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Meat Productivity of Volgograd Breed Ram Hogs of Different Genotypes.

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ABSTRACT

The results of studying the economic efficiency of mutton production under different variants of crossing the Volgograd and Edilbai sheep breeds are presented. The mongrel youngsters had higher indices of the growth rate than their purebred peers, with the ½ VM × ½ Ed offspring having the highest values. The superiority of the live weight indices in this group reached 15.8% in comparison with purebred animals and in terms of the overall and average daily weight gains, 16.2 and 16.4%, respectively. The crossbred rams were characterized with a more developed breast, higher indices of the pelvis and chest and blockiness indexes. According to the main slaughter values, the half-bred rams had superiority (in terms of the fresh carcass weight by 17.5% and slaughter weight by 24.3%). At the same cost per unit of production, the ½ VM × ½ Ed crosses also had the best economic indices; the level of profitability was higher than in VM × VM and ¼ VM × ¾ Ed groups by 22.2 and 15.8%, respectively. The crossing of the Volgograd breed ewes with the Edilbaev breed rams helped to improve this trait in relation to the fine-wooled breed zoned.

Keywords: Crossbreeding; Meat productivity; Profitability; Sheep-breeding

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INTRODUCTION

The Volgograd sheep was being bred in the period of 1931-78 by means of a complex reproductive crossing of fat-rumped hair sheep ewes with rams of Soissons, Caucasian and Groznian breeds, followed by the animals of a desired type to be selected and main economic traits in the stud lines to be fixated in the Southern regions of the Soviet Union. Tribal herds of the Volgograd breed were developed by the method of accumulation cross breeding of fine-wooled crossbreeds with Volgograd rams from the "Romashkovsky" state farm. Daughter studs at the "Eltonsky" state farm in the Pallasovsky rayon and "Mayak Oktyabrya" collective farm in the Leninsky rayon were formed mainly with the pedigree sheep brought from the "Romashkovsky" breeding farm followed by their pure breeding and accumulation cross breeding of the crossbreeds being there with Volgograd rams. Large-scale selection to create new Volgograd breed herds was carried out by the Pallasovsky and Bykovsky breeding enterprises. Through their branches in the Volga region's rayons, they annually inseminated more than 400 thousand ewes by rams, grown and selected in the herd of the "Romashkovsky" state farm.

The Edilbai breed is a fat-rumped sheep resulted from a long selection, refers to a mutton-fat sheep type of productivity, but with the minimum content of fat deposited in the fat tail and is relatively unpretentious to various environmental conditions. Drought or severe frosts are tolerated fairly easily. Even in fattening they are able to gain a considerable living weight up to 110-130 kg.

Summarizing the results of different variants of crossing fine-wooled ewes with rams of mutton and mutton-fat breeds in different regions of the country, we can conclude that this hascontributed to the increase in the production of young mutton [1-8].

Thus, the research aimed at studying the possibilities of increasing the meat productivity of the Volgograd sheep breed due to different variants of crossing with the Edilbai breed are topical and of great economic importance [9; 10].

MATERIALS AND METHODS

The experimental part of the work was carried out in the Elton-Agro in the Pallasovsky rayon of the Volgograd region on fine-wooled Volgograd ewes and their offspring, purebred and cross-bred youngsters obtained by crossing with the Edilbai rams.

To conduct the research and production experiment, three groups of ewes were formed, 170 heads each. Test Groups I and II consisted of Volgograd breed ewes and Test Group III included ½ Volgograd × ½ Edilbai ewes. Insemination of ewes was carried out according to the following scheme (Table 1). All the experimental animals were in one flock in the same conditions of feeding and keeping.

After weaning lambs at 4 months of age, 3 groups of rams were formed by the method of analogue groups (n = 100 for each group): Group I consisted of purebred rams of Volgograd breed (VM), Group II of ½ Volgograd × ½ Edilbai rams (½ VM × ½ Ed) and Group III of ¼ Volgograd × ¾ Edilbai rams (¼ VM × ¾ Ed).

To determine the live weight, we carried out an individual weighing of all the experimental animals before the morning feeding within the accuracy of 0.1 kg at birth and at the age of 4, 6 and 8 months within the accuracy of 0.5 kg.

The live weight was determined by individual weighing the rams before morning feeding within the accuracy of 0.1 kg at birth, and at 4, 6 and 8 months of age. According to the weighing results, the overall, average daily and relative live weight gains were calculated (GOST 25955-83).

Mutton and fattening qualities of rams were studied on the basis of their control slaughter, fifteen heads from each group in accordance with the requirements of the GOST 31777-2012. In the carcasses, the pre-slaughter weight, weight of the chilled carcass, inner and tail fat, slaughter weight and slaughter yield were taken into account.

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The cost-effectiveness of beef production was counted based on the annual actual and intrafarm economic effect and according to Minakov [11] using the following formulas:

$$\text{Prime cost of 1 kg of gain, €} = \frac{\text{Farm inputs, € per head}}{\text{Total gain, kg}}$$

$$\text{Mutton sales proceeds, €} = \text{Total gain, kg} \times \text{Market value of mutton, € per kg}$$

$$\text{Profit, €} = \text{Mutton sales proceeds, €} - \text{Farm inputs, € per head}$$

$$\text{Profitability level, \%} = \frac{\text{Profit, €}}{\text{Farm inputs, € per head}} \times 100\%$$

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The data on different variables, obtained from the experiment, were statistically analyzed by Statistica 10 package (StatSoft Inc.). The significance of differences between the indices was determined using the criteria of nonparametric statistics for the linked populations (differences with P<0.05 were considered significant: [a]P>0.999; [b]P>0.99; [c]P>0.95; ns = not significant at P<0.95). Student's t-test was applied for the statistical analysis [12]. The mean of a set of measurements was calculated according to the formula: $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$, where $\bar{x}$ is a mean value; $\sum_{i=1}^{n} x_i$ is the sum of all x_i with i ranging from 1 to n, n is the number of measurements. The residual variation is expressed as a root mean square error (*r.m.s.e.*): $\sigma = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$. The standard error of mean (*s.e.m.*) was calculated using the formula: $s.e.m.(\bar{x}) = \frac{\sigma}{\sqrt{n}}$. The reliability of a sample difference (*Student's t-distribution*) was estimated by the test of the difference validity, which is the ratio between the sample difference and the non-sampling error. The test of the difference validity was determined by the formula: $t = \frac{\bar{x_1} - \bar{x_2}}{\sqrt{s.e.m._1^2 + s.e.m._2^2}} \geq t_{st.}(d.f. = n_1 + n_2 - 2)$, where t is a Student's t-distribution; $\bar{x_1} - \bar{x_2}$ is the difference of the sample mean measurements; $\sqrt{s.e.m._1^2 + s.e.m._2^2}$ is the sample difference error; $s.e.m._1$and $s.e.m._2$ are the a nonsampling errors of the compared sample statistics; t_{st} is the standard criterion according to the t-Table for the probability threshold preset depending on degrees of freedom; n_1 and n_2 are the numbers of measurements in the samples compared; *d.f.* is the degrees of freedom for the difference of two mean measurements.

RESULTS AND DISCUSSION

It has been established that in growing and developing, an animal acquires breed and species traits, and also its own features of constitution, exterior and productivity. Ontogeny is known to consist of two main processes, namely, growth and development that are interrelated complementary concepts.

The growth results in changes in weight, structure, function and metabolism in the body.

The ultimate goal in growing and fattening is the animals' live weight gain. An intensively growing animal consumes less feed per unit of live weight. Therefore, optimal environmental conditions allow the animal to manifest its genetic growth potential.

A study of the live weight dynamics of rams of different origins has shown that the crossed lambs had considerable growth superiority in all age periods (Fig. 1).

Throughout the experiment, the mongrel youngsters surpassed their purebred peers. At birth, the crosses in Groups II and III exceeded the purebred lamb by 10.6% (P<0.999) and 4.3% (P<0.99), respectively. After weaning (at the age of 4 months), this pattern was the same, and the mongrel youngsters had higher indices of the live weight by 20.8% (P<0.999) and 12.1% (P<0.999), respectively. By the age of 8 month, the rams in Group II were notable for greatest live weight; they significantly exceeded their purebred peers of Volgograd breed by 6.68 kg or 15.8% (P<0.999) and crossbred rams in Group III by 4.74 kg or 10.7% (P<0.999). The crossbred rams (¼ VM × ¾ Ed) had superiority over the Volgograd rams by 1.94 kg or 4.6% (P<0.99).

The live weight dynamics showed that its overall gain in different periods reflected the biological patterns of the youngsters' development in ontogeny.

For the entire period of the experiment, the rams in Group II had the highest overall live weight gain of 44.5 kg; the rams in Group I had the smallest one of 38.3 kg, which was by 6.2 kg or 16.2% (P<0.95) less than in Group II; and the rams in Group III had greater overall live weight gain by 1.8 kg or 4.7% (ns) than in Group I (Table 2).

It was found that in fattening the purebred rams' overall live weight gain by months remained the same 6.2 kg at the age of 4-6 months and 6.2 kg at the age of 6-8 months and was lower than that of crossbred lamb. In all groups of rams, the maximum overall live weight gain was in the period of 4-8 months of age, and from 6 to 8 months of age, there was a decrease in the body weight gain.

The same regularity has been established in terms of the average daily live weight gain in the groups of experimental youngsters.

It should be noted that for the first 4 months of fattening, the maximum values of the average daily gain was registered, with the highest gain being of 264.0 g in the half-bred lamb in Group II. The dynamics of the average live weight daily gain of lamb of different origins is presented in Table 2.

Analysis of data on the average daily live weight gain showed that the highest growth rate was registered in young animals in all groups for the period from birth to 4 months of age.

During the entire period of fattening, the half-bred rams in Group II had the highest average daily weight gain; they exceeded their peers of Volgograd breed, having ¾ of Edilbai breed, by 26.1 g or 16.4% (P<0.999) and 18.7 g or 11.2% (P<0.95).

The relative live weight gain reflects the growth intensity in the development of young rams in different age periods. This indicator is expressed as a percentage of an average index of the initial live weight, which characterizes the relationship between the values of the growing weight and growth rate.

Regular decrease in growth energy depending on the animal's age indicated a normal course of its growth, and the increase in growth sometimes observed in young animals at a later age indicated a compensation for growth retardation in the previous period.

In our studies, the indices of the rams' growth regularities agreed with the results of a number of researchers and general biological laws (Table 2).

The analysis of the data in the table makes it possible to note that the half-bred youngsters in Group II had the maximum growth rate in the period from birth to 6 months, which is by 0.74 and 0.49 higher than their peers in Groups I and III had. Later, the growth rate decreased, and the growth coefficient at the age of 6-8 months was 1.14-1.17.

The superiority of the crossbred youngsters over their purebred peers of Volgograd breed in terms of growth rate and intensity is explained by the manifestation of the heterosis effect. It can be concluded that the crossbred youngsters occupy an intermediate position between the parental forms for each individual trait.

So, the use of the Edilbai rams on the Volgograd ewes had a positive effect on the growth of the offspring obtained from them. This conclusion has been confirmed by high indices of live weight and average

daily gain. It should be noted that the crossbred youngsters had the highest growth potential in most of the periods studied.

In carrying out animal examination, the exterior and physique are the most accessible indicators of the morphological and physiologic animal characteristics of the animal, its constitution and adaptability to certain environmental conditions, reflecting the breed characteristics and potential opportunities for production.

In assessing the development and productivity of farm animals, great attention is paid to the external forms of the animal's body, its exterior. The exterior has been established to be one of the main indicators of the breeding selection that reflects the character of the animal's productivity and the strength of the constitution.

A more accurate and objective method of studying the exterior is measuring the body of animals, and the assessment of the measurements makes it possible to compare them with each other (Table 3).

To study the exteriors of the experimental rams, the following measurements were taken: height at the withers and rumps; oblique body length; depth, width and girth of the chest; width at hips; and pastern girth at the ages of 4 and 8 months.

In our studies, to evaluate the physiological characteristics of the experimental youngsters, we studied the measurements of the exterior at 4 and 8 months of age.

Height at withers and rumps. The magnitudes of these measurements are mainly determined by the development intensity of the bones of the peripheral skeleton.

The analysis of the experimental data shows that with respect to the height at withers, the crossbred rams (Groups II and III) exceeded their peers in Group I by 3.6 (P>0.99); 2.3 (P>0.95) and 5.8 (P>0.999); 1.7% (P>0.95), respectively, at the ages both of 4 and 8 months.

The superiority in height at rumps in these age periods also belonged to the rams in Groups II and III and was 3.7 (P>0.999); 1.3 (P>0.95) and 7.1 (P>0.999); 3.2% (P>0.999), respectively.

In terms of the body length, the crossbred youngsters were superior to their purebred peers. So, at the age of 4 months, the rams in Groups II and III had this parameter of 68.2 and 66.9 cm, respectively, which was by 4.1 (P>0.999) and 2.1% (P>0.95) more than the purebred youngsters in Group I (65.5 cm) had. At the age of 8 months, the superiority of crossbreeds over purebreeds was 3.2 (P>0.999) and 0.7% (ns).

The chest width, depth and girth measurements characterize the development of the chest and depend on the development of the axial skeleton bones that have the greatest growth rate in the postembryonic period.

In the period of weaning, the chest width of the youngsters in Group II and Group III was by 10.0 (P>0.999) and 3.3% (P>0.95) higher than that in Group I and at the age of 8 months, by 6.6 (P>0.99) and 2.0% (ns), respectively.

Measurement of the chest depth showed that the crossbreeds in the studied age periods exceeded the purebred youngsters by 8.3 (P>0.999); 5.1 (P>0.99); 9.9 (P>0.999); and 4.6% (P>0.999).

At the age of 4 months, the maximum chest girth was registered in the animals in Group II and amounted to 83.5 cm, which was by 5.7 and 2.4 cm or by 7.3 (P>0.999) and 4.1% (P>0.999) higher than that in the youngsters in Groups I and III. At the age of 8 months, the superiority of the crossbreeds in Group II over their peers was 5.7 (P>0.999) and 3.6% (P>0.999), respectively.

The youngsters both of ½ and ¾ of the Edilbai pedigree had superiority in the development of the chest, which is a characteristic trait of sheep of mutton production. For a more complete characterization of the external forms of the animals, there were determined some corresponding body build indices, characterizing

the ratio of anatomically interrelated body articles. The body build indices were calculated on the basis of the measurements taken in the youngsters at 4 and 8 months of age (Table 3).

The index of leg height characterizes the degree of development of the animal's limbs in length. At the age of 4 months, the purebred rams in Group I had the greatest index of leg height of 57.97%. The crossbreeds occupied an intermediate position (56.09-56.82) and with respect to this indicator were inferior to their purebred peers by 1.88 and 1.15%, respectively. At the age of 8 months, the superiority of Group I over Groups II and III was 1.66 and 1.22%, respectively (Table 3).

The index of blockiness. The magnitude of this index characterizes the development of the body weight. The half-bred rams were characterized by the highest index of blockiness in all age periods. With respect to the index of blockiness, at 4 and 8 months of age the half-bred rams in Group II exceeded the youngsters in Group I by 3.65 and 2.95%, respectively.

Pelvis and chest index. This index characterizes the development of the width of the anterior body part in relation to the posterior one. The rams in Group II were characterized by the greatest value of this index. The half-bred youngsters in Group II surpassed their purebred peers by 5.83-2.88% in all age periods.

Comparison of the physique indices of purebred Volgograd rams and their Edilbai crossbred peers showed that the latter are characterized by a more developed chest, high indices of the pelvis and chest and blockiness, that is, those traits of the physique that are characteristic for the animals of mutton productivity.

The mutton production of animals is determined by the quantity and quality of meat and other slaughter products obtained, it is characterized by the live weight and slaughter weight of the animal, as well as its slaughter yield.

The mutton has been established to vary in terms of quality, depending on the breed, sex, age, fatness, keeping and growing conditions.

Many researchers indicated that the most objective indicators of meat productivity are, first of all, the slaughter weight and slaughter yield.

At the same time, it was found that crossbred animals obtained from crosses of different breeds, as a rule, surpass their purebred analogues.

To study the mutton productivity, control slaughter was carried out, 15 heads from each group.

The results of control slaughter are given in Table 4.

The analysis of the slaughter data established that, according to the main indicators characterizing the level of meat productivity, the half-bred rams had the highest indices. In terms of the fresh carcass weight, they surpassed their peers in Group I by 3.17 kg or 17.5% ($P>0.999$) and in Group III by 3.04 kg or 16.6% ($P>0.999$), respectively. The slaughter weight is one of the most important indicators of meat production. Crossing of the Volgograd ewes with the Edilbai rams helped to improve this trait in relation to the fine-wooled breed zoned. So, the crossbred lamb in Group II had the highest slaughter weight of 22.86 kg, which was by 4.47 kg or 24.3% ($P>0.999$) higher than the purebred youngsters had and by 2.58 kg or 12.7% ($P>0.999$) higher than the rams of the ¼ VM × ¾ Ed breed.

The experimental animals' indices of slaughter yield corresponded to the general biological patterns. The sheep of coarse-wool breeds had much higher values of the slaughter yield in comparison with the Merino sheep. In our studies, the greatest slaughter yield was registered in half-bred young animals and amounted to 48.02%.

In terms of this indicator, the superiority of the Group II rams over their peers in Groups I and III was 3.43 and 1.36%, respectively.

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One of the main criteria for assessing the results of crossing the Volgograd ewes with the Edilbai rams is the economic efficiency.

To determine the economic efficiency, we took into account the productivity indicators for the experimental period, as well as actual direct costs and realizing prices for sheep products in this period (Table 5).

The conducted calculations established that with the same expenditure on production of a unit of production, the crossbred rams had the best economic indices. In terms of the profits per head, they exceeded the purebred Volgograd peers by 6.2 EUR, and rams of the ¼ BM × ¾ Ed breed by 4.4 EUR (the average values calculated as economic indicators up to spring 2018, the RUR/EUR exchange rate was 70.4). The profitability of lamb production was quite high in animals in all groups, but the most profitable was growing of half-bred youngsters of the ½ Volgograd × ½ Edilbai breed; the level of profitability of the rams at the age of eight months was 62.0%, which was more than that of the rams in Groups I and III by 22.2 and 15.8%.

Table 1. Experimental design

Group	Breed				Breed of offspring	n
	rams	n	ewes	n		
I	VM	3	VM	170	VM × VM	100
II	Ed	3	VM	170	½ VM × ½ Ed	100
III	Ed	3	½ VM × ½ Ed	170	¼ VM × ¾ Ed	100

Table 2. Growth indicators of experimental rams, kg (M±m)

Age period	VM × VM (n=100)	½ VM × ½ Ed (n=100)	¼ VM × ¾ Ed (n=100)
Overall live weight gain			
From birth to 4 months of age	25.9±1.26	31.7±1.84 ^{b}	28.1±1.92 ^{ns}
From 4 to 6 months of age	6.2±0.34	7.0±0.42 ^{ns}	6.4±0.39 ^{ns}
From birth to 6 months of age	32.17±1.95	38.7±2.04 ^{c}	34.5±1.89 ^{ns}
From 6 to 8 months of age	6.2±0.42	5.8±0.36 ^{ns}	5.6±0.32 ^{ns}
From 4 to 8 months of age	12.4±0.51	12.9±0.68 ^{ns}	12.0±0.47 ^{ns}
From birth to 8 months of age	38.3±2.04	44.5±2.31 ^{c}	40.1±2.92 ^{ns}
Average live weight gain			
0-4	215.7±3.65 ^{A}	264.0±3.78	233.8±3.84 ^{A}
4-6	103.0±2.78 ^{A}	117.5±3.02	107.3±2.86 ^{C}
6-8	103.7±3.06 ^{NS}	96.8±2.84	92.7±3.96 ^{NS}
0-8	159.5±2.85 ^{A}	185.6±2.98	166.9±2.24 ^{C}
Growth rates of rams of different origin			
From birth to 4 months of age	7.55	8.25	7.81
From 4 to 6 months of age	1.21	1.20	1.20
From birth to 6 months of age	9.12	9.86	9.37
From 6 to 8 months of age	1.17	1.14	1.14
From 4 to 8 months of age	1.42	1.36	1.37
From birth to 8 months of age	10.69	11.19	10.72
b = P>0.99, c = P>0.95, ns = not significant at P<0.95 compared with data on the VM × VM group; A = P>0.999, C = P>0.95, NS = not significant at P<0.95 compared with data on the ½ VM × ½ Ed group			

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Table 3. Comparison of experimental rams exteriors (M±m)

Indicator	VM × VM (n=100)	½ VM × ½ Ed (n=100)	¼ VM × ¾ Ed (n=100)
Measurements of the structure of the rams at the age of 4 months, cm			
Height at withers	60.2±0.51	62.4±0.44 [b]	61.6±0.26 [c]
Height at rumps	61.8±0.23	64.1±0.38 [a]	62.6±0.32 [c]
Oblique body length	65.5±0.42	68.2±0.36 [a]	66.9±0.38 [c]
Chest depth	25.3±0.28	27.4±0.26 [a]	26.6±0.32 [b]
Width of chest	18.0±0.21	19.8±0.19 [a]	18.6±0.19 [c]
Width at hips	18.4±0.16	19.1±0.18 [b]	18.7±0.12 [ns]
Chest girth	77.8±0.47 [A]	83.5±0.38	80.2±0.32 [A]
Pastern girth	8.8±0.09	8.6±0.08 [ns]	8.7±0.10 [ns]
Indices of the structure of rams at the age of 4 months, %			
Leg height	57.97	56.09	56.82
Lengthiness	108.80	109.29	108.60
Chest	71.14	72.26	69.92
Overgrowth	102.65	102.72	101.62
Blockiness	118.78	122.43	119.88
Boniness	14.62	13.78	14.12
Pelvis and chest	97.83	103.66	99.46
Measurements of the structure of the rams at the age of 8 months, cm			
Height at withers	65.8±0.31	69.6±0.28 [a]	66.9±0.34 [c]
Height at rumps	66.1±0.24	70.8±0.22 [a]	68.2±0.26 [a]
Oblique body length	69.4±0.44	71.6±0.36 [a]	69.9±0.39 [ns]
Chest depth	28.4±0.26	31.2±0.31 [a]	29.7±0.27 [a]
Width of chest	19.8±0.29	21.1±0.34 [b]	20.2±0.31 [ns]
Width at hips	18.8±0.14	19.5±0.11 [a]	19.0±0.12 [ns]
Chest girth	84.8±0.42 [A]	89.6±0.38	86.5±0.37 [A]
Pastern girth	9.2±0.08	9.4±0.09 [ns]	9.4±0.09 [ns]
Indices of the structure of rams at the age of 8 months, %			
Leg height	56.83	55.17	55.61
Lengthiness	105.47	102.87	104.48
Chest	69.72	67.63	68.01
Overgrowth	100.45	101.72	101.94
Blockiness	122.19	125.14	123.75
Boniness	13.98	13.51	14.05
Pelvis and chest	105.32	108.20	106.31
a = P>0.999, b = P>0.99, c = P>0.95, ns = not significant at P<0.95 compared with data on the VM × VM group; A = P>0.999 compared with data on the ½ VM × ½ Ed group			

Table 4. Results of control slaughter of young animals (M±m)

Age, months	VM × VM (n=15)	½ VM × ½ Ed (n=15)	¼ VM × ¾ Ed (n=15)
Weight, kg: pre-slaughter	41.24±0.38 [A]	47.60±0.41	43.46±0.53 [A]
fresh carcass	18.12±0.14 [A]	21.29±0.27	18.25±0.19 [A]
chilled carcass	17.75±0.16 [A]	21.02±0.18	17.86±0.12 [A]
internal fat	0.64±0.04 [NS]	0.72±0.03	0.54±0.06 [B]
Tail fat	-	1.12±0.02	1.88±0.08 [A]
Slaughter weight, kg	18.39±0.24 [A]	22.86±0.21	20.28±0.26 [A]
Slaughter yield, %	44.59	48.02	46.66
A = P>0.999, B = P>0.99, NS = not significant at P<0.95 compared with data on the ½ VM × ½ Ed group			

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Table 5. Economic efficiency of breeding sheep of different genotypes (per 1 head). The average values calculated as economic indicators up to spring 2018, the RUR/EUR exchange rate was 70.4.

Indicator	VM × VM	½ VM × ½ Ed	¼ VM × ¾ Ed
Live weight of 1 head at the age of 8 months, kg	42.24	48.92	44.18
Feed costs per 1 kg of gain, EFU	6.99	6.01	6.68
Farm inputs, EUR	27.9	27.9	27.9
Mutton sales proceeds, EUR	39.0	45.2	40.8
Profit, EUR	11.1	17.3	12.9
Level of profitability,%	39.8	62.0	46.2
EFU = energetic feed unit			

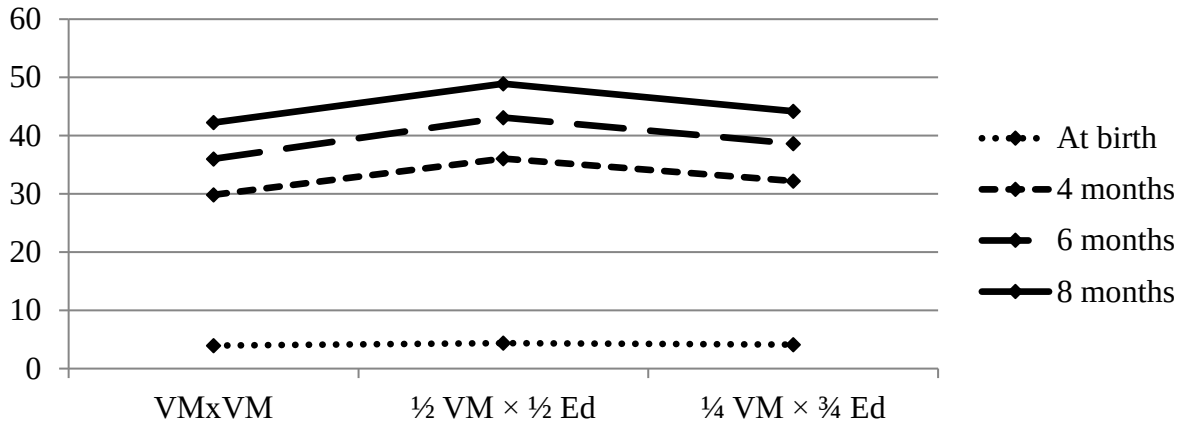

Figure 1. Dynamics of live weight of experimental rams, kg

CONCLUSION

Thus, to increase the production of young mutton and improve its quality and enhance the profitability of raising sheep, it is advisable to use industrial crossing of the Volgograd ewes with the Edilbai rams. The greatest economic effect is achieved when half-bred sheep are grown and sold in the same year of their birth.

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