

Impact of Mating of Youth Tsigai on Reproductives Indices and Body Weight at Adult Age

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Abstract

The impact of age and body weight on reproductive indices was studied in 43 Tsigai sheep - rusty variety over four lambing seasons. At the time of the 1st mating, the sheep had an average body weight of 40.66 kg, which increased to 52.08 kg by the 1st lambing season, at an average age of 13.80 months (1.15 years). By the 4th reproduction season, the average body weight was 45.56 kg at mating, and 48.21 kg at lambing respectively, with the sheep age being 48.71 months (4.06 years). The study found that fertility indices were unaffected by age or body weight, as the fertility rate remained constant at 81.40% across both the 1st, and 4th seasons, but were affected by the feeding system in the 2nd season. The highest prolificacy (117.14%) was observed in the 4th lambing season, while the highest lamb survival rate (94.74%) occurred in the 3rd lambing season, compared to a lower survival rate (82.35%) in the 1st lambing season, where the mortality rate was the highest, 17.35% respectively.

Keywords: female, fertility, lambs, prolificacy, survival rate

1. Introduction

In recent years, the lack of labour in the sheep sector has led many sheep farmers to prioritize improving meat production. While there are various methods to enhance meat production within a breed, key factors include advancements in feeding technologies and improvements in reproductive performance. Both play a crucial role in boosting meat production.

According to [1], reproductive traits (such as fertility) and lamb weaning rates are essential factors influencing the efficiency and profitability of meat sheep production.

Sheep breeders believe that farm profitability can be enhanced by introducing young females to reproduction at 12-14 months of age. Mating the female sheep to lamb at an earlier age than at 24 months, can improve reproductive efficiency and contribute to increased flock profitability. Introducing young females to reproduction a few months earlier than usual allows sheep breeders to optimize flock management, obtain earlier information on the reproductive traits of the ewes,

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and promptly identify and remove infertile individuals from the breeding program.

According to [2], the reproductive rate of young sheep can differ by as much as 50% compared to mature ewes. The reproductive performance of young females is also influenced by their genotype. [3] suggest that both age and body weight at first mating are key factors affecting the reproductive performance of ewe lambs.

Within a specific genotype or breed, body weight is likely the most important factor influencing the reproductive performance of young sheep. Several studies have identified positive correlations between the body weight of young sheep at first mating and their subsequent reproductive characteristics [4-10].

The purpose of the current study was to investigate the influence of age and body weight on reproductive performances of young female from Tsigai breed – rusty variety.

2. Materials and methods

The present study was conducted at the Reghin Experimental Base and followed the evolution of body weight and reproductive indices for a number of 43 females, starting with the 1st breeding season at the age of approximately 8-9 months and until the 4th lambing, at the age of approximately 4 years, the sheep being the same.

The body weight of ewes was recorded at 1st and 4th mating and lambing.

The mating was done in a harem in the 1st year (the ratio ewe/ram being 15 youth ewe/ram) and in the 2nd, 3rd and 4th the natural controlled mating was done „by hand,, based on mating plans (choosing ewes in oestrus every morning at 7 o' clock using testing rams and assigning ewes to the rams, the ratio being 25 ewes/ram).

The feeding conditions in the 2nd, 3rd and 4th breeding season are factors influencing reproductive indices in the sense that, in these seasons, feeding was carried out on medium quality pastures and supplemented with concentrates, compared to the first breeding season, when the young female benefited from accommodation conditions in shelters and feeding on roughage and concentrated feed.

Up to 16 months, the sheep were raised in the shelter. After this period, the sheep grazed on pastures annually, in the 15 May - beginning of

December period, and were housed in the shelter from December trough May. In mid-August, for a period of 45-days controlled mating with Tsigai rams was organized. In the mating period, the food was supplemented with 0.3 kg corn-barley-based concentrate (14% crude protein content)/head/day. The mating was carried out over a period of 45 days due to the fact that the Tsigai sheep from the Reghin Experimental Base are registered in the breed's pedigree register and subjected to the control of their productive performance. The application of the pedigree register for this breed (as for other local breeds) allows the recording of matings only for a period of 45 days, considering that if the sheep do not show oestrus during a 45 period, their maintenance for reproduction is ineffective.

In the 1st year, before and after mating, all females were fed with 1.5 kg hay and 0.50 kg corn-barley concentrate (50%-50%, 14% crude protein content) per head per day during first 3 months of pregnancy, and with 2.0 kg hay and 0.8 kg corn-barley concentrate (50%-50%) in late pregnancy and early lactation. In the other seasons (2nd, 3rd and 4th), except the mating period of 45 days, when along with pastures, food was supplemented with 0.3 kg corn-barley-based concentrate, the sheep were fed only with pasture until beginning of December.

To analyse the reproductive activity, we calculate fertility (pregnant ewes × 100/mated ewes), natality (lambd ewes born × 100/pregnant ewes), prolificacy (lambs born × 100/ewes lambd), mortality (dead lambs × 100/lambs born), and the abortion rate [11] (Table 1).

To assess the impact of early introduction to reproduction and body weight at first mating in young female sheep on their reproductive performance and adult body development, the descriptive statistic of the variables was carried out using the JASP procedure.

Table 1. Characteristics analysed (heads)

Characteristics	Year			
	2021	2022	2023	2024
Mated	43	43	43	43
Pregnant	35	29	35	35
Lambd	34	29	34	35
Lambs obtained	34	29	38	41
Lambs survived	28	25	36	37

3. Results and discussion

This experiment examined the effect of age and body weight on the breeding performance of young females over four mating and lambing seasons, starting with mating at 8-9 months of age in 2020 and ending with the lambing seasons in 2024. Table 2 shows body weight and age of sheep at first and fourth mating and lambing seasons.

From the data in Table 2 it is evident that, in the first gestation period, the average body weight increased by 28.09% compared to the weight recorded at the first mating. There is a high difference - 26 kg - between the maximum and minimum body weight recorded, highlighting the significant variation in growth potential among the females in the study. Interestingly, although the body weight of the ewes at the fourth mating is 12.13% higher than at the first mating, the post-lambing body weight does not reach the weight recorded at the first lambing. Despite this, the body weight remains 8.03 % higher in females with an average age of 1.15 years compared to those with an average age of 4.06 years.

It is important to note that after the first breeding season up to lambing, the young females were kept in shelter (whereas in the subsequent seasons, they were grazed during the first three months of

gestation). This limited their movement, which contributed to the weight gain observed in Table 2.

Over the four-year period, the reproductive indices of the Tsigai females (Table 3) show that fertility rate in the first mating was identical with that of the third and fourth mating. However, it was 13.96% lower in the second mating season compared to the other three seasons. The reduced fertility in the second mating could be attributed to physiological, and nutritional factors respectively, possibly due to changes in the feeding system. Since the first mating of the youth female occurred between 6 October - 6 December 2020, the lambing season took place between March - April, with lambs being weaned in June. Consequently, the subsequent mating began on 15 August 2021, which was less than two months after the lambs were weaned. The change in the feeding system refers to the diet and management of the sheep. Before the first lambing and until the lambs were weaned, the sheep were kept in the stable and fed a diet of concentrates and hill hay.

After weaning, and until the start of the second mating, the sheep grazed on pasture of medium quality. This pasture was composed of 90% grasses from the spontaneous flora, (including over 50% *Deschampsia cespitosa*, along with *Festuca pratensis*, *Dactylis glomerata*, and *Lolium perenne*), and 10% legumes (*Trifolium repens*).

Table 2. Body weight and age of ewe at 1st and 4th mating and lambing seasons

Specification	N	Mean ± SE	Minimum	Maximum
BW at 1 st mating in 2020, kg	43	40.66 ± 0.68 ^a	34.00	51.40
BW at 1 st lambing in 2021, kg	35	52.08 ± 1.01	40.00	66.00
BW at 4 th mating in 2023, kg	43	45.59 ± 0.66 ^b	36.00	56.00
BW at 4 th lambing in 2024, kg	35	48.21 ± 0.98	36.70	58.50
Age at 1 st mating, (months)	35	8.80 ± 0.09	7.80	9.97
Age at 1 st lambing, (months)	35	13.80 ± 0.09	12.80	14.97
Age at 4 th mating, (months)	35	43.71 ± 0.09	42.77	44.80
Age at 4 th lambing, (months)	35	48.71 ± 0.09	47.77	49.80

The ability to conceive and give birth to live lambs is the first measurable aspect of ewe reproductive performance and plays a crucial role in lamb production [1].

When comparing prolificacy and the weaning rate over the four years, an upward trend is observed, with the lowest values recorded at the first lambing, and the highest at the fourth lambing.

However, the weaning rate at the third lambing exceeded that of the fourth. [12] suggest that the

higher lamb survival rate in adult ewes is likely due to improved milk production during the lactation period compared to young sheep.

Table 4 reveals that, by the age of 4 years, 34.88% of the sheep (15 heads) lambed every year, 48.84% (21 heads) lambed three times, while 4.66% never lambed or lambed only once.

The fertility rate was slightly lower (1.4%) compared to the values reported by [1] for adult

Tsigai ewes, but significantly lower (by 16%) than those found by [13].

Table 3. Reproductive indices of ewes

Characteristics	Year			
	2021	2022	2023	2024
Fertility (%)	81.40	67.44	81.40	81.40
Natality (%)	97.14	100.00	97.14	100.00
Prolificacy (%)	100.00	100.00	111.76	117.14
Survival rate (%)	82.35	86.21	94.74	90.24
Mortality (%)	17.65	13.79	5.26	9.76
Abortion rate (%)	2.86	0.00	2.86	0.00

For young Blackhead Tsigai females from Teleorman, [11] reported a fertility rate of 86.89% and a lamb survival rate of 92.06%; for adult ewes of the same breed, the fertility rate was 99.20% and a lamb survival rate of 94.52%, with mortality rates of 5.48% in adult ewes compared to 7.94% in young females.

For Tsigai breed, [14] had found a fertility rate of 77.0% for youth female, at a body weight of 41.62 kg at first mating (at 9.63 months age), and 48.85 kg at first lambing (14.57 months age).

Table 4. The number of sheep that lambed by the age of 4 years

Specification	N/%
Number of sheep joined	43.00 (100.00)
Sheep that have never lambed	1.00 (2.33)
Lambed once	1.00 (2.33)
Lambed twice	5.00 (11.62)
Lambed three time	21.00 (48.84)
Lambed four time	15.00 (34.88)

From an economical point of view, it was observed that the early introduction of youth female to reproduction at the ages of 8-9 months contributed to additional income in 2020. Thus, a lamb survival rate until weaning of 82.35% (28 lambs out of 34 obtained), leads to obtaining an income of 8.400 RON/1.680 EUR (at an average weaning weight of lambs of 20 kg and an average price/kg live weight of 15 RON/3 EUR). This income is sufficient to cover the wage for one person working on the farm for two months.

4. Conclusions

Based on the results obtained, it can be concluded that introducing youth female to reproduction at the age of 8-9 months, at an appropriate body weight, does not affect negatively the subsequent development in adulthood.

Sheep prolificacy and lamb survival rate increase with the ewes age, respectively in the 3rd and 4th lambing seasons.

Early introduction of young female sheep to reproduction, can contribute to enhance the farm's economic performance trough increasing the number of lambs/ewe throughout their productive life, on the one hand, as well as to the early identification and elimination of infertile ones from the herd, on the other hand.

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