd, the recorded fertility at first lactation was 125.9% (Metodiev et al., 2010). For a same breed herd in another region Boikovski et al. (2003) found 1.33 lambs born by one ewe at first lactation. Zhelyazkova et al. (2014), in BDSP ewes reported fertility of 1.36 lambs and Stancheva et al. (2014) – 1.24. All these results are higher than the ones we obtained in this study.

Conclusions

No effect of the “blood introduction” from Lacaune to Bulgarian dairy synthetic population was observed on the milk yield and fertility of the ewes.

No significant difference between the mean milk yield for a standard 120 d period of first lactation was found (79.47 l and 81.83 l, respectively for the BDSP and the Lacaune crosses).

The percentage of the fat and the dry matter of the first control in the Lacaune crosses (5.27% and 16.64%) was significantly lower ($P<0.01$; $P<0.05$) when compared to the purebred BDSP ewes (6.21% and 17.32%).

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