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Meat Productivity Of Crossbred Rams After Fattening

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Abstract

The study was performed in the Western region of Kazakhstan with the Akzhaik sheep with wool crossbred type. This article shows the results of studying meat productivity and the characteristics of young Akzhaik meat-wool sheep carcasses obtained from various selection variants. The aim was to obtain preliminary information for future studies that would make it possible to scientifically substantiate the way of increasing production of sheep breeding due tomore complete implementation of the genetic potential of the breed. Encouraging results have been obtained in terms of increasing meat productivity and quality of carcasses of lambs that can be sold at the age of 7.5-8 months for obtaining high-quality meat.

Keywords: Semi-fine sheep, meat and wool direction, Akzhaik breed, crossbred wool, meat productivity, indicators of reference slaughter, varietal cutting, morphological and chemical composition, weight of hot carcass, slaughter yield, coefficient of meatiness, energy value.

INTRODUCTION

Sheep breeding is the major industry in the world's agriculture. The widespread use by the sheep of natural and, in some countries, multi-herb high-yielding pastures throughout the year creates the conditions for widespread production of cheap and cost-effective products: meat, wool, and fur raw material and milk. In many developed countries, this industry is economically beneficial and brings certain income in the external market, for example, in Australia and New Zealand sheep farming accounts for almost one fifth of the national income, where wool and mutton are constantly exported to industrial states.

In our country, sheep breeding is traditional, historically established industry, development of which is facilitated by the presence of extensive natural pastures, which make up more than 65% of all pastures [1-2].

Being a complex industrial and economic system aimed at satisfying the needs of population in food products and in agricultural raw materials, it is unparalleled in the variety and uniqueness of the products obtained from it [3-9].

The master plan of sheep breeding development in Kazakhstan until 2020 states that in the new phase of development of the Republic, which is characterized by globalization of economic relations and by increasing competition in the global food market, a special role will be played by animal breeding as an export-oriented agricultural sector [10].

In recent years, there have been significant changes in the economic importance of certain types of sheep products, as rightly noticed by D.B. Smagulov, 2014. Until recently, domestic sheep breeding has been mainly based on wool production, the share of which in the total value of products of this industry reached 80-90%, and the purchase price was equivalent to 20 kg of lamb live weight. However, the income from wool sales does not ensure stable profitability of sheep breeding [11].

According to Y.M. Uzakov et al., 2015, lamb is a valuable food product. Unlike meat of other animals, lamb meat is distinguished by the taste and dietary properties, as well as high content of vitamins B_1, B_6, B_{12}, D_2, E, PP. Pantothenic, para-aminobenzoic and folic acids, choline, vitamin E and physiologically active peptides stimulate the bioactive regulation of the organism. Consumption of lamb meat also strengthens tooth enamel without disturbing the carbohydrates metabolism. This is because meat lamb contains high amount of fluoride. It is no wonder that lamb meat is widely used in meat processing industry [12].

In accordance with the current requirements of the domestic and international markets, increasing meat productivity in sheep breeding is regarded as more promising, as believed by B. Zapasnikiene and R. Nainiene, 2012 [13].

In this regard, greatly interesting are the works of D.S. Chynybaev et al., 2008, L. Pannier et al., 2014, about increasing the share of young animals among meat sheep in recent years. This is due to the preferences of consumers, the main reason being high nutritive value, and better tasteful digestibility [14-15].

Lamb meat production in meat-wool sheep breeding is performed mainly as a result of selling young animals for meat within the year of birth. This allows to improve the quality of lamb meat, and to improve its biological value.

So, efficiency of slaughtering the early maturing lambs for meat in the year of their birth is confirmed by the works of I.A. Minakov et al., 2003, B.B. Traisov et al., 2013 [16-17].

METHODS

With the aim of determining the efficiency of growing lambs at autumn pastures with additional feeding by concentrated forages, rams were fattened after weaning them from dams at the age of 4-4.5 months, obtained from various combinations of parental pairs of the Akzhaik meat-wool breed. In group I, producer rams of intra-breed pedigree meat type – AKMWm – were used, the sperm of which was used for inseminating nonlinear ewes – AKMWn, group II – meat type sheep and ewes, and group III – non-meat type (non-linear).

For studying meat productivity, reference slaughtering of 5 animals from each group was made at the age of 7.5-8 months after fattening at the slaughtering station of the farm.

At the time of slaughtering, according to the methodology of the All-Russian Academy of Agricultural Sciences and the All-Russian Research Institute of Livestock (1978), the pre-slaughter weight, hot carcass and internal fat weight, slaughter yield and other factors were considered for each animal [18].

The carcasses of each group were sorted by grades according to GOST 7596-81 "Meat. Cutting lamb and goat meat for retail trade", according to which the first grade includes: hips, lumber and scapular-spinal sections; the second includes lean, forearm and the hind shank [19]. For the purpose of complete studying meat merits and meat yield on bones, deboning of carcasses was performed. The chemical composition of meat was studied in the laboratory of the West Kazakhstan Agrarian-Technical University according to common techniques.

RESULTS AND DISCUSSION

The results of determining the fattening qualities are shown in table 1.

Table 1 – Fattening qualities of 7.5-8 month-old rams (n = 15 in group)

Indicators	I	II	III
	$\bar{X}\pm m_{\bar{x}}$	$\bar{X}\pm m_{\bar{x}}$	$\bar{X}\pm m_{\bar{x}}$
Body weight, kg, at the start of fattening	32.8±0.55*	34.5±0.41*	31.4±0.27*
At the end of fattening	41.9±0.42*	44.6±0.20*	40.2±0.31*
Live weight gain:			
absolute, kg	9.1	10.1	8.8
daily average, g	151.7	168.3	146.6
relative, %	27.7	29.3	28.0
Used fodder units per 1 kg of body weight gain, kg	7.3	6.6	7.5

** note – P>0.999*

At the end of fattening, rams from group II were heavier than their peers from group I by 2.7 kg, from III – by 4.4 kg, at P>0.999.

The highest intensity of increasing live weight in rams from group II and group I is 10.1 and 9.1 kg, and in their peers from group III – 8.8 kg, which is 1.3 and 0.3 kg, or 12.9% and 3.3% less than those in their peers, respectively.

Similar results were obtained for average daily and relative live weight gains as well. The average daily gain was higher in animals from groups I and II – 151.7 g and of 168.3 g, as compared to their peers from group III – 146.6 g.

Rams from groups I and II in the eaten forge spent, per kilogram of their body weight growth, by 0.27 and 0.91 feed units less on the average. Therefore, a conclusion can be made that they used eaten forage in a more rational way.

The work of N.I. Nagdalieva, 2008, about studying the fattening qualities of sheep provides information about the using of 6-7 forage units per 1 kg of the gained weight in young meat-wool sheep with the average daily gain of 200-250 g [20].

The data obtained in our studies are consistent with the results of this author.

More objectively, meat qualities are characterized by the slaughter indicators (table 2). One of the important indicators for assessing meat productivity is live weight of the animal before slaughtering. However, judging the meat productivity only by the live weight is not sufficient, since it gives an indirect idea about the number of edible parts.

Table 2 – Weight and yield of the main slaughtering products

Indicators	I	II	III
Number of heads	5	5	5
Weight, kg			
pre-slaughter	42.5±0.58	44.6±1.67	40.2±0.88
hot carcass	19.7±0.26	21.3±0.79	18.3±0.25
chilled carcass	19.3±0.26	20.8±0.63	17.9±0.30
Slaughter	20.8±0.28	22.8±0.63	19.4±0.20
internal fat	1.10±0.03	0.98±0.13	1.05±0.21
Slaughter yield, %	48.9	49.9	48.1
Hot carcass yield, %	46.4	47.7	45.5
Internal fat yield, %	2.59	2.20	2.61

The results of the reference slaughtering showed that rams from group II had higher pre-slaughtering weight than their peers from groups I and III by 2.1 and 4.4 kg, respectively. As a consequence, the weight of hot carcass was also higher by 1.6 and 3.0 kg. The difference in the hot carcass weight between rams from groups II and III was 2.2%. This indicator in animals from group I was intermediate – 46.4%.

In general, carcasses of animals for slaughtering were massive, rounded and compact, the subcutaneous fat evenly covered the surface of the carcass.

The results of the reference slaughtering determined that there was no difference in the yield of byproducts of the first and second categories in various groups of young animals.

The weight of the byproducts of the first category by groups was 1.5-1.6 kg, and that of the second category – 3.5-3.7 kg. The total weight of by-products ranged between 5.1 and 5.3 kg by groups.

The stomach was better developed in rams from group II, which was more than that of their peers from groups I and III by 0.065 and 0.074 kg or 7.5 and 8.6%, respectively, which, in our opinion, is explained by the natural feature of meat type animals.

The overall yield of slaughter products, including by-products of the first and second categories, with rams from group I was 61.4%, II – 61.5%, and III – 60.8%. Higher yield of by-products was characteristic of the young meat type animals of the Akzhaik meat-wool breed.

With the aim of determining the morphological composition of young animals carcasses, and determining the coefficient of meat productivity, carcasses of rams from each selection variant were subjected to deboning.

The result of carcasses deboning and the coefficient of meatiness are shown in table 3.

Table 3 – Morphological composition of carcasses and the coefficient of meatiness

Indicator	I	II	III
N	3	3	3
Chilled carcass weight, kg	19.3±0.26	20.8±0.63	17.9±0.30
The carcass contains:			
meat, kg	15.2	16.4	13.9
%	78.7	79.1	77.5
bones and tendons, kg	4.2	4.3	4.0
%	21.3	20.9	22.5
Coefficient of meatiness	3.64	3.78	3.44

Morphological cutting of experimental rams' carcasses showed superiority of animals in group II over their peers from groups I and III by meat yield by 0.4 and 1.6%.

The highest coefficient of meatiness was characteristic of rams in group II – 3.78.

Measuring the rib eye area showed that in young animals of meat type, the longest muscle was greater than in young animals from group III by 1.62 cm^2.

Being a sort of meat, lamb is an important and valuable component of human nutrition, an essential source of animal protein. Its biological value is largely determined by the content and proportion of basic nutrients in it: protein and fat. The ratio of these components determines the biological and energy value of the meat.

The results of studying the chemical composition is shown in table 4.

Table 4 – Chemical composition of an average sample of ram meat

Indicator	I	II	III
Content in the flesh, %:			
moisture	60.2	60.0	60.4
dry matter	39.8	40.0	39.6
protein	16.2	16.1	16.7
Fat	22.7	23.0	22.0
Ash	0.9	0.9	0.9
Meat protein-qualitative indicator	4.45	4.48	4.12
Fat-protein ratio	1.4	1.4	1.3
Energy value in 1 kg of flesh, MJ	11.61	11.71	11.43

As shown by the data in table 4, the chemical composition of meat in the studied groups was characterized by the general biological law: with increasing age, carcasses accumulate more fat, but the content of moisture decreases. Moisture content in the edible parts of the carcass decreases in calves of the meat type by 4.7%, in nonlinear – 6.4%, in calves obtained as a result of selection of ♂ AKMWm x ♀ AKMWn – 5.1%.

The relation between the contents of fat and protein is not so obvious. However, increased fat content affects decreased content of protein.

The protein-to-fat ratio that determines nutritional value and taste of the meat should be 1:1. The obtained data shows clearly that the protein-to-fat ratio is close to the optimum one for all groups.

Attention should be paid to changes in the water-to-protein ratio. It is the indicator of chemical ripeness of the meat. In all studies groups it pretty much changed with the age, which indicated unripeness of lamb meat during this period.

Due to increased amount of fat, the caloric value of meat increases in rams: I group 2.38 MJ, group II – 2.19 MJ, and III – 2.59 MJ.

The best protein quality indicator was discovered in the flesh of rams from group II – 4.48.

Butchering showed that specific weight of valuable junctures (hip, lumbar and scapular-spinal) in rams from groups I and II was higher than that in rams from group III by 0.6 and 1.1 abs. %, respectively. These data are consistent with the exterior features of animals in groups I and II, characterized by better development, as compared to non-linear peers from group III (table 5).

Table 5 – Yield of juncture after lamb butchering, %

Name of the juncture	I	II	III
I grade junctures:			
Hip	26.9	26.4	26.5
Scapular and spinal	45.3	45.8	44.9
Lumbar	8.5	9.0	8.7
II grade junctures:			
Hind shank	5.1	5.2	5.4
Brachium	5.7	5.4	6.0
Lean	8.5	8.2	8.5
Total:	100	100	100

The yield of second grade junctures, including the hind shank, forearm and the lean amounted on the average by groups to 19.3%.

Indicators of junctures yield by grades in our experiments are consistent with the data of V.A. Radionov, 1979, obtained during slaughtering meat and wool youngsters [21].

The weight of first-class meat in carcasses of rams from group II was 16.4 kg, or 81.2%, which exceeded the indicators in groups I and III by 2.6 and 1.3 kg, respectively.

CONCLUSIONS

Analyzing the results of slaughtering, graded butchering, deboning of carcasses, chemical composition and organoleptic analysis of the meat obtained from experimental rams of the Akzhaik meat-wool breed at the age of 7.5-8 months, one can conclude that in terms of meat productivity, the crossbred meat type youngsters have significant advantages, and their peers obtained by heterogeneous breeding occupy an intermediate position between groups II and III.

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