

Age-Specific Meat Productivity of Young Edilbay Sheep



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Abstract: Among breeds of sheep meat-greasy directions productivity one of the prospective is edilbaevskoy breed. Due to the high maturing-STI, meat productivity and adaptability to arid conditions edilbaevskoy sheep are the most competitive. Young sheep are characterized by high slaughter qualities, especially lambs, slaughtered at an early age. This makes it possible to use them to produce high-quality lamb (lamb). The article analyzes the regularities of growth and development of young edilbaevskoy breed, it is established that the chemical composition of mutton affect the breed, age, sex, fatness, conditions of co-holding. With the age of animals at slaughter yield increases. Thus, the increase in slaughter yield in the period from 2 to 4 months of age was 2.9%, from 4 to 7 months of age was 4.5%, from 7 to 10 months of age – was 6.7%, from 10 to one year of age-the increase was 1.6%. And for the entire period of cultivation from birth to one year of age - the increase in slaughter yield was 10.7%. A positive correlation was established between the pre-slaughter live weight of animals with total protein in blood serum at 4-month age it was 0.54, and at 7-month - 0.51. Studies have found that the strongest correlation with a high level of reliability ($P > 0.99$) is between total protein, albumins and pre-slaughter live weight at 4 months of age. A globulin fraction of proteins has no significant correlation with the live weight of rams in different periods of growth ($P > 0.99$). Consequently, with increasing concentration of total protein in serum increases pre-slaughter live weight. Thus, in order to obtain mutton, complete in biochemical and morphological composition and in high demand on the market, it is recommended to slaughter sheep of the edilbaevsky breed at the age of 4 months when they reach a live weight of at least 40 kg and a carcass weight of at least 16 kg.

Keywords : About four key words or phrases in alphabetical order, separated by commas.

I. INTRODUCTION

In modern times, the priority task of the agro-industrial complex of the Russian Federation is to develop meat resources and provide population with meat products according to scientifically based nutritional standards.

Therefore, one of important state tasks is production of high-quality lamb that is not inferior to beef with respect to protein, amino acids, vitamins and minerals.

In lamb fat, cholesterol is significantly lower than in beef or pork fat [3, 5]. To solve the problem of expanding production and improving the quality of lamb, it is necessary to increase the population of specialized meat sheep breeds. The Edilbay breed is one of the most promising meat and fat sheep breeds.

Due to their high earliness, meat production and adaptability to arid conditions, Edilbay sheep have become the most competitive breed in recent years [1, 6].

The meat production is determined not only by genetic factors, but also by the conditions of keeping and feeding, as well as the age of animals at slaughter.

Young lamb is one of the best types of meat. However, the difference in quality of lamb can be significant due to the age. The best quality meat is obtained from young animals at the age of up to one year. Then, intense fat deposition begins and results in fat mutton [2, 4].

The meat production and biological traits of sheep are developed during ontogenesis under the influence of genotypic and paratypic factors, so it can be predicted based on objective laws governing the development of meat production.

Edilbay sheep are noted for high earliness and reach 50% of the adult weight by weaning, which enables rams of this breed to be slaughtered at a young age.

The purpose and objectives of the research. The purpose of the scientific research was to study the characteristics of the meat production development of young Edilbay sheep in conditions of OOO Volgograd-Edilbay, Volgograd Region.

In this regard, the following tasks were set:

- to study and evaluate the meat production and quality of lamb obtained from young rams at different ages; and
- establish guidelines and extent of the relationship between blood biochemistry and meat production.

II. MATERIAL AND RESEARCH METHODS.

The following parameters were studied:

- meat production was studied on samples obtained from control slaughter in terms of the pre-slaughter live weight, weight of hot carcass, weight of fat tail and internal fat, slaughter weight and slaughter yield according to the VIZh method (1978) established by Ernst Federal Science Center for Animal Husbandry.

Biochemical parameters of rams at the age of 4 and 7 months were examined refractometricly and protein fractions were determined by paper electrophoresis.

All samples obtained were processed biometrically.

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The digital experimental data were processed by the variation statistics method to find significance of differences between indices compared, using Student's t-test adopted in biology and animal science by the Microsoft Excel software package. The statistical significance of the processed data is indicated by the corresponding designations, i.e. $P < 0.05$ *; $P < 0.01$ **; and $P < 0.001$ ***.

III. RESEARCH RESULTS AND DISCUSSION

The analyzed control slaughter results indicated an increase of age-specific indices characterizing the slaughter qualities of young animals.

Table 1 - Control slaughter results of rams of Edilbay breed

Parameter	Age, months					
	Newborn	2	4	7	10	12
Pre-slaughter weight, kg	6.0 ± 0.25	28.1 ± 0.53	40.15 ± 1.33	51.0 ± 2.02	62.5 ± 0.69	78.0 ± 0.98
Weight of hot carcass, kg	3.15 ± 0.07	11.7 ± 0.72	17.25 ± 0.85	23.0 ± 0.99	30.8 ± 0.66	36.9 ± 0.51
Weight of internal fat, kg	-	0.10 ± 0.01	0.125 ± 0.01	0.417 ± 0.01	1.27 ± 0.18	1.3 ± 0.08
Weight of fat tail, kg	-	1.64 ± 0.28	2.85 ± 0.22	4.6 ± 0.28	6.4 ± 0.12	11.1 ± 0.47
Slaughter weight, kg	3.15 ± 0.07	13.34 ± 0.26	20.23 ± 0.53	28.02 ± 0.77	38.47 ± 0.96	49.3 ± 1.80
Slaughter yield, %	52.5	47.5	50.4	54.9	61.6	63.2

The pre-slaughter live weight of rams increased 6.7 times, and the weight of hot carcasses increased by 14.1 kg or 5.5 times in the pre-weaning period (from birth to 4 months of age). The pre-slaughter live weight of rams increased 1.95 times, and the weight of hot carcasses increased by 19.65 kg or 2.1 times in the post-weaning period at the age of from 4 to 12 months. Over the period from birth to one year of age, the slaughter live weight of rams increased 13 times, and the weight of hot carcasses increased by 33.75 kg or 11.7 times.

The animals at 2 and 4 months of age showed no statistical significance with respect to the weight of internal fat that was 3.3 times greater in rams at 7 months of age than those at 4 months. The maximum content of internal fat was in the carcasses of rams aged 10-12 months.

A similar pattern was observed with respect to the weight of fat tail that increased with age by 1.2 kg or 1.7 times for the period of 2-4 months of age; by 1.75 kg for the period of 4-7 months and by 6.5 kg for the period of 7-12 months. Thus, the weight of fat tail increased by 9.5 kg or 6.8 times during the growing period from birth to one year of age.

The weight of hot carcass, internal fat and fat tail increased with age, so the slaughter weight did. The slaughter weight

increased by 17 kg or 6.4 times for the period of from birth to 4 months of age and by 7.8 kg for the period of 4-7 months of age.

An important indicator of slaughter qualities is the slaughter yield. The analysis of the control slaughter results of Edilbay sheep found that the slaughter yield increased with age, i.e. by 2.9% for the age period of 2-4 months, by 4.5% for the period of 4-7 months, by 6.7% for the period of 7-10 months, and by 1.6% for the period of from 10 months to one year of age. And for the entire growing period from birth to one year of age, the increase in the slaughter yield was 10.7%. The most important indicator of meat production is the morphological composition of carcasses.

With growth, muscle tissue develops unevenly and its most intensive gain was observed from birth to weaning and depended on feeding and fodder base (Table 2). Carcasses of rams aged 2 and 4 months contained 66.38—61.01% of muscle tissue, which made it possible to obtain high-quality lamb.

Table 2 - Morphological composition of carcasses of Edilbay sheep

Parameter	Age, months					
	Newborn	2	4	7	10	12
Weight of chilled carcass, kg	3.05 ± 0.14	11.45 ± 0.32	16.98 ± 0.47	22.3 ± 0.63	28.8 ± 0.35	35.6 ± 0.15
Relative weight, % of carcass weight						
Weight of muscles	64.53	66.38	61.01	60.5	60.42	55.45
Weight of fat	2.23	7.71	11.78	17.93	19.79	26.1
Weight of bones	30.16	22.92	22.3	17.11	16.32	15.17
Weight of other tissues	3.08	2.99	4.9	4.1	3.47	3.29

Growing animals were gaining fat; the most intensive fat deposition was observed after weaning. Chilled carcasses of one-year-old rams contained 26.1% of fat.

The varietal composition of carcasses is an important indicator of meat production, as the nutritional value of meat is not the same in different parts of the carcass. The greatest weight of first grade cuts in absolute and relative terms was registered in the carcasses of rams at the age period of up to 4 months. In addition to the morphological composition, the chemical composition of meat greatly influenced the carcass value (Table 3). The chemical composition of meat gives an idea of the maturity of meat and its biological value that depend on the ratio between protein, fat, minerals and water. calculated.

Table 3 – Chemical composition of lamb

Age, months	Parameter				
	Moisture content, %	Dry matter content, %	Protein content, %	Fat content, %	Ash content, %
4	67.44	32.56	18.37	13.63	1.22
7	62.0 ± 1.8	38.0 ± 0.58	18.7 ± 0.24	18.1 ± 0.1	1.2 ± 0.06

Table 4 – Protein quality indicator of lamb

Parameters	4 months	7 months
Tryptophan, mg/%	310.19 ± 1.96	311.0 ± 1.45
Oxyproline, mg/%	64.73 ± 0.97	66.0 ± 0.22
PQI	4.79	4.71

Table 5 – Biochemical blood parameters of rams (n=5)

Parameter	Age	
	4 months	7 months
Total protein, g/l	65.1 ± 0.25	64.87 ± 0.21
Albumins, g/l	34.12 ± 1.25	27.01 ± 0.53
Globulins, g/l	38.52 ± 0.32	33.15 ± 0.51

To optimize the costs of amino acid analysis of meat, only two amino acids are often determined – tryptophan (a dispensable amino acid) and hydroxyproline (an essential amino acid). Tryptophan is part of muscle fibers that consist of protein complexes; they are mostly high-grade proteins that are well absorbed by the human body. Hydroxyproline is a defective protein in connective tissue and is difficult for the human body to digest. There is a direct relationship between these two amino acids in meat, which is called the protein-quality indicator (PQI). A large amount of hydroxyproline and a small amount of tryptophan indicate tough meat with low biological value (Table 4).

Rams at the age of 4 months were noted for the highest BQI, which allowed us to confirm this lamb being full-value and well digestible.

Analyzing the foregoing, we can conclude that young sheep have high slaughter qualities, especially rams slaughtered at an early age, and make it possible to obtain high-quality lamb.

Proteins play an important role in life and body building of an animal organism. There are three main functions of proteins, i.e. construction, energy and bio-logical function. The construction or plastic function is that proteins are the building material for the synthesis of body proteins that are part of all organs and tissues, as well as an integral part of a product.

Numerous studies confirmed that the chemical composition of lamb is influenced by breed, age, gender, fatness, and living conditions.

An increase in the amount of protein with age and a decrease in the proportion of moisture is the main indicator of the quality improved and, consequently, nutritional value of meat.

To determine the nutritional value of meat, you need to know the qualitative composition of proteins. For this purpose, an amino acid analysis of meat was performed, indices of dispensable and essential amino acids were established, and their ratio was

The biological function is that proteins are an integral part of many biologically active substances—enzymes that determine the rate of synthesis and decay processes at the cellular level and hormones involved in the regulation of vital processes. Proteins are part of antibiotics and immune bodies that determine protective functions of body.

Based on the fact that the growth processes in an animal organism are associated with the intensity of protein metabolism, we evaluated its activity and guide-lines by blood parameters in rams (Table 6).

The bloodstream of 4-month-old rams contained the largest amount of total protein (65.1 ± 0.25) that decreased, as animals grew older. In 7-month-old animals, this indicator was 64.87 ± 0.21 g/l. The highest albumin fractions of 34.12 ± 1.25 were registered in animals at 4 months of age. The examination of globulin fractions indicated a variability of this indicator depending on both the age of animals and their growth rate, e.g., globulin was 38.52 ± 0.32 g/l at 4 months of age, and 33.15 ± 0.51 at 7 months of age. We studied the relationship between blood proteins and pre-slaughter weight of experimental animals in different age periods. The relationship between the traits was determined by calculating the correlation coefficients, with the statistical significance being assessed according to the Student's t-test at different degrees of probability. We established positive correlation between blood serum proteins and pre-slaughter live weight of experimental animals in different age periods. The study established a positive correlation between the pre-slaughter weight of animals and total protein in blood serum that was 0.54 at 4 months of age and 0.51 at 7 months.

Correlations between the slaughter weight, albumins and globulins were positive in all groups.

IV. CONCLUSION

The research study established the interdependence between the total protein, albumin and pre-slaughter weight, with a high statistical significance (P>0.99) being the strongest in rams at 4 months of age. The globulin fraction of proteins had no significant correlation with the live weight of rams in different growth periods (P>0.99). Therefore, if the concentration of total protein increases in serum, so the pre-slaughter live weight does. Thus, in order to obtain lamb that is nutritionally complete in terms of bio-chemical and morphological compositions and in high demand in the market, we recommend slaughtering rams of Edilbay breed at 4 months of age, when they reach live weight of at least 40 kg, and a carcass weight is at least 16 kg.

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