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PRODUCTIVITY OF THE TSIGAI SHEEP BREED UNDER DIFFERENT FEEDING REGIMENS

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ABSTRACT: In the present study, the influence of levels of feeding on the formation and development of economic and commercial traits of the Tsigai breed was studied in the conditions of the southern steppe of Ukraine. The research was conducted on purebred sheep from birth to 14 months of age. For this purpose, 2 groups of 3.5-4 years old ewes of the first class were selected with 40 heads in each class. It was established that poor feeding of ewes (experimental diet and below standard nutritional levels) and their offspring at the early stage of ontogenesis had a negative effect on the formation and growth of productive qualities of lambs, means of live weight and wool productivity indicators. Qualitative and quantitative indicators of wool were better in ewes obtained from mothers of the control group (who received a balanced diet in accordance with the standard of feeding). Advantage in length of wool at 12 months age was 29.3%, shearing of unwashed wool (26.7%), washed (26.5%), strength of wool at 4 months of age (10.5%), and in the 14th month aged was 5%. The improvement in housing and nutrition conditions in the control group proved that the counts were better and this had a very positive effect on the productivity of the sheep. In conclusion, full-fledged feeding of ewes of the Tsigai breed ensured good development of offspring at all stages of ontogenesis and contributed to the birth of healthy, viable lambs that are capable of high productivity. Any decline in nutrients of Tsigai sheep breed (from standards of commercial formula) can cause considerable deficiency in productivity of animals.

Keywords: Feeding, Live weight, Local breeds, Productivity, Wool quality.

INTRODUCTION

One of the most important tasks of the agro-industrial complex of Ukraine is the production of high-quality food products, in particular, meat and milk (multi-purpose animal breeding) (Chemerys et al., 2020). In this regard, the role of the sheep breeding industry, which produces milk, meat, and fat, is growing significantly (Peshko, 2022). Sheep breeding has no equal in terms of the variety and uniqueness of the products obtained from it and the ability to effectively produce (Kitayeva and Novichkova, 2023). The successful development of global sheep breeding and its competitiveness are largely determined by increased attention to meat and dairy productivity (Zygoyiannis, 2006; Pulina et al., 2018). With an almost constant level of wool production in the world over the past 12 years, the production of meat and sheep milk has increased by 70-80% (Ulyanov et al., 2011).

Currently, the economic value of various types of sheep products has changed in a positive direction (Duisebayeva, and Campbell, 2023; Bessell et al., 2023). In the fattening sheep industry, the focus is on the production of lambs, which account for more than 90% of the industry's total production value, of which up to 80% are lambs of the current year of birth (Erokhin et al., 2012).

The meat productivity of sheep is an integral indicator of signs caused by morphological, genetic, climatic and other factors and individual characteristics of animals (Tibbo, 2006). The main factor that determines the level of productivity of any breed of sheep is complete feeding, which leads to the receipt of high-quality products, better and more complete realization of genetically embedded high productivity and an increase in the period of economic use of animals. Improving the nutrition of sheep's diet by 30% and enriching it with mineral additives helps to increase the meat productivity of young sheep (Omarov, 2016).

At the current prices for wool and mutton and the actual costs of keeping animals, sheep breeding can be competitive due to increased fertility (Kosgey, 2004). Fertility is evidenced by the fact that different breeds have different fertility of ewes. But phenotypic factors also have a great influence on the fertility of sheep, as a result of which the

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coefficient of inheritance of fertility is very low, only 10-20%, since twin sheep more often give birth to twins compared to identical sheep, which characterizes the hereditary condition of multiple fertility (Zeitoun et al., 2020). Thus, in order to obtain a high commercial profit from sheep breeding, it is desirable to use large ewes in order to improve the reproduction of the herd (Hamilton and Hamilton, 2002). The high percentage of lamb mortality from birth to weaning leads to significant losses. There is a certain relationship between the live weight at the birth of lambs and their mortality. If at the birth of merino lambs with a live weight of less than 1.8 kg, 65% of the lambs mortality, then at the birth of 1.8 to 2.7 kg, about 3.5% die, and from 3.6 to 4.0 kg, only 4.0%. If the weight of lambs at birth in mothers of thin-wool breeds significantly exceeds 4.0 kg, then their mortality increases again (Filatov, 2016). The adaptation of their mothers (ewes) to the natural, climatic and geographical conditions of the breeding area is of great importance in the preservation of lambs (McManus et al., 2014; Zokabend Konig et al.., 2016). The main factor restraining the growth of animal productivity is the imbalance of their diets in terms of basic nutrients.

In practice, the quality of feeding is achieved by improving the quality of feed, improving the structure of rations and enriching them with complex protein and biologically active feed additives (Salem and Smith, 2008). In this regard, the use of non-traditional feed additives in feeding, which contain the main nutrients in an optimal ratio, deserves attention (Romero-Huelva et al., 2017; Chisoro et al., 2023; Dida et al., 2023).

Along with the need to optimize feeding, which involves providing the diet with a sufficient level of energy, protein, minerals, and vitamins, the negative impact of feeding poor-quality feed contaminated with xenobiotics is noted in animal husbandry practiceAt the same time, the processes of digestion and absorption of fats, proteins, carbohydrates, and vitamins are not disturbed, the regenerative potential of body tissues increases, and immunity is strengthened (McDowell, 2000).

In this regard, polyunsaturated fatty acids (PUFA) content is higher in pasture-fed lambs supplemented with green ryegrass compared to lambs fed soybean meal. Feeding weaned Awassi lambs with hydroponic barley for 3 months showed a positive effect on feed intake, body weight gain, absolute and average daily live weight gain, and feed conversion compared to lambs that received a diet without hydroponic barley. The introduction of alfalfa hay into the diet of lambs at the rate of 300 g per head per day not only increases growth indicators, but also improves the physical parameters of the carcass and the quality of lamb meat (Ibrahim et al., 2016).

Tsigai sheep is a Slovakian-Hungarian milk-meat-wool breed of sheep (Krupova et al., 2009; Kusza et al., 2010). Tsigai sheep mature early, graze well and are fattened. This breed is well adapted to year-round grazing and to extreme climatic conditions (mountains, frost), and is also capable of running hundreds or thousands of kilometers. In order to increase the meat productivity of young sheep of the Tsigai breed, it is very important to study its reaction to different levels of feeding during ontogenesis (Angelow et al., 2011).

Due to the fact that animals of different breeds react differently to these conditions, the study of the influence of different levels of feeding on the development of productive traits in the Tsigai breed in the conditions of the southern steppe of Ukraine is relevant and important for increasing the efficiency of lamb and young lamb production and needs research in this direction.

The purpose of the research is to study the growth of live weight and indicators of wool productivity of the Tsigai breed under different levels of feeding at the early stage of ontogenesis.

MATERIALS AND METHODS

The research was conducted on a private farm the "Rozdilnianske" sewage treatment plant of the Rozdilnian district of the Odesa region of Ukraine, and it was in according to ethical regulation of “Odesa State Agrarian University” for animal behavior.

Two groups of ewes of the Tsigai breed of the first breeding class, 3.5-4 years old, 40 heads in each, were formed. Groups were formed according to the principle of analogues, taking into account productivity, class, body weight, the nature of the wool cover, wool shearing and exterior and constitutional features.

The feed of the experimental and control groups differed in total nutrition, digestible protein and mineral substances. The control group of ewes received a balanced diet in accordance with the standard of feeding of ewes, which contained 1.35 feed units and 135 g of digestible protein, 15 MJ of exchangeable energy. The experimental group of ewes received a ration that was below the norm in terms of total nutrition by 11.5%, in digestible protein by 27.5%. In the period from 20 days of age to weaning at 4 months of age, lambs obtained from ewes of the control and experimental groups were fed with flattened oats in the amount of 50 to 100 g per head/day, depending on age. Feeding with table salt and chalk at will, as well as hay of good quality.

The lambs obtained from the ewes of the experimental and control groups were raised in the same conditions of keeping by the pen-based method before weaning, and after weaning, they were grazed on natural pastures and fields after the harvest of grain crops in the summer, and in the winter - by the stall method with provision of ration feeding, balanced in total nutrition, digestible protein and minerals. It contained: 1.12 feed units, 115 g of digestible protein, 12.0 MJ of exchangeable energy. After weaning and up to 14 months of age, lambs born from ewes in the control group were additionally fed concentrates to the main diet at the rate of 200 g of crushed barley per head/day. Lambs born from ewes in the experimental group were not given concentrates. During the research, the growth and development of the offspring of ewes was studied by determining the variability of their live weight, qualitative and quantitative indicators of the wool

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cover, namely: length, thickness, strength, shearing of wool in physical mass and washed fiber, and the yield of washed fiber. Research was conducted according to generally accepted methods. The digital material was processed by the method of variational statistics according to Plokhinsky (1969) using a computer.

Statistical analysis

The main task that the researcher solves using the methods of biological statistics is to draw conclusions about the properties of the general discovery based on the study of the selective discovery. Basic formulas were the power and structural averages (Efimova, 2015). Power compounds were mixed based on the general formula: M = [∑ Xi k n] 1⁄k or $M = \sqrt{\sum}$ Xi k, Where M is the average value, xi – contacts (date), n – sample size, k – type comparisons, k = 1 – arithmetic mean, k = 2 – arithmetic mean.

The coefficient of variation (CV) is an indicator of the degree of variability of a characteristic, used to compare the characteristics of variability in different variation series: $CV = \sigma X \cdot 100$ %, where the standard deviation (σ) serves as the main indicator diversity of a trait in a group.

Method of analysis

1. Find the arithmetic mean value of the characteristic in the group using the formula: $x = (x_1 + x_2 + \ldots + x_n)/n = \sum x_1/n$ where ∑ is sum sign, x is value option and n is number of animals.
2. Find the standard deviation in this group using the formula: $\sigma = \sqrt{\frac{\Sigma(x_1 - \bar{x})^2}{n}}$
3. Find the coefficient of variation using the formula: CV= (SD/xbar) * 100.
4. Find the error of the arithmetic mean: Sx-m (we indicate in tables Sx): $m = \pm \frac{\sigma}{\sqrt{n}}$

Reliability of sample data

To determine the reliability of sample data, it is necessary determine three statistical quantities: statistical error (m), reliability criterion (t) and probability (P). I determined the confidence level (P) from the table

Student (T Student test)

Table with critical values of Student's t-Distribution shows confidence levels of values probability (P) and at the same time critical values of significance levels (p), therefore, the value of the confidence probability 0.95 (95%) corresponds to the critical value of the significance level.

0.05 (5% X respectively P0.99 (99%) = p0.01 (1%); P0.999 (99.9%) = p0.001 (0.1%)

Reliability scale according to Plokhinsky: not reliability NS: P>0.05, reliable**: P<0.01, high reliability, ***: P<0.001.

RESULTS AND DISCUSSION

In order to achieve the set goal, it was planned to solve the following tasks of A) investigating the completeness and balance of rations for ewes and lambs obtained from them in the period of ontogenesis after weaning; B) determining the conditions for keeping newborn lambs before and after weaning from their mothers; C) determining the live weight of newborn lambs and the dynamics of its variability in the process of ontogenesis up to 14 months of age; D) carrying out calculations of the absolute increase in the live mass of the young at all stages of ontogenesis from birth to 14 months of age; E) evaluating the indicators of wool productivity of lambs at different levels of feeding; and F) establishing the effect of more than the normalized feeding of lambs on the formation and development of productive traits.

When studying the growth and development of lambs of the Tsigai breed from birth to 14 months of age, which received different levels of feeding both in the intrauterine and post-uterine periods of growth, it was established that their growth and development is significantly influenced by full feeding. Thus, in the ewes of the control group, which received a complete balanced diet during the period of contraction, the lambs received a sufficient amount of nutrients during the period of intrauterine development, as a result of which they developed significantly better than the lambs of the experimental group of ewes, which did not receive a sufficient amount of nutrients in an unbalanced diet. The live weight of lambs at birth testifies to the effect of different levels of feeding of ewes on the intrauterine development of the fetus (Table 1). Those lambs that received complete feeding during the early period of ontogenesis achieved live weight indicators for the first class by 10 months of age, and those that did not receive complete feeding did not reach this indicator even at 14 months of age. Their live weight was 1.95 kg, or 5.7% less than the requirements of the first class when scoring the young of the Tsigai breed. The live weight of lambs obtained from ewes of the control group was greater than that of the lambs of the same age from mothers of the experimental group from 0.5 kg or 18.2% at birth to 16.7 kg or 52.2% at 14 months of age). Lambs obtained from control ewes also had higher growth intensity (Table 2).

Therefore, lambs that received complete feeding during ontogenesis had a significant advantage in absolute live weight gain compared to lambs that were raised at a low level of feeding. During the period from birth to 4 months of age, the lambs obtained from ewes of the control group exceeded the lambs obtained from ewes of the experimental group by 14.13 kg or 2.2 times. However, in the future, lambs obtained from ewes of the experimental group intensively

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gained growth speed, and their absolute increase in live weight from 4 to 6 months of age was greater by 2.38 kg or 67.0% than that of animals obtained from ewes. control group.

Table 1 - Age-related variability of live weight of lambs, kg

Lambs received from mothers / Age (month)	Control group			Research group		
	N	X±Sx	CV, %	N	X±Sx	CV,%
At birth	20	3.25±0.090***	13.9	20	2.75±0.105	16.6
1	20	9.31±0.290***	13.3	20	6.19±0.211	14.9
2	20	15.57±0.446***	2.5	20	8.78±0.294	14.6
4	19	28.60±0.605***	14.7	18	13.97±0.748	23.3
6	19	28.15±0.647***	13.6	18	19.90±0.888	19.4
8	19	29.80±0.933***	13.6	18	23.05±0.723	13.7
10	19	36.20±1.166***	14.0	18	25.35±0.519	8.9
12	19	39.80±1.176***	12.8	18	27.15±0.454	7.3
14	19	48.80±1.208***	11.2	18	32.05±0.573	7.8

Not significant (NS): P>0.05, **: P<0.01, ***: P<0.001

Table 2 - Differences in the live weight of lambs (kg)

Lambs group / Growth period (month)	Control group		Research group	
	N	X±Sx	N	X±Sx
0 - 4	20	25.35±0.347***	20	11.22±0.426
4 - 6	19	3.55±0.626	18	5.93±0.818*
6 - 8	19	2.65±0.790	18	3.15±0.808
8 - 10	19	6 .30±1.049**	18	2.30±0.621
10 - 12	19	3.70±1.171	18	1.80±0.486
12 - 14	19	8.90±1.192**	18	4.90±0.513
0 - 14	19	45.55±0.649***	18	29.30±0.339

Not significant (NS): P>0.05, **: P<0.01, ***: P<0.001

Table 3 - Age-related dynamics of the length of the lambs depending on the level of feeding.

Lambs group / Age (month)	Control group			Research group		
	N	X±Sx	CV, %	N	X±Sx	CV, %
At birth	20	0.4±0.020	20.5	20	0.4±0.021	25.6
1	20	1.1±0.064	24.7	20	1.1±0.108	44.0
2	20	2.5±0.077***	13.1	20	1.9±0.145	32.6
4	19	3.8±0.076**	18.8	18	3.4±0.097	12.4
6	19	4.9±0.307NS	27.6	18	4.0±0.246	26.8
8	19	5.7±0.341NS	25.9	18	4.7±0.224	20.8
12	19	7.5±0.345***	20.2	18	5.8±0.209	15.5
14	19	9.8±0.360NS	10.1	18	8.8±0.150	17.4

Not significant (NS): P>0.05, **: P<0.01, ***: P<0.001

The period from 4 to 8 months of age is stressful for lambs. During this period, they stop receiving mother's milk and switch to a new type of feeding and independent living conditions, separated from their mothers. Their body adapts to new, unfamiliar conditions of keeping and feeding. Each animal reacts differently to such living conditions, which largely depends on the individual characteristics of the animals.

Ewes obtained from ewes of the control group, despite the fact that before weaning had higher indicators of live weight and absolute growth, after weaning felt the negative impact of stress more strongly and reacted to it by decreasing the rate of growth of live weight, which affected the indicators of its absolute increase. During the growth period from 8 to 10 months of age, lambs obtained from ewes of the control group prevailed over lambs obtained from ewes of the experimental group by 4.0 kg or 2.7 times in absolute live weight gain. This advantage was preserved during the early and subsequent periods of individual growth. During the period of growth from 12 to 14 months of age, their absolute growth increased compared to the bright ones obtained from ewes of the experimental group by 4.0 kg or by 81.6%, and during the entire period of rearing from birth by 14 months of age by 16.25 kg or by 55.4%.

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In small ruminant, in the process of individual development, with increasing age, the intensity of growth processes decreases, but this does not happen uniformly and periodically (Hoffman and Valencak, 2020). A period of temporary growth retardation is followed by a period of increased growth of tissues, organs and the entire body of the animal. Irregular growth with insufficient supply of nutrients to animals leads to uneven growth and development of various organs and tissues (Lawrence et al., 2012). This is due to the reproductive capacity of ewes, when during the period of confinement they must use part of the nutrients for the growth and development of their fetus, and after lambing - for the production of milk. With unsatisfactory feeding, they produce a smaller amount of products with worse technological qualities, in according to Blache et al. (2008) and Ochoa Cordero et al. (2019).

The wool productivity of sheep is affected by many factors, one of which is feed or dietary regimen (Hynd and Masters, 2002). Thus, present research has confirmed that the length of the wool in the Tsigai breeds depends on the level of providing them with nutrients and minerals. Brights obtained from ewes of the control group at all age periods of growth had longer wool than brights obtained from ewes of the experimental group (Table 3).

The given data are in the table 3 showed that up to one month of age, there were no differences in the length of the wool between the bright ones obtained from the mothers of the control and experimental groups. A statistically significant difference with varying degrees of probability was observed only after 2 months of age. A high degree of probability of the difference in wool length was found in lambs of the control group at 2- and 12-months of age and was 0.6 cm or 31.5% and 1.7 cm or 29.3%, respectively. In other age periods of growth of lambs, the difference in wool growth in length ranged from 0.4 to 1.0 cm or from 11.3 to 22.5% at .

Differences in the length of wool in the ewes obtained from ewes of both groups became significant after one month of age, when they began to receive supplementary feeding which is in agreement with Behrendt et al. (2011) in merino breed. This indicates that feed intake and nutrient absorption in ewes from control ewes were better than ewes from experimental ewes, and receiving additional nutrients with concentrated feed after weaning contributed to better growth wool in length. This is also due to the fact that the foals obtained from mothers who received balanced, complete nutrition during the gestation period had better conditions for development even in the fetal period and were born more viable and developed. Inadequate feeding also contributed to lower milk yield of ewes, as a result of which the development of their offspring was worse compared to the offspring of ewes that received complete feeding.

Production verification of the received data confirmed the results of our research. For this, two groups of lambs grown at different levels of feeding were individually evaluated. One group of lambs was grown in all periods of individual development on balanced rations, and the second received a ration below the norm in terms of total nutrition by 11.5%, and in terms of digestible protein by 27.5%. The results of the research showed that lambs, which received a ration below the norm, had shorter wool length compared to lambs, which received full feeding. Lambs that received a ration below the norm had a shorter length of wool by 1.7 cm or 22.67% compared to lambs that received full feeding. The lambs of wool in the length of the lambs of both groups, although there were significant differences, was not statistically significant. Taking into account the fact that wool longer than 5 cm is used for the production of worsted yarn, the length of wool of the evaluated sizes of both groups meets the requirements of the textile industry.

The level of animal feeding affects not only the growth of wool in length, but also the mass of wool and its quality indicators, that is, wool productivity (Table 4).

Table 4 - Qualitative indicators of wool of lambs

Lambs group / Indicators	Control group		Research group	
	X±Sx	CV, %	X±Sx	CV, %
Wool shearing, kg	7.5±0.345	20.2	5.8±0.209	15.5
Physical mass	3.60±0.108	13.3	2.84±0.198	29.1
Washing fiber	1.62±0.036	22.2	1.28±0.019	54.4
Strength, km (breaking length)	9.19±0.157	7.5	8.75±0.123	6.1

Table 5 - The thickness of the wool of lambs depending on the level of feeding

Wool thickness / The level of feeding		According to the norm		Below the norm	
Mkm	Quality	Heads	%	Heads	%
14.5 – 20.5	80 - 70	-	-	4	22.2
20.6 – 25.0	64 - 60	5	26.3	3	16.6
23.1 – 27.0	58 - 56	10	52.6	8	44.4
27.1 – 31.0	50 - 48	3	15.8	2	11.2
31.1 – 40.0	46 - 44	1	5.3	1	5.6
Total	-	19	100	18	100

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Table 6 - Shearing of wool of lambs depending on the level of feeding (kg)

Control group / The level of feeding	Physical mass	Washing fiber
According to the norm, (n = 200) Below the norm: (n = 225)	3.04±0.052	1.62±0.036***
Fodder units on 11.5% Digestive protein on 27.5%	2.73±0.112	1.28±0.019

Not significant (NS): P>0.05, **: P<0.01, ***: P<0.001

Table 7 - The thickness of the wool of lambs depending on the level of feeding

The level of feeding / The thickness of the wool		According to the norm (n=200)		Below the norm 11.5% for feeding unit 27.5% protein (n=225)	
Mkm	Quality	Heads	%	Heads	%
14.5 – 20.5	60	2	1.0	2	0.9
20.6 – 25.0	58	14	7.0	47	20.9
23.1 – 27.0	56	65	32.5	101	44.9
27.1 – 31.0	50	95	47.5	63	28.0
31.1 – 40.0	48	24	12.0	12	6.3
Total	-	200	100	225	100

Wool shearing in the physical lambs of the control group's lambs was 0.76 kg or 26.7% greater than that of the experimental group's lambs, after shearing wool in the washed fiber was 0.34 kg or 26.5%. Under optimal feeding conditions, lambs is a predictive factor of herd productivity. But providing sheep with fodder in sufficient quantity in accordance with their physiological state and feeding norms is, unfortunately, a problem, especially in commercial herds, where their diets are unbalanced in terms of nutrients and minerals, which negatively affects wool productivity. The technological properties of wool fibers largely depend on their tensile strength, which primarily determines the wearability, durability and duration of use of woolen products. The strength of wool in litters obtained from the mothers of the control group was higher than that of their peers from the mothers of the experimental group. The wool strength of the lambs of the control group is greater than that of the lambs of the experimental group by 0.44 km of breaking length or 5.0% than that of the lambs of the experimental group. In all age periods, the tensile strength of wool met the requirements of semi-fine wool. The technological properties of wool are also determined by its thickness. The thickness of wool is influenced by breed, age, individual characteristics, as well as the conditions of feeding and keeping sheep. The thickness of the wool of the furrows obtained from the ewes of the experimental group in the upper growth zone had a greater tendency to thin than the furrows obtained from the control group of ewes (Table 5).

Fluctuations in the thickness of the wool in the experimental group were in the range from 14.5 to 40.0 μm or from 80 to 44 quality, while in the animals of the control group, the fluctuations in the thickness of the wool were in a much smaller range (from 20.6 to 40.0 μm or from 60 to 46 qualities. The largest number of animals in the control group (14 heads or 73.7%) had the thickness of wool characteristic of sheep of the Tsigai breed, and among the animals of the experimental group, 11 heads or 61.2%, respectively. 64 qualities (20.6 - 23.0%) in the control group was only 5.3% (1 head), and in the experimental group (3 heads or 16.6%). In addition, among the pits of the experimental group there were 4 heads or 22. 2% of animals with a wool thickness of 14.5-20.5 microns or 70-80 qualities, while in the control group there were no animals with this wool thickness.

Greater thinning of the wool in the animals of the experimental group is caused by the fact that during the embryonic development period, when the laying and formation of hair follicles took place, as a result of unsatisfactory feeding of the mothers (McGrice, 2010; Scoobie et al., 2015), the formation of wool fibers was unsatisfactory due to insufficient supply of nutrients, and since lambs are born overgrown with length wool cover up to 1-1.5 cm, then, based on the patterns of wool growth, the upper zone of the wool feels the greatest negative impact of unsatisfactory and inadequate feeding of the mother during pregnancy, which affected the thickness of the wool of the fetus by thinning wool fibers. This finding is in agreement with Scobie et al. (2015).

In the postnatal period of lamb development, their mothers (ewes) were provided with the same complete and balanced diet, and the lambs themselves, in addition to mother's milk, were fed with concentrates, which contributed to better wool growth in thickness. Therefore, providing animals with a sufficient amount of nutrients contributes to a better supply of them to the hair follicles, as a result of which the genetically determined thickness of the wool characteristic of Tsigai sheep is manifested. Thus, when good feeding conditions are created, the difference in wool thickness is leveled.

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However, the tendency to produce finer wool fibers still persists in previously underfed animals. The results of the production inspection of our research on the influence of different levels of maternal feeding on the wool productivity of the offspring, which was carried out on a large herd, are shown in Tables 6 and 7. Wool shearing in the physical mass of lambs that received complete feeding was greater by 1.42 kg (87.6%), and in washed fiber by 1.45 kg or 2.1 times compared to bright ones grown on a low level of nutrition.

The obtained data indicate that the normalized feeding of lambs contributed to the growth of a woolen coat with a thickness characteristic of sheep of the Tsigai breed. Thus, the largest number of lambs (184 head or 92%), whose feeding was carried out according to the norm, had a wool thickness of 48-56 qualities. Only 176 heads, or 78.2%, had this thickness of wool in the group of lambs that were grown on an inferior diet. In addition, in this group of animals, 49 heads or 2.2% had a thickness of wool of qualities 58-60, which is not typical for Tsigai sheep, which indicates a thinning of the wool fibers. Therefore, high productivity of sheep is possible only if the animals are provided with full nutrition.

CONCLUSION

Full-fledged feeding of ewes of the Tsigai breed ensures good development of offspring at all stages of ontogenesis and contributes to the birth of healthy, viable lambs that are capable of high productivity. Complete feeding of ewes could have helped to increase the live weight of offspring at birth: lambs by 0.5 kg or 18.2%, and rams by 0.45 kg or 12.9%. Feeding 200 g of crushed barley in addition to the diet contributes to an increase in the live weight of lambs at the age of 14 months by 16.7 kg or 52.2%, the absolute increase in live weight by 16.25 kg (55.4%). Balanced feeding of lambs could have helped to increase the length of wool at the age of 12 months by 1.7 cm (29.3%), shearing of washed wool by 0.34 kg (26.5%), and strength wool by 0.44 km of breaking length (5%).

DECLARATIONS

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Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Authors' contribution

All authors have seen and confirmed the authenticity of all the raw data and contributed equally to the details of this manuscript.

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Not applicable.

Competing interests

The authors declare no competing interests in this research and publication.

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