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Study of Meat Productivity in Cattle

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ABSTRACT

The research was carried out on a private farm in the village of Sarygaya in Samukh district, in the laboratory of the Department of Livestock Production Technology of the Faculty of Zoo engineering of the Azerbaijan State Agrarian University. The purpose and task of our research was to study the effectiveness of the use of interspecific and interbreed industrial crossing and intensive rearing to increase the meat productivity of hybrid and crossbred young animals obtained from crossing cows of the Caucasian brown breed with bulls of the Zebu, Santa Gertrude and limousine breeds.

Keywords: *hybridization, crossing, meat productivity, slaughter yield, internal fat mass, slaughter weight, carcass weight, cross.*

1. INTRODUCTION

Meat is considered one of the important natural food products, which has good culinary properties. Meat dishes can be combined with various cereals, vegetables, and pasta.

Meat occupies an important place in the human diet, making it harmonious due to its composition and nutritional properties. First, meat is protein (content - 15-20%). Meat also contains minerals (content ranges from 0.8 to 1.6%) - mainly potassium, calcium, magnesium phosphates, zinc and copper, as well as iron. Minerals are mainly found in the liver and other organs, as well as in the blood. The liver is a source of vitamin B, vitamins D and A, and the main source of vitamin B12.

The total amount of meat and meat products in the human diet should be no more than 20-25% of the total amount of food, with low and medium physical activity. In case of high physical activity, the proportion of meat in the diet should be no more than 30-35%. At the same time, if possible, it is necessary to limit the consumption of fatty meats. Poultry and fish can be eaten without significant restrictions. The main reason for the negative consequences of immoderate meat consumption (especially fatty meats) is the increased intake of exogenous cholesterol, which leads to an increased risk of atherosclerosis. The concentration of nitrogen compounds also increases, which, in case of uric acid metabolism disorders, can lead to gout. The composition of the diet affects a person's activity, performance and resistance to diseases. An imbalance of nutrients in the diet leads to increased fatigue, apathy, decreased performance, and then to more pronounced manifestations of alimentary diseases (hypovitaminosis, vitamin deficiency, anemia, protein-energy deficiency, metabolic diseases). The importance of meat dishes in nutrition has been known since ancient times. Meat contains vitamins, microelements, rich proteins that stimulate growth and physical activity. Eating meat products is indispensable for people leading an active lifestyle. The energy value of a meat product in human nutrition depends on how many calories it contains. The calorie content varies from 120 to 500 kcal, depending on the type, variety, and category of meat delicacy.

The level of self-sufficiency in all types of meat and meat products in Azerbaijan in 2022 was 86% compared to 86.4% at the end of 2021, according to data from the State Statistics Committee.

At the same time, according to statistics, the level of self-sufficiency in beef and its products in 2022 was 93%, lamb and its products - 97%, poultry meat and its products - 78.5%.

The level of self-sufficiency in eggs in Azerbaijan in 2022 was 100.5% (in 2021 - 99.1%), with 179 eggs consumed per capita per year (in 2021 - 170).

In 2022, per capita consumption of all types of meat and meat products in Azerbaijan was 42 kg per year, including beef and beef products - 15.8 kg per year, lamb and its products - 9 kg per year, poultry meat and its products - 16.2 kg per year.

According to data in 2022, imports of beef and beef products to Azerbaijan amounted to 11,333 thousand tons (a decline of 11.7% - IF), lamb and lamb products - 2,728 thousand tons (an increase of 67.7% - IF), poultry meat and poultry products - 37,149 thousand tons (an increase of 14% - IF).

Object and methods of research. One of the primary tasks of the agro-industrial complex of our republic is a sustainable increase in the production of livestock products and providing the population with high-quality food products. (1)

In the main directions of economic and social development of the republic for the period up to 2000, it is envisaged to ensure an annual per capita meat consumption of 82 kg by 2025, for which its production must be increased to 25 million tons (in slaughter weight).

In this regard, the task of the research included studying: (2,3)

Features of the growth of meat productivity, the quality of meat of hybrid and crossbred uncastrated bulls, as well as their purebred peers.

1. To determine the dynamics of the exterior and some interior indicators of the experimental young animals. 2. To establish the feasibility of interspecific and industrial crossing of Caucasian Brown cows with Zebu, Santa Gertruda and Limousin bulls and to assess the economic efficiency of raising purebred, hybrid and crossbred bulls for meat in tethered housing conditions.

3. In this regard, our research is relevant and has significant scientific significance.

The novelty of our work is the study of meat productivity and meat quality of hybrids and crossbreds from crossing Caucasian Brown cows with Zebu, Santa Gertruda and Limousin bulls. A positive effect of paternal breeds on the productive qualities of hybrid and crossbred offspring has been established.

Discussion and analysis of the research results. An additional reserve for increasing the production of high-quality beef has been established. The introduction of the identified patterns of work and development of hybrids and crossbreeds into agricultural production will allow farms in the Republic of Azerbaijan to sell animals with a live weight of 307-377 kg at the age of 15 months for meat.

Hybridization in cattle breeding to increase the meat productivity of cattle (4.5)

Hybridization is the mating of animals of different species. At the present stage, it is one of the common methods for increasing the productivity, fertility and viability of farm animals. The widespread use of hybridization in cattle breeding is due to the manifestation of hybrid strength in animals obtained from mating, which is manifested in the following:

- superiority of hybrids over parental forms in live weight and viability:

- intermediate inheritance in live weight and superiority over parents in fertility and viability:

- superiority of hybrids in constitutional strength, performance, longevity, and fertility is lost partially or completely:

- in hybrids, economically useful traits are individually inherited by an intermediate type, and in general there is superiority over the average productivity indicators of the parents.

The experiment was conducted according to the scheme, which is given in Table 1.

Table 1 - Experiment scheme

Наименование групп	**Breed and type of bulls**	**Number of animals**	**Duration of cultivation, months.**
Control	Caucasian brown	10	15
Experienced	Cuban Zebu x Caucasian Brown	10	15
Experienced	Santa Gertrude x Caucasian Brown	10	15
Experienced	Limousin x Caucasian brown	10	15

Growth and development of experimental bulls. The experimental young animals were raised under the same feeding and housing conditions. The need for a rapid increase in meat production in our country requires a further increase in the meat productivity of cattle by means of proper organization of intensive growing and fattening and the use of industrial crossbreeding of dairy and combined breed cows with beef producers. In this case, the growth rate of young animals plays an extremely important role. Live weight and absolute gain to a certain extent allow us to judge the growth rate of the animal. Table 2 shows the dynamics of the live weight of the experimental bulls

Table 2 - Dynamics of the live weight of bulls, kg

Age . Months.	**Animal genotype**			
	Caucasian brown	**Cuban Zebu x Caucasian Brown**	**Santa Gertrude x Caucasian Brown**	**Limousine x Caucasian brown**
At birth	27.5±0.27	30.1±0.26	26.5±0.19	26.6±0.16
3	81.3±0.76	97.8±0.74	89.3±0.45	86.3±0.75
6	137.1±1.57	167.3±1.22	154.6±1.09	148.3±0.86
12	251.6±3.24	308.0±2.35	291.6±2.18	274.6±2.29
15	307.4±3.39	377.3±2.90	361.8±2.98	341.1±3.29

The data in Table 2 show that the hybrid and crossbred young animals have a greater live weight than their counterparts from the control group. Thus, the bulls of the 2nd experimental group Zebu x Caucasian Brown exceeded the animals of the control group in this indicator at 6 months by 30.2 (22%), at 12 months by 56.4 kg (22.4%), at 15 months by 69.9 kg (22.7%) and at 18 months by 82.3 kg (21.7%). Animals of the 3rd experimental group Santa Gertruda x Caucasian Brown had a greater live weight than their peers from the 1st group at the age of 6 months by 17.5 kg (12.8%), at 12 months by 40.0 kg (15.9%). at 15 months by 54.4 kg (17.7%)

The bulls of the IV experimental group Limousin x Caucasian Brown surpassed their peers from the control group at 6 months by 11.2 kg (8.2%). at 12 months by 23 kg (9.1%). at 15 months by 33.7 kg (11.0%)

The average daily gain in live weight of the experimental young animals is given in Table 3.

From the data in Table 3 it is evident that the growth energy of the Zebu x Caucasian Brown bulls was the highest. In general,

over the experimental period, the average daily gain in animals of this group was equal to 789 g. In the crossbreeds Sapta-Gartrude x Caucasian Brown and Limousin x Caucasian Brown this indicator was slightly lower than in hybrids, but higher than in peers of the Caucasian Brown breed. Both hybrids and crossbred young animals exceeded their purebred peers by 82-146 g/l and 12.8-22.7%.

Table 3 - Average daily gain in live weight of experimental young animals (kg)

Periods of growth	Group			
	1	2	3	4 .
0-3	584	735	682	648
0-6	602	753	703	668
0-12	615	763	728	681
0-15	616	764	738	692

It should be noted that hybrid and crossbred bulls also have higher linear growth rates, which characterizes the meatiness of the animals. In general habits and constitution, they lean towards the paternal breed. They have particularly well-developed breeds, the lions and back of the body, which produce the most valuable types of meat. They have a rounded and deep chest, a fairly muscular back. straight, a wide sacrum, with a well-developed ham, while peers of the Caucasian brown breed are characterized by more angular body shapes and a less muscular body.

Table 4

Group	Removable live weight, kg	Pre-slaughter live weight kg	Carcass weight, kg	Mascara yield.%	Mass of internal fat, kg	Slaughter weight kg	A killer exit. %
15 months							
1	307,3± 0,67	293.0± 1.00	153,0± 0.58	52.2± 0.12	6,0± 0.12	159,0± 0,68	54.3± 0.10
II	377,3± 0,67	366,0± 1,00	197.7± 0.88	54.0± 0.11	10.0± 0.15	207.7± 1.02	56.7* 0.13
III	361,8± 1.17	350.0± 1.53	188.0± 1.15	53.7± 0.13	9.5* 0.12	197.5± 1.27	56.4r 0.16
IV	341,2± 0.93	328,0± 1.00	!75.0± 1.15	53.4± 0.23	9.0± 0.15	!84.0± 1.30	56.1* 0.27

Results of control slaughter of experimental bulls. The data in Table 4 show that in the experimental bulls with intensive rearing up to 15 months of age, the first-generation hybrids Zebu x Caucasian Brown and the crossbreeds Santa Gertruda x Caucasian Brown, Limousin x Caucasian Brown had heavier carcasses weighing 197.7; 188.0; 175.0 kg, respectively, and the carcass weight of peers of the Caucasian Brown breed was 153 kg. The carcass weight of hybrid and meat bulls at 15 months was greater than that of purebreds by 44.7; 35; 22 kg. The carcass yield of hybrids was 1.8 - 2.2% higher than that of purebred animals of the Caucasian Brown breed. Accordingly, the slaughter yield of bulls of groups II, III and IV was higher than that of peers of group I.

Live weight increases coefficients of experimental bulls

Table 5

Old month	Groups			
		2	3	4
3	2,96	3,25	3,37	3,24
6	4,99	5,56	5,83	5,58
12	4,15	10,23	11,00	10,3
15	11,18	12,53	13,65	12,82

The data in Table 5 show that with age, the coefficient of increase in live weight in both the experimental and control groups of bulls increased. The animals in the control group are characterized by the lowest indicators in all age periods.

Since the absolute increase in live weight does not provide a complete description of the comparative intensity of the animal's growth process, we determined the relative growth rate (Table 5)

The data in Table 5 show that with age, the relative growth rate of bulls decreases. Hybrid crossbred young animals are characterized by the highest indicators of the relative growth rate up to 15 months of age. This indicates their better precocity compared to purebred peers. Moreover, Limousin v Caucasian brown bulls maintain the highest growth rate up to 15 months of age.

Relative growth rate of bulls (%)

Table 6

Old month	Groups			
	1	2	3	4
0-3	98,9	105,8	108,5	105,8
3-6	51,1	52,4	53,5	52,9
0-6	133,2	139,0	141,4	139,
6-12	58,9	59,2	61,4	59,2
0-12	160,5	164,3	166,6	164,7
12-15	20,0	20,2	21,5	21,6
0-15	167,1	170,3	172,5	171,0
6-15	76,6	77,1	80,2	78,8

Meatiness and morphological composition of carcasses

The morphological composition of carcasses of experimental bulls and the meatiness index are characterized by the data in Table 6.

Table 7 - Morphological composition of half carcasses and the meatiness index of experimental bulls.

Groups	Half carcass weight, kg	Pulp		Bones		Tendons		Meatiness coefficient
		Kg	%	Kg	%	Kg	%	
15 months								
I	78.00	59.9	76.8	13.93	17,9	4.2	5.3	4,3
II	102,00	82.30	80,7	17,3	16,8	2,6	2,5	4,8
III	96,00	76,60	79.8	15.93	16,6	3,5	3,6	4,8

IV	89,33	70.42	78,9	15,06	16,9	3,8	4,3	4,7

It is evident from the data in Table 7 that the best carcass morphological composition was demonstrated by the hybrids Zebu x Caucasian Brown and the crosses Santa Gertruda x Caucasian Brown and Limousin x Caucasian Brown. It was revealed that the meat content in the carcasses of hybrid and crossbred young animals was higher compared to purebred. Thus, at the age of 15 months, the muscle mass of the bulls in the experimental groups in groups II, III and IV was 80.7, 79.8 and 78.8%, against 76.8% in the control.

The smallest number of bones at the age of 15 months were found in the carcasses of hybrid and crossbred bulls. Thus, in groups II, III and IV, the percentage of bones in the carcass was 16.8, 16.6 and 16.9% by group, and 17.1% in the control group. At the age of 18 months, the above-mentioned indicators were also higher in hybrid and local young animals. The meat coefficient at the age of 15 months was higher in bulls of groups II, III and IV by 11.6%, 11.6 and 8.6%, respectively, than in purebred animals. This can be explained by the relatively low content of bone tissue in carcasses.

Химический состав и колорийность мяса. Качество и питательная ценность мяса Chemical composition and caloric content of meat. The quality and nutritional value of meat depend not only on the morphological composition of the carcass, but also on its chemical composition (Table 8)

The data in Table 8 show that with age, the moisture content in the average meat sample decreases, and the amount of dry matter increases.

At 15 months of age, the moisture content in the meat of bulls in the experimental groups was less than that of their peers from the control group by 0.67-1.27%. At the same time, hybrids and crossbreeds exceed young Caucasian brown cattle by 0.71-1.22%. As a result, the caloric content of 1 kg of pulp in groups 2-4 is higher than in control by 287-476 kJ or 4.2-7.0%.

Table 8

Groups	**Moisture**	**Protein**	**Fat**	**Ash**	**Caloric content kg,**
15 мес.					
1	73,75	20,61	4,77	0,87	6763
2	72,66	20,98	5,48	0,88	7131
3	72,48	20,58	5,99	0,95	7239
4	73,08	20,30	5,68	0,94	7050

2. CONCLUSIONS:

Based on the research conducted, the following conclusions can be made:

1. Hybridization and industrial crossing allow obtaining young animals capable of showing higher growth energy with lower feed costs per unit of live weight gain during intensive rearing than purebred animals of the maternal breed.

At the age of 15 months, the live weight of Caucasian brown bulls was 307.4 kg, zebu x Caucasian brown hybrids 377.3 kg, Santa Gertruda x Caucasian brown crossbreeds 361.8 kg, Limousin x Caucasian brown crossbreeds 341.1 kg, which is 21.7%, 16.0%, and 11.0% higher than that of purebred peers, respectively.

2. By body type, crossbred and hybrid young animals tend towards animals with meat productivity, have a deep and wide body, well-executed back, loin and ham with developed muscles, high indices of compactness, meatiness, stretch and meatiness, characterizing meat body shapes.

3. Carcass meat, slaughter yield and carcass pulp yield in hybrids are higher than in crossbreds, higher than in maternal peers of the brown Caucasian breed.

4. At the age of one and a half years, the meat of hybrid and local bulls contains slightly fatter, and therefore its caloric content is slightly higher than that of peers of the Caucasian brown breed.

5. The skins of hybrids and crossbreds are characterized by large weight, size, area and thickness.

6. The use of hybridization and industrial crossbreeding methods reduces the cost of a unit of live weight gain by 6.0-10.0% and increases the profitability of beef production by 13.8-22.0%.

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