Comparative Study on Production Efficiency in Native Romanian Carpatina and Banat White Goats

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Abstract

Objective of the current study was to evaluate the milk yield, health, reproductive rate and fitness indicators in two Romanian indigenous goat breeds, selected for milk (Banat White) and unimproved (Carpatina), managed under extensive rearing conditions. Milk yield in Carpatina goats was on average 323.6±1.68 kg/lactation, compared to that of Banat's White does of 561.4±1.43 kg, differences for milk production under identical rearing conditions being significant ($p \leq 0.001$). Prolificacy in the two breeds was significantly influenced by the genotype ($p \leq 0.001$), with average litter size of 148.0±0.49% in Carpatina, and 184.8±0.51% in Banat's White does. Growth rates in the un-weaned kids were on average of 119.8±0.86 g/day in Carpatina and of 134.3±0.76 g/day in Banat's White breeds ($p \leq 0.05$). Adult does annual voluntary culling rate was on average 16.4±1.46 % in Carpatina and of 20.6±1.88% in Banat's White breed ($p \leq 0.05$). Clinical mastitis incidence was significantly lower ($p \leq 0.05$) in Carpatina goats (2.88±1.65%) compared to that of Banat White (4.65±2.28%). Significant differences ($p \leq 0.05$) for lameness were found between Carpatina and Banat White populations, with occurrence rates of 3.85±1.89% and 5.81±2.54%, respectively. Abortion and pneumonia incidence were not affected ($p > 0.05$) by selection pressure among the two breeds.

Keywords: Banat's White, Carpatina, goats, production efficiency.

1. Introduction

In Eastern and Southern European regions, over 85% of the sheep and goats flocks are being reared in mountainous and disadvantageous areas, called Less Favored Areas (LFAs) as defined in Dir.75/268/EEC, having an important economic, social and ecological role, and also contributing to the conservation of the environment [1].

Currently, Romania has a national flock of 1.44 million goats [2], with numbers increasing with over 35% the last decade. Small ruminants are being reared in Romania almost exclusively under extensive low-input production systems, with the breed structure being dominated by the indigenous rustic and unimproved Carpatina breed, which represents over 80% at national level [3].

Carpatina breed is low performing, however the breed has a remarkable organic resistance and environmental adaptation. Previous reports concerning performance levels of Carpatina breed have shown modest production outputs, with milk yields estimates ranging between 240 and 260 kg/lactation [4] and growth rates in kids after weaning, as low as 90-100 g/day [5].

The upgraded and improved Banat's White breed is currently listed as endangered, and included under a genetic conservation program, with a census of 1.002 purebred does [6]. The Banat's White previous reports give estimates of milk yields of 370–400 kg/lactation and an average litter size exceeding 200% [7].

Objective of the current study was to evaluate the milk yields, health, reproductive rate and fitness indicators in two Romanian indigenous goat

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breeds, selected for milk (Banat White) and unimproved (Carpatina), managed under extensive rearing conditions.

2. Materials and methods

The trial was initiated starting autumn 2015 at the Research and Development Station for Sheep and Goats from Caransebes (45°25'N/22°13'E). Caransebes region has a typical Central European humid continental climate, with the research station being located at 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. Temperatures express seasonal patterns with summer daily means of 20.1°C in July and winter daily means of −0.8°C in January.

The project herd consisted of 68 purebred Carpatina and 46 Banat's White does, managed under extensive rearing conditions. Buck/doe ratio was roughly of 1:20, for two consecutive estrous cycles (42 days), with the reproduction season starting in mid-September. Nutritional flushing was not practiced before the mating seasons. Animals were housed indoors during winter for a period of 120 days, on deep straw bedding, with a space allowance of 1.8 m^2 and 0.5 m^2 per doe and kid, respectively.

Does did receive high-quality clovers and pastures hays *ad libitum*, with an additional 200 g of concentrates in late gestation and during the suckling period. All hays and concentrates were produced on farm. Creep feeding of kids was not practiced, they were solely reliant on the dams' milk production. Kids were weaned at 70±5 days of age.

Milk production was evaluated using B4 ICAR method. The growth rates of kids were evaluated using Inscale Platform EOE 150 K 100 XL.

The research activities were performed in accordance with the European Union's Directive for animal experimentation (Directive 2010/63/EU) [8].

Data were statistically using MiniTab14 software and differences between groups were analyzed 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.

3. Results and discussion

Results for production outputs in Carpatina and Banat White goat breeds are being presented in Table 1. Milk yield in Carpatina goats was on average 323.6±1.68 kg/lactation, compared to that of Banat's White does of 561.4±1.43 kg, differences for milk production under identical rearing conditions being significant ($p \leq 0.001$). This results show the implication of the genetic improvement schemes and also that of upgrading unimproved breeds with specialized ones. Given that the Banat White breed was formed throughout crossing of Carpatina breed with Weiße Deutsche Edelziege and some extent Saanen. Having in mind that the milk production represents the main source of income in goat enterprises, a more rigorous improvement and selection scheme for the Carpatina breed is being advised. Some commercial breeders can practice upgrading of their Carpatina goats with better performing breeds, such as the French Alpine, Murciano or Saanen, given that the Romanian native breed represents over 80% of the goats from the country, and as such it not at risk of extinction.

Lactation length was on average of 207.4±7.43 days for the Carpatina breed and of 238.1±4.88 days in the Banat White, with differences being significant ($p \leq 0.05$).

Conception rates were not influenced by the goats breed ($p > 0.05$), with current results being in accordance with previous estimates for the two populations [4, 7].

Prolificacy in the two breeds was significantly influenced by the genotype ($p \leq 0.001$), with average litter size of 148.0±0.49% in Carpatina, and 184.8±0.51% in Banat's White does. Lamb meat production represents an additional source of income for the farmers. Thus, prolificacy has economic implications as well for the goat enterprises. With young kids being weaned usually at 60 to 80 days of age, and slaughtered at body weights ranging between 12 to 18 kg live weights, being consumed during Easter celebration. Resulting in a high demand for kid meat, and also farmers that produce pedigree replacement does and bucks for breeding purposes can have better returns in their farms.

Growth rates in the un-weaned kids were on average of 119.8±0.86 g/day in Carpatina and of 134.3±0.76 g/day in Banat's White breeds, with differences being significant between the two

genotypes ($p \leq 0.05$). Similar growth rates in Carpatina kids were previously reported [5, 9].

Overall, both milk yield and meat production potential are superior in the Banat White goat breed, compared to Carpatina. Although the Banat White is an endangered breed nowadays, efforts should be made by the breeders to preserve the breed and improve throughout purebred selection schemes the milk yield.

For Carpatina, the upgrading with better performing breeds such as Saanen and French Alpine is advised. And purebred selection to be practiced only in farms situated in the mountainous regions, where the adaptation of the breed to harsh conditions represents a valuable trait.

Data for adult does culling rates, clinical mastitis incidence, lameness incidence, abortion rate and pneumonia incidence in Carpatina and Banat White goats are being presented in Table 2.

Adult does voluntary culling annual rate was on average 16.4±1.46% in Carpatina and 20.6±1.88% in Banat White breeds, differences between the two populations being significant ($p \leq 0.05$).

Clinical mastitis incidence for the two breeds was on average of 2.88±1.65% in Carpatina and 4.65±2.28% in Banat White does, with the incidence being influenced by the breed factor ($p \leq 0.05$).

Lameness incidence in the two breeds was on average of 3.85±1.89% in Carpatina and of 5.81±2.54% in Banat White, with the incidence being influenced by the breed factor ($p \leq 0.05$).

Overall, for the culling rate, clinical mastitis and lameness incidences, the Carpatina does showed a better organic resistance, with implications on the animal welfare and health, given the lower veterinary treatments needed for the Carpatina flock.

Abortion and pneumonia incidences in Carpatina and Banat White were not influenced by the breed ($p > 0.05$).

Considering the current results, for the Carpatina breed, given the low performance production levels and the high numbers, crossbreeding of the breed with dairy and meat specialized breeds is advised for the most of the population. However, attention should be advised when crossbreeding is being practiced, in order to evaluate the effects of upgrading native goat breeds with exotic populations, coming from divergent rearing conditions, such as the meat specialized South African Boer or the dairy Spanish Murciano breeds [10, 11].

Moreover, Carpatina breed, given its remarkable organic resistance and potential for low input extensive production systems should be used by farmers that practice organic production. Given the current restrictions in using antibiotics and other substances in order to maintain a good flock health in conventional systems [12].

Table 1. Means (±SE) for milk yield, lactation length, conception rates, prolificacy and kids growth rates in Carpatina and Banat White goats

Breed	Milk yield (kg)	Lactation length (days)	Conception rates (%)	Prolificacy (%)	Kids growth rates (g/day)
Carpatina	323.6±1.68	207.4±7.43	97.1±3.12	148.0±0.49	119.8±0.86
Banat White	561.4±1.43	238.1±4.88	95.7±4.13	184.8±0.51	134.3±0.76
Differences	***	*	*NS*	***	*

^{NS} P>0.05; * P≤0.05; ** P≤0.01; *** P≤0.001

Table 2. Means (±SE) for adult does culling rates, clinical mastitis incidence, lameness incidence, abortion rate and pneumonia incidence in Carpatina and Banat White goats

Breed	Does culling rate (%)	Clinical mastitis incidence (%)	Lameness incidence (%)	Abortion rate (%)	Pneumonia in adult does (%)
Carpatina	16.4±1.46	2.88±1.65	3.85±1.89	1.8±0.96	1.8±0.66
Banat White	20.6±1.88	4.65±2.28	5.81±2.54	2.1±1.08	2.1±0.68
Differences	*	*	*	*NS*	*NS*

4. Conclusions

Current result shown that the Banat White breed has superior production outputs when it comes to both meat and milk production, compared to the Carpatina goat. However, when organic resistance is concerned, the Carpatina breed has a significantly higher genetic resistance to disease. As a result, the current breeding schemes should include functional traits for selection of the Banat White goats. While for the Carpatina breed, upgrading with meat and milk specialized breeds, has the potential of increasing significantly the economic returns in extensive farming systems.

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