THE EFFECT OF AGE OF EWES AND LAMBING SEASON ON LITTER SIZE AND WEIGHT OF LAMBS

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Summary. In 2000, a study was conducted to determine the effect of age of Lithuanian Blackface sheep and lambing season on the fertility of sheep and weight of lambs at the state enterprise "Šeduvos avininkystė". The data of 5 - years studies have been analysed. The influence of various factors on vitality and survival rate of newborn lambs until their weaning has been also studied. Ewes from 5 to 7 years of age were most fertile and dropped 0.4 lamb (39.0%) more (P< 0.001) than 1 to 1.5 - year-old sheep and had by 11.5% higher fertility than 2 to 4 - year and 8 year and older ewes. Besides, older ewes dropped 0.6 kg (P< 0.001) heavier lambs compared with the young ones and at weaning their lambs weighed also 2.3 kg (P< 0.001) more. It should be noted that ewes lambing in winter were by 10.4% (P< 0.01) more fertile than those lambing in spring. Winter lambs were by 0.2 kg heavier at birth and by 2.8 kg (P<0.01) heavier at weaning than spring lambs.

It is most expedient to mate Lithuanian Blackface sheep at the end of summer (in order to have winter lambing) and to keep higher number of 4 to 6-year-old ewes in a flock. Ewes should be mostly cared about at the second half of pregnancy (100 days), so that vital lambs of 3.5 to 5.0 kg weight were born.

Keywords: sheep, Lithuanian Blackface, lambing season, age of ewes, fertility, weight.

AVIŲ AMŽIAUS BEI ĖRIAVIMOSI SEZONO ĮTAKA VISLUMUI IR PRIEAUGLIO SVORIUI

Santrauka. 2000 metais išanalizavome Valstybės įmonėje "Šeduvos avininkystė" auginamų Lietuvos juodgalvių avių amžiaus ir ėriavimosi sezono įtaką avių vislumui bei prieauglio svoriui, panaudojant 5 metų tyrimų duomenis. Taip pat ištyrėme įvairių faktorių įtaką atvestų ėriukų gyvybingumui bei jų išsaugojimui iki nujunkymo. Visliausios buvo 5-7 metų amžiaus ėriavedės. Jos atvedė 0,4 ėriuko arba 39,0% (P< 0,001) daugiau negu 1-1,5 metų avys ir 11,5% daugiau, negu 2-4 metų bei 8 metų ir vyresnės ėriavedės. Be to, senesnės ėriavedės atvedė apie 0,6 kg (P<0,001) stambesnius ėriukus palyginti su jauniklėmis, kurie 2,3 kg (P< 0,001) daugiau svėrė ir nujunkymo metu. Reikia pažymėti, kad 10,4% (P< 0,01) vislesnės buvo tos ėriavedės, kurios atvedė ėriukus žiemą, palyginti su pavasarį apsiėriavusiomis avimis. Taip pat žiemą apsiėriavusių avių ėriukai buvo 0,2 kg stambesni atvedimo metu ir 2,8 kg (P<0,01) nujunkymo metu negu pavasarį apsiėriavusių avių jaunikliai.

Lietuvos juodgalves avis tikslingiausia kergti vasaros pabaigoje (kad ėriuotųsi žiemą) ir bandoje laikyti kuo daugiau 4-6 metų amžiaus ėriavedžių. Didžiausią dėmesį avims skirti II-oje ėringumo pusėje (100 d.), kad jos atvestų gyvybingus ir 3,5-5,0 kg sveriančius jauniklius.

Raktažodžiai: avys, Lietuvos juodgalvės, ėriavimosi sezonas, avių amžius, vislumas, svoris.

Introduction. At the beginning of the year 2002, the number of sheep in Lithuania comprised 12.300 animals. Sheep are raised only by farmers and other land users, where as agricultural partnerships do not keep these animals, except for the state enterprise "Šeduvos avininkystė". The conservation of the gene pool of Lithuanian Blackface sheep is also carried out at this enterprise, where over 800 sheep, including about 400 ewes, are raised every year. "Šeduvos avininkytė" is the only breeding centre of Lithuanian Blackface sheep, the main research base for the Lithuanian Institute of Animal Science and supplier of the breeding material for farmers.

Mutton sheep raising and sheep of mutton breeds, including Lithuanian Blackface, are considered as having greatest prospects in the current market. Fertility of sheep and growth rate of lambs are the factors of importance in the development of mutton sheep breeding. Highly fertile, milk productive and early maturing sheep are more valued in many countries (Burgkart, 1987; Rieder, 1989; Zuchtreport, 2000).

The literature survey indicates that sheep 3 to 6 year-old are most fertile and drop lambs of the highest weight. Meanwhile, first-litter ewes drop fewer lambs and of lower weight. It has been also noticed that winter (December-February) lambs are larger in size than spring (March-May) lambs. Besides, ewes lambing in winter are by 20 % to 25 % more fertile than those lambing in spring (Šveistienė, 1988; Anderson et al, 1998).

The highest growth rate of lambs was determined in the first four weeks, and their weight was mostly dependent on the milk productivity of the dam.

Weight of the lamb increases from three to four times in the first month of age and during the following three months. By the time weaning, the growth rate becomes twice lower and further even lower. On the other hand, if the lambs are well fed, there is no difference between the weight of single and twin lambs at the end of the year

(Šveistienė, 1988; Васильев, Целютин, 1990).

The improvement of fertility and meatiness of sheep should be related to vitality of newborn lambs and their survival untill weaning. It has been found that 1 lamb out of 6 or 7 born dies due to the dam's indifference. This is especially the case with the lambs of first litter and fertile ewes, in spite of the fact that the dam had enough milk and the lamb was born well-developed. Besides, the death rate for male lambs is by 5% to 7% higher than that for female lambs. The best survival rate was determined for single lambs born of 4 to 5 kg weight and twin lambs of 3.5 to 4 kg weight. Vitality and survival of lambs is highly influenced by the dam's weight in the second half of pregnancy (100 d.). Therefore, feeding of ewes and feed quality are very important at this period (Хамицаев, Калабаев, 1990).

The purpose of the present study was to investigate the influence of dam's age and lambing season on the litter size and weight of Lithuanian Blackface lambs and also the effect of various factors on vitality of newborn lambs and their survival untill weaning.

Materials and Methods. The experiments were carried out at the breeding centre for Lithuanian Blackface sheep (state enterprise "Šeduvos avininkystė") where sheep have been raised since 1963. This breeding centre, has been the base for the scientific research, breed improvement and individual productivity recording since the first days of its foundation. On the basis of the data of 1996-2000, the effects of various factors on litter size, vitality, survival rate and growth rate of lambs have been analysed.

On the basis of the record books 2000 sheep were evaluated for mating, lambing and progeny growth. All the experiments with sheep were conducted in compliance with the Law of the Republic of Lithuania on Animal care, housing and use No 8-500 (issued on 6 Nov., 1997).

Sheep were mated from August to December, using 20 ewes of 1 to 8 years of age per ram service. Fertility of ewes was determined by the litter size. Lambs were weighed at birth, weaning and 12 months to within 0.1 kg.

The data were processed by statistical analysis and biometric methods.

Results. Fertility of ewes and growth rate of lambs are constant as well as hereditary characters of a certain breed, but these characters are considerably dependent on well-organized mating of sheep, feeding and housing conditions, individual traits of an animal, age and other factors. The influence of the dam's age and lambing season on the litter size as well as weight gains of lambs are shown in Tables 1 and 2.

Table 1**. The effect of dam age on litter size and weight of lambs**

Item	Groups of ewes			
	1-1.5 year of age (n=66)	2-4years of age (n=448)	5-7 years of age (n=462)	8 years and older (n=444)
Litter size	1.05 ±0.03	1.30 ±0.02	1.46 ±0.03	1.32 ±0.02
Weight of newborn lamb, kg	3.31 ±0.15	3.86 ±0.08	3.97 ±0.09	3.99 ±0.08
Weight of weaned lamb, kg	23.64±1.37	25.86±0.77	25.82±0.78	25.90±0.86
Daily gain, g	151	163	162	162

Table 2**. The effect of lambing season on litter size and weight of lambs**

Item	Lambing season	
	Winter (n=1021)	Spring (n=389)
Litter size	1.38 ±0.02	1.25 ±0.02
Weight of newborn lamb, kg	3.94 ±0.05	3.74 ±0.09
Weight of weaned lamb, kg	26.15±0.53	23.36±0.91
Daily gain, g	165	145

Table 1 indicates that ewes from 5 to 7 - year old were most fertile and their litter size was by 0.4 lamb (39.0%) higher than that of 1 to 1.5 – year old ewes ($P<0.001$) and by 11.5% higher than that of 2 to 4, 8 and over 8 – year old ewes. Besides, older ewes dropped 0.6 kg (17.8%) heavier lambs compared with the young ones ($P<0.001$), and at weaning their lambs also weighed by 2.3 kg (9.7%) more ($P<0.001$).

The data in Table 2 indicates that ewes lambing in winter were by 10.4% more fertile than those lambing in spring ($P<0.01$). Besides, winter lambs were by 0.2 kg (5.3%) and 2.8 kg (11.9%) heavier, at birth and weaning respectively ($P<0.01$) than spring lambs.

The analysis of death causes of Lithuanian Blackface lambs before weaning with respect to their sex, weight and lambing season over the period of the last five years is presented in Tables 3, 4 and 5.

Table 3 indicates that 70.8% of lambs were born in winter and 29.2% in spring. Though the ratio of newborn female and male lambs was similar, yet the death rate of male lambs before weaning was almost thrice higher than that of female lambs. The average annual death rate at the breeding centre was 15.5% of lambs that weighed at birth by 0.2 kg less than those surviving.

Table 3**. The effect of lambing season, sex and weight on survival of lambs**

Item	Lambing season		
	Winter	Spring	Total
No of lambs born	864	357	1221
Including: females	446	172	618
males	418	185	603
Weight of newborn lamb, kg	4.04	3.88	3.96
Including: females	3.97	3.82	3.90
males	4.11	3.94	4.03
No of dead pre-weaned lambs	134	55	189
Including: females	38	12	50
males	96	43	139
Weight at birth of dead lambs, kg	3.78	3.70	3.74
Including: females	3.50	3.32	3.41
males	3.90	4.07	3.99
Weight at birth of surviving lambs, kg	4.07	3.82	3.95
Including: females	4.02	3.78	3.90
males	4.13	3.87	4.00
Mortality rate	15.51	15.41	15.48
Including: females	8.52	6.98	8.09
males	22.97	23.24	23.05

Table 4 **. Ratio of born and dead lambs according to lambing season, litter size, sex and weight**

Weight of newborn lambs, kg	Winter lambs				Spring lambs			
	single		twins		single		twins	
	males	females	males	females	males	females	males	females
1.6-2.0	4/2	2/1	7/3	6/1	2/1	2/1	3/1	5/2
2.1-2.5	2/1	4/2	1/0	6/1	-	1/0	-	1/0
2.6-3.0	21/8	24/3	96/23	91/11	14/4	11/2	4/1	6/0
3.1-3.5	15/5	16/2	18/4	30/2	12/3	13/1	6/2	13/1
3.6-4.0	51/10	71/5	53/12	63/6	22/5	28/2	9/2	18/1
4.1-4.5	26/5	49/1	28/5	23/2	24/5	25/1	29/5	16/0
4.6-5.0	39/6	29/0	17/4	13/1	20/4	6/0	11/2	8/0
5.1-5.5	17/3	9/0	12/4	3/0	19/5	7/0	5/1	4/1
5.6-6.0	5/1	6/0	1/0	1/0	2/1	3/0	3/1	2/0
6.1 ir >	4/0	-	1/0	-	-	2/0	-	1/0
Total	184/41	210/14	234/55	236/24	115/28	98/7	70/15	74/5

Table 5**. Death rate of lambs till weaning according to lambing season, litter size, sex and weight**

Weight of newborn lambs, kg	Winter lambs				Spring lambs			
	single		twins		single		twins	
	males	females	males	females	males	females	males	females
1.6-2.0	50.0	50.0	42.9	16.7	50.0	50.0	33.3	40.0
2.1-2.5	50.0	50.0	0.0	16.7	-	0.0	-	0.0
2.6-3.0	38.1	12.5	24.0	12.1	28.6	18.2	25.0	0.0
3.1-3.5	33.3	12.5	22.2	6.7	25.0	7.7	33.3	7.7
3.6-4.0	19.6	7.0	22.6	9.5	22.7	7.1	22.2	5.6
4.1-4.5	19.2	2.0	17.9	8.7	20.0	4.0	17.2	0.0
4.6-5.0	15.4	0.0	23.5	7.7	20.0	0.0	18.2	0.0
5.1-5.5	17.6	0.0	33.3	0.0	26.3	0.0	20.0	25.0
5.6-6.0	20.0	0.0	0.0	0.0	50.0	0.0	33.3	0.0
6.1 ir >	0.0	-	0.0	-	-	0.0	-	0.0
Mean	22.3	6.7	23.5	10.2	24.3	7.1	21.4	6.8

In order to analyse the causes of death more precisely, all lambs were grouped according to the birth weight at an interval of 0.5 kg. Twin lambs were grouped apart. The analysis indicated that lambs of 3.5 to 5.0 kg birth

weight had the highest survival rate. Furthermore, the death rate for both winter and spring lambs was similar. However, the death rate of spring twin male lambs was by 3.0% lower than that of single male lambs, and the death rate of winter twins was by 1.0% higher. Meanwhile, the death rate of single and twin female lambs born in spring was almost the same, but the death rate of twin female lambs born in winter was by 3.5% higher than that of single female lambs.

Discussion and conclusions. The study indicated that the reproductive performance of Lithuanian Blackface sheep raised at the state enterprise "Šeduvos avininkystė" was very similar to that of sheep on other farms. Although the number of sheep in the flocks on private farms is considerably lower, the survival rate of lambs is almost the same (88 to 80%) and most of ewes drop lambs in February and March.

* It can be concluded that it is most expedient to mate Lithuanian sheep at the end of summer (in order to have winter lambing) and to keep higher number of 4 to 6 – year old ewes in a flock.

* Ewes should be mostly cared about at the second half of pregnancy (100 days) so that vital lambs of 3.5 to 5.0 kg weight were born.

References

1. Anderson M. L., Harvey M. L., Visscher A. H. et. al. The effect of genotype, year, environment and dams age on litter size and birth weight of highly fecund lambs. Proceedings of the 49th Annual Meeting of the European Association for Animal Production (EAAP). Warsaw, 1998. 6 p.
2. Burgkart M. Praktische Schafhaltung. München: BLV Verlagsgesellschaft, 1987. S. 48-65.
3. Rieder H. Schafe halten. Stuttgart: Ulmer, 1989. S. 9-82.
4. Šveistienė E. Lietuvos juodgalvės avys. Žinynas. Vilnius: Mokslas, 1988. P. 33-38.
5. Zapasnikienė B. Lietuvoje auginamų avių veislės ir jų perspektyva. Vilnius, 2001. 16 p.
6. Zapasnikienė B. The influence of season and frequency of lambing on fertility and progeny weight of Lithuanian lacal coarsewooled sheep. Proceedings of the 7 th Baltic animal breeding conference. Tartu, 17-18 April 2001. P. 188-190.
7. Zuchtreport 2000 des Landes Mecklenburg-Vorpommern. Landesforschungsanstalt Mecklenburg-Vorpommern, 2001. S. 131-161.
8. Васильев Н. А., Целютин В. К. Овцеводство и технология производства шерсти и баранины. Москва: Агропромиздат, 1990. С. 172-259.
9. Козы и овцы. Разведение. Выращивание. Использование продукции. Ростов-на Дону: Проф-пресс, 1999. С. 105-158.
10. Козы, овцы. Разведение и уход. Москва: Вече, 2001. С. 5-87.
11. Методы определения параметров продуктивности овец. Москва, 1984. 32 с.
12. Хамицаев Р. С., Калабаев З. М. Что влияет на сохранность ягнят. Овцеводство. Москва: Агропромиздат, 1990. №. 4. С. 33-34.

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