Performance of F₁ Primiparous German Black-headed Mutton x Turcana Crossbred Ewes under Extensive Management Conditions

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Abstract
Aim of the current research was to evaluate the effects that crossbreeding Romanian indigenous Turcana (TA) ewes with German Black-faced Mutton (GBM) rams have on the body weight and reproduction performances of primiparous F₁ GBM x TA descendants under extensive management conditions, when put to ram as ewe lambs or as yearlings. The study was initiated in a commercial farm from Timis County, western Romania, and starting autumn 2009. At the age of 8 months, F₁ crossbred female lambs registered on average 37.6 kg, while averages of 32.2 kg were achieved by the TA females from the control group (CG), differences between the two genotypes were significant (p<0.001). When put to ram as ewe-lambs at the age of 8 months, F₁ crossbreds registered a average fertility rate of 84.0%, compared with 29.4% the females from the CG, differences registered between the two groups were significant (p<0.01). Data registered in the current study proven that the F₁ crossbreds are significantly more precocious compared to purebred TA, reared under identical conditions. When put to ram at the age of 18 months, F₁ crossbred glimmers registered an average prolificacy of 140.0%, compared to 111.7% the females from the CG. GBM sired females grow faster, achieve higher body weights, are more precocious and more prolific compared with purebred TA females of the same age.

Keywords: German Blackhead Mutton, Turcana, crossbred ewes, reproduction performance, growth rates

1. Introduction
No single breed of sheep excels for all economically important traits, highlighting the importance of heterosis and breed complementarities in crossbreeding systems to optimize economic performance [1]. Incomes registered from the Romanian sheep sector in the last five years are orientated primarily on the meat production with around 70% of the income, followed by milk production with 20-25% of the income, and less than 5% is registered from the wool and skin productions [2]. With a population of 9.14 million breeding ewes, Romania’s sheep flock holds the third place among European countries regarding the sheep number, and has an annual growth rate of this sector of 3-3.5%. Turcana breed is the most numerous sheep breed in Romania, accounting for over 6 million ewes, representing roughly 70 % of the Romanian flock [3, 4, 5]. Despite popularity of the breed, modest traits for meat production (low prolificacy and growth rates), make the breed unsustainable and unprofitable for nowadays mutton production. Outstanding traits of the TA breed are survivability, versatility and adaptation to most extensive farming conditions. Although, is a well appreciated breed by farmers due to its qualities, low growth rates of 110-160 g/day, average

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prolificacy of 105-115% [2], poor quality carcasses and the fact that is late maturing, with first lambing occurring in primiparous at around 24-26 months of age, makes the breed unsuitable and uncompetitive in the current lamb production systems. In the region that the experiments were carried out (Banat region), the TA breed represents over 90% of the sheep reared. Efficiency of lamb production is controlled by reproduction, mothering ability and milk production of the ewes, as well as, growth rate and survival rates of the lambs [6, 7]. On the other hand, selection for prolificacy in sheep is a slow process due to the low heritability traits, 0.03 to 0.18 for the reproduction characters [8, 9, 10].

Aim of the current research was to evaluate the effects that crossbreeding Romanian indigenous Turcana ewes with German Black-faced Mutton rams have on the growth and reproduction performances of primiparous F1 descendants under extensive management conditions, when put to ram as ewe lambs or as yearlings.

2. Materials and methods

The study was initiated in a commercial farm from Timis County, from western Romania, starting autumn 2009. To establish the effects that crossbreeding Romanian indigenous Turcana (TA) ewes and German Black-headed Mutton (GBM) rams have on the growth rates and reproductive performances of F1 GBM x TA crossbreds, when reared extensively, under organic sheep farming conditions.

Three pedigreed GBM rams were imported in autumn 2009 as yearlings, and mated with purebred TA ewes, managed under an annual lambing season. As control group, productive and reproductive performances of purebred TA rams, ewes their progeny was registered. Flock taken into study is included in the National Sheep Improvement Program, coordinated by the National Agency for Genetic Improvement and Reproduction in Animal Husbandry.

Individual ewe records identified tag number, genotype, weight at 8 and 18 months, fertility, and litter size. Reproduction season started on 1th of October, for a period of 55 days (three heat cycles). Ewes were exclusively kept on fenced natural unimproved pastures, grazed rotationally, with an average stocking rate of 7-9 heads/hectare. Since the commercial farm was registered for organic farming, only minimum tillage work was done for managing the pasture. During winter time, animals were fed additional alfalfa hay and ryegrass hay, and only in days with snow covering the pasture, animals received concentrates (100-150 grams/head). Animals had permanent access to a water source, and also natural shade during the summer. F1 crossbred ewes were housed and managed under exactly same conditions as the purebred TA lambs (control group). Flushing was practiced for a period of 3 weeks before the ewes were put to ram, in order to improve reproduction performances. Both ewe lambs and yearlings were put to ram at the same time, with a sex ratio of roughly 1:30.

The study was performed in accordance with the EU Commission Recommendation 2007/526/EC of 18 June 2007 on guidelines for the accommodation and care of animals used for experimental and other scientific purposes. Averages and dispersion indices were calculated with the help of MiniTab 14 programme. Differences were tested using Mann-Whitney non-parametric test.

3. Results and discussion

Body weight and reproductive performances registered by the F1 crossbred females and TA from the CG is being presented in Table 1, when put to ram as ewe lambs or as yearlings.

At the age of 8 months, F1GBMxTA female lambs had on average 37.64 kg and 32.23 kg the TA. Differences between the two genotypes were found to be statistically significant (p<0.001). At the age of 18 months, differences between the two genotypes were also significant (p<0.001). The dual-breeds registered on average 61.10 kg, while the purebred TA glimmers registered 44.52 kg. Differences between the F1 genotype at 8 and 18 months were also statistically significant (p<0.001), when females were put to ram at the age of 18 months registered a body weights heavier with 23.46 kg, compared with the same genotype females included to reproduction as ewe lambs.

In their work concerning variance components for prolificacy and growth performance Ceyhan et al.
(2009), reported that selection for yearling weight could be more effective than for birth and weaning weights [11]. When put to ram as ewe lambs, at the age of 8 months, F1 crossbred females achieved an average fertility rate of 84.00%, compared with 29.40% registered by the TA females from the CG. As expected, differences registered between the two groups were significantly statistic (p<0.01). Values registered in the current study proven that the dual-breeds are significantly more precocious compared to purebred Turcana ewe lambs reared under identical conditions.

When the two genotypes were put to ram at the age of 18 months, differences registered were not significant (p>0.05), with averages of 95.24% in F1 crossbred females, and 89.47% the TA yearlings respectively. Differences between the two groups from the F1 genotype were tested as insignificant.

Litter size in crossbred ewe lambs was on average of 109.5%, compared with one registered by the purebred TA ewe lambs, of 100%. Differences registered between the two genotypes were statistically significant (p<0.01).

When put to ram at the age of 18 months, as glimmers, F1 crossbred lambs registered an average prolificacy of 140.0%, compared to 111.7% the CG. Differences registered were insignificant (p>0.05).

Litter size varied significant between the two F1 crossbred groups (p<0.05) when females were put to ram as ewe lambs or as yearlings.

According to Byrne et al. (2010), traits with high positive economic weight are lamb survival rate and number of lambs born per ewe [12].

| Table 1. Body weight and reproductive performances of the F1 crossbred ewes |
|-----------------|-----|-----------------|-----------------|-----------------|
| Genotype        | Age (months) | Body weight (kg) | Conception rate (%) | Litter size (%) |
| F1 GBM x TA [A] | 8   | 37.64±0.714     | 84.00±7.480       | 109.52±6.560    |
| TA [B]          | 8   | 32.23±0.591     | 29.40±11.400      | 100.00±0.000    |
| **A vs. B**     |     | **             | **               | **              |
| F1 GBM x TA [a] | 18  | 61.10±1.000     | 95.24±4.760       | 140.00±13.400   |
| TA [b]          | 18  | 44.52±0.832     | 89.47±7.230       | 111.76±8.050    |
| **a vs. b**     |     | ***             | ns               | ns              |
| **A vs. a**     |     | ***             | ns               | *               |

![Figure 1](image.jpg)

**Figure 1.** F1 German Black-headed Mutton x Turcana yearling ewe

As presented in Figure 1, the crossbred females exhibit dark colour face and semi-coarse wool. Further studies which to follow productive performance in adult-multiparous crossbred ewes need to be done. As well as the study on organic resistance of the newly introduced genotype to the extensive production system specific to Romanian conditions.

4. Conclusions

» The F1 GBMxTA achieved at the age of 18 months on average 61.1 kg, while the purebred Turcana glimmers registered 44.5 kg;

» When put to ram as ewe lambs at the age of 8 months, F1 crossbred females registered an average fertility rate of 84.0%, compared with 29.4% the females from the control group, differences registered between the two genotypes were statistically significant (p<0.01);

» When put to ram at the age of 18 months, as glimmers, F1 crossbred lambs registered an average litter size of 140.0%, compared to 111.7% the purebred Turcana yearlings;
German Black-headed Mutton sired females grow faster, achieve higher body weights, are more precocious and are more prolific compared with purebred Turcana females, when reared in identical, extensive management conditions.

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