

Effects of Crossbreeding Lacaune with Turcana Breed on Milk Production Traits

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Abstract

Objective of the current research was to evaluate the effects of crossbreeding the French Lacaune breed with Romanian indigenous Turcana sheep on milk production traits in crossbred ewes. Milk yield in Turcana ewes was on average 77.98 ± 2.73 kg, with limits ranging between 64.67kg and 92.01kg. While in the F₁ Lacaune x Turcana, the average milk production was of 109.04 ± 4.70 kg, with limits ranging between 89.23kg and 129.76kg. The F₁ Lacaune x Turcana ewes outperformed significantly ($p < 0.001$) the Turcana breed. The fat percentage in milk was on average of $8.02 \pm 0.22\%$ with limits ranging between 6.95% and 8.98% in the Turcana breed, and of $8.60 \pm 0.40\%$, ranging between 5.45% and 11.06% in the F₁ Lacaune x Turcana ewes. Genotype had no significant influence ($p > 0.05$) on the fat percentage from milk. Current results show that by using Lacaune rams for crossbreeding with the unimproved Turcana, the progeny will have significantly higher milk yields, and thus, the farm returns could be much improved in sheep enterprises that practice the semi-intensive pasture-based farming system. Thus, current results should be advertised to both farmers and the breeders associations, in order for the sheep farmers to take advantage of the breed complementarity found between the specialized Lacaune and the local Turcana.

Keywords: crossbreeding, dairy sheep, Lacaune, Turcana.

1. Introduction

Milk production varies greatly between sheep breeds, mainly because of the different feeding management of flocks and due to the genetic improvement schemes practiced and selection pressure. Furthermore, considerable phenotypical variation for milk yields exists among most dairy breeds, given that AI is rarely practiced for the species, unlike dairy cattle.

Some breeds, due to selection and proper nutrition, may be able to produce yields higher than 600 kg of milk/lactation [1], taking into

account the heritability for milk yield, that ranges between 0.20-0.30 [2,3], with individuals that produced under experimental conditions over 1.000 kg of milk/lactation [4].

The Lacaune is the most important sheep dairy breed originating from France, with a census of over 800.000 breeding ewes in the country [5]. The Lacaune breed has three types, Lacaune 'lait' which was selected for milk production, Lacaune 'viande' selected for growth traits of lambs and one type of Lacaune that possesses a major gene for prolificacy.

The milk production of the Lacaune breed increased from 80 liters to 270 liters in roughly 30 years [1,5]. In France, the estimates for the milk yield represents the milking period only (165 days), while excluding the suckling phase.

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The Lacaune is a large-framed breed, with adult ewes weights of 70-75 kg, and males around 90-100 kg. Multiparous Lacaune ewes have an average prolificacy of 170-180 %, with a long breeding season, and an average prolificacy of 140 % in primiparous ewes, when put to ram as ewe-lambs at the age of 8 months.

Romanian indigenous Turcana, accounting for over 6 million heads [6], is one of the most representative breeds belonging to the Eastern European Zackel group. Milk production of the breed is generally low, with ewes producing yields of 40 to 60 kg of milked milk, after weaning the lamb(s) at 60-70 days of age. However, there are authors that give significant higher milk yields for the Zackel strains, e.g. 240 kg of milk in 240 days of lactation in Serbian Bardoka [7]. Milk quality is very high in the Turcana breed, with the average fat content ranging between 7 to 8% and 6% proteins [8].

Objective of the current research was to evaluate the effects of crossbreeding the French Lacaune breed with Romanian indigenous Turcana sheep on milk production traits in crossbred ewes.

2. Materials and methods

The study was carried out at the Research and Development Station for Sheep and Goats from Caransebes (45°25'N/22°13'E), south-western Romania, in 2016. Caransebes region has an elevation of 280 m above sea level and a total annual precipitation of 737.2 mm, with a mean annual temperature of 12.9°C.

Two groups were set-up for the study as follows: the experimental group, with 11 multiparous F₁ Lacaune x Turcana ewes (lactations 3 and 4); and the control group, consisting out of 11 multiparous Turcana ewes, on the same parities as the Lacaune crossed ewes. Both groups were kept under identical feeding and housing conditions, being kept and managed in the same flock, under semi-intensive production system.

The reproduction season started in mid-September 2015, when nutritional flushing was practiced for three weeks before the mating seasons, in addition, all animals had free access to potable water and mineral blocks year around.

Ewes were housed indoors during winter for a period of 120 days, on deep straw bedding, with a space allowance of 1.8 m²/ ewe. Ewes received

high-quality clovers and pastures hays *ad libitum*, with an additional 200 g of concentrates in late gestation and during suckling period (65±5 days). After weaning of the lambs, ewes were managed exclusively on pastures, with two milking's per day (starting 6:00 and 17:00).

Milk yield was estimated using the ICAR rules and recommendations, having a number of 4 days for the control of the daily milked milk (morning and evening milking, at intervals of 28-31 days, with ewes being dried-off in early September 2016.

Milk samples were taken on all 4 control days, from the evening milking, and the following chemical composition traits were evaluated: fat content, protein content, lactose content and total solids non-fat, using Milko Scan S50.

Data were statistically using MiniTab14® software and differences between groups were analysed by non-parametric Mann-Whitney-Wilcoxon test. All decisions about the acceptance or rejection of statistical hypothesis have been made at the 0.05 level of significance.

The research activities were performed in accordance with the European Union's Directive for animal experimentation (Directive 2010 63/EU).

3. Results and discussion

Data on the effects of crossbreeding the Lacaune sires with indigenous Romanian Turcana ewes on the milk yield and milk chemical composition in crossbred multiparous are being presented in Table 1.

Milk yield in Turcana ewes was on average 77.98±2.73 kg, with limits ranging between 64.67kg and 92.01kg. While in the F₁ Lacaune x Turcana, the average milk production was of 109.04±4.70 kg, with limits ranging between 89.23kg and 129.76kg. F₁ Lacaune x Turcana ewes outperformed significantly (p<0.001) the Turcana breed.

Milk chemical composition of milk was generally not affected through crossbreeding, although given the higher milk yield of the Lacaune sired ewes, such outcome would have been expected. Given the strong and negative correlations found between milk yield and fat and protein contents.

Current results are in accordance with previous reports for the Turcana breed reared in Romania

[9,10], while the production registered in the F₁ Lacaune x Turcana is significantly higher than previous published data for the Romanian indigenous sheep breeds.

The fat percentage in milk was on average of 8.02±0.22% with limits ranging between 6.95% and 8.98% in the Turcana breed, and of 8.60±0.40%, ranging between 5.45% and 11.06% in the F₁ Lacaune x Turcana ewes. Genotype had no significance (p>0.05) on the fat percentage from milk.

Protein content in Turcana ewes was on average 5.77±0.15%, with limits ranging between 5.11% and 6.79%. In the Lacaune crossbred ewes, the average protein content in milk was 6.13±0.19%, ranging between 5.02% and 6.89%. Differences between the two genotypes were not significant (p>0.05), although a tendency could be observed (p=0.081).

Lactose percentage was on average 4.17±0.10%, with limits ranging between 3.70% and 4.82% in

the Turcana purebred multiparous ewes, while in the F₁ Lacaune x Turcana the lactose percentage was of 4.19±0.14%, the limits ranging between 3.34% and 4.97%. As for the protein and fat content, the genotype seem to have no significant (p>0.05) influence over the lactose content from milk.

As for the SNF content, in the Turcana ewes, the value was on average of 11.41±0.14%, with limits ranging between 10.61% and 12.32%. While in the F₁ Lacaune x Turcana ewes, the average was 11.82±0.15%, with limits of 10.99% and 12.46%. Genotype of the ewes significantly (p<0.05) influenced the SNF content from milk.

Results on the chemical composition of milk from Turcana and F₁ Lacaune x Turcana genotypes are in accordance with previous published data for the Romanian local breeds [10,11].

Table 1. Milk production in Turcana and F₁ Lacaune x Turcana ewes and milk chemical composition

Genotype	Trait	X±Sx	SD	CV (%)	Min.	Max.
Turcana	Milk yield (kg)	77.98±2.73	9.07	11.63	64.67	92.01
	Fat (%)	8.02±0.22	0.73	9.16	6.95	8.98
	Protein (%)	5.77±0.15	0.49	8.53	5.11	6.79
	Lactose (%)	4.17±0.10	0.32	7.63	3.70	4.82
	SNF (%)	11.41±0.14	0.45	3.98	10.61	12.32
F ₁ Lacaune x Turcana	Milk yield (kg)	109.04±4.70	15.62	14.32	89.23	129.76
	Fat (%)	8.60±0.40	1.33	15.47	5.45	11.06
	Protein (%)	6.13±0.19	0.62	10.05	5.02	6.89
	Lactose (%)	4.19±0.14	0.46	10.97	3.34	4.97
	SNF (%)	11.82±0.15	0.49	4.18	10.99	12.46

4. Conclusions

Current results show that by using Lacaune rams for crossbreeding with the unimproved Turcana, the progeny will have significantly higher milk yields, and thus, the farm returns could be much improved in sheep enterprises that practice the semi-intensive farming system.

Thus, such results should be advertised to both farmers and the breeders associations, in order for the sheep farmers to take advantage of the breed complementarity found between the specialized Lacaune and the Turcana.

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