



Livestock development in Kazakhstan: results of meat productivity from steers of different genotypes (Research Base LLP «Agrofirm Dinara-Ranch»)

Desarrollo ganadero en Kazajstán: resultados de la productividad de la carne de novillos de diferentes genotipos (Base de búsqueda LLP «Agrofirm Dinara-Ranch»)

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ABSTRACT:

The article presents research data on the development of animal farming in Kazakhstan. This article describes the results of a study on the meat content of animals of different genotypes under the raising conditions of "Agrofirm Dinara-Ranch". The use of bulls LLP (limited liability partnership) "Agrofirm Dinara-Ranch" to obtain main indicators of meat productivity makes it possible to improve later the productive quality of cattle of the Kazakh white breed after a genetic improvement breeding program. Analysis of the results of the slaughter control and the study of the morphological composition of carcasses give reason to conclude that the bulls Aberdeen-Angus breed and crossbred bulls have high slaughter qualities. The results of this study can be used both under the conditions of the Republic of Kazakhstan than abroad.

Keywords: Livestock, Economics, breed-cattle 's meat, Kazakh breed

RESUMEN:

El artículo presenta datos de investigación sobre el desarrollo de la ganadería en Kazajstán. Este artículo describe los resultados de un estudio sobre el contenido de carne de animales de diferentes genotipos bajo las condiciones de cría de "Agrofirm Dinara-Ranch". El uso de toros de "Agrofirm Dinara-Ranch" LLP (sociedad de responsabilidad limitada) para obtener los principales indicadores de la productividad de la carne permite mejorar más adelante la calidad productiva del ganado de la raza blanca kazaja después de un programa de mejora genética. El análisis de los resultados del control de sacrificio y el estudio de la composición morfológica de los cadáveres dan razones para concluir que los toros de raza Aberdeen-Angus y los toros mestizos tienen altas cualidades de sacrificio. Los resultados de este estudio se pueden utilizar tanto en las condiciones de la República de Kazajstán como en general.

Palabras clave: ganadería, economía, carne de ganado vacuno, raza kazaja

1. Introduction

Currently, the problem of increasing beef production in Kazakhstan is solved mainly by breeding beef breeds. At the same time, an important reserve for increasing meat resources is the development of specialized beef cattle breeding, which has a number of economic and productive features. Animals of specialized meat breeds are characterized by higher meat productivity and quality of beef, precocity, and good payment of feed products. From their slaughter receive heavy carcasses that meet international standards, high yield of edible parts, excellent raw leather. This industry is low-cost, allowing to effectively produce meat products (Gussenov, Korabaeva, Zhunusova, Tolamisova & Aitkulova, 2018).

In this regard, one of the important tasks -along with the technology of rearing- is selection, aimed at the assortment of animals by growth rate and feed payment by growth, allowing to obtain breeding bulls, proven by their own productivity, and high growth energy. At the same time, the main issue in breeding along the lines is the identification of outstanding bulls in the breed and their wide use on large arrays of breeding herds in order to obtain a large number of animals with similar characteristics on productive and exterior qualities (Carrillo, 2010).

The transition to competitive beef production is impossible without the use of highly productive breeds adapted to the specific conditions of their breeding. From this position, the introduction of the best meat breeds in the world is of particular relevance.

The need to study the results of meat productivity of bulls when crossing the Kazakh white-headed breed with Aberdeen – Angus, obtaining a crossbred young cattle under the conditions of LLP "Agrofirma Dinara - Ranch" allows you to get the maximum growth rate, effective use of feed, nutritious and high meat quality, tender marbled beef with high profitability of its production gives fattening bulls Aberdeen-Angus breed (Dietrich, Berner, 2004).

Currently, the Republic pays more attention to the development of beef cattle breeding, as the industry is an important indicator of the state of food security of the country. In this regard, the Republic of Kazakhstan has developed and implemented state programs aimed at improving the efficiency of breeding and fattening of young meat-cattle (Dyrka & Gussenov, 2018).

Nevertheless, due to the presence of certain problems in the industry, a detailed and comprehensive study of the issues of state support for beef cattle breeding is necessary.

Meat is the most important high-calorie food in the nutritional balance of the country the first place is beef (45-48% of all meat produced). In a number of regions of our country for beef use specialized meat breeds (Iskakov, 2010). The most widespread were: Kazakh white-headed, Kalmyk, Hereford, Aberdeen-Angus and others. Cattle of these breeds are characterized by high meat productivity, fast fattening and good feeding in the summer pastures. The greatest meat productivity differs young growth of Hereford, Kazakh white-headed breeds and it is a little lower at Kalmyk and Aberdeen-Angus young growth, but these breeds differ in very high-quality indicators of meat. The Kazakh white-headed breed combines high meat qualities of Herefords, fitness and endurance of local Kazakh and Kalmyk cattle. These animals are well tolerated by the heat of dry steppes, in winter - severe cold with winds and blizzards. Very valuable in the Kazakh white-headed breed is its adaptability to the use of extensive pastures often unproductive, good health and endurance, the ability to easily overcome the distance when grazing and driving, so it is successfully bred in all areas of the Republic of Kazakhstan (Musabekov, 2015).

It is known that meat productivity during the life of the animal is characterized primarily by indicators of live weight and fatness. However, live weight and appearance do not provide accurate and objective data on meat productivity and quality of meat. Therefore, the most complete picture can only be obtained after slaughter (Naimanov, 2012).

Authors studied the productivity and quality of meat of Kazakh white-headed bulls depending on their genotype.

1.1. Contribution of scientists to the study of this issue

One of the most important tasks of the development of beef cattle in the country is to increase the economic efficiency of meat production. For this purpose, the genetic capabilities of the Kazakh white-headed and Aberdeen-Angus cattle were widely used for the production of beef. For the comparative assessment of efficiency of growing and fattening steers of these breeds in the conditions of intensive technology the experiment was carried out in the fulfillment of which was attended by A. F. Shevkhezhev, D. R. Simachev, A. M. Kardan & A. M. Matayev (2010).

At the same time, the breed needs constant improvement of meat quality. For this purpose, many countries widely use Aberdeen Angus, characterized by good health, rapid maturity and is

considered to be a cost-effective breed for breeding. It adapts well to the arid climate and sparse vegetation in the pasture period, so it is often grown in arid steppe areas (Nurgazy, 2017).

The taste and nutritional qualities of their meat is not inferior to Herefords and is considered ideal for steaks – the so-called "marble" beef, tender, juicy, with thin layers of fat. This structure of meat occurs due to the fact that the Aberdeen Angus cattle most of the fat is deposited not under the skin, and in the thickness of the muscles (Nurgazy, 2018).

Valuable qualities of Aberdeen-Angus, which served as their wide dissemination, is a very high growth rate, small body size, high yield pulp and the excellent quality of the meat: severe graining, marbling and high calorie (Rangeline, V. V., Humpback, E. S. & Storme, O. A, 2015).

Due to the good acclimatization properties, unpretentiousness of feed, well-expressed precocity, remarkable meat qualities, Aberdeen Angus have become popular all over the world.

Rangeline, V. V., Humpback, E. S. cite data that currently the breed is widespread in the United States, Canada, Argentina, New Zealand, England, Australia. Animals differ in that they can be kept outdoors, even in the most severe frosts. When crossed with other breeds of animals well pass offspring meat quality (Program "Agribusiness 2020")

The research of A. F. Shevkhuzhev showed that with abundant feeding of the Aberdeen-Angus, obtained from large parents, and by 18 months had a mass of 440 kg, and bulls from smaller parents – 418 kg During the nursery and fattening average daily gain of calves of the first group was 873 g, II group – 776 G.

Rangeline, V. V., Humpback, E. S. revealed in Aberdeen-Angus bulls with intensive fattening average daily increase of 1000-1200 g, slaughter yield – 55-57% and meat with unsurpassed taste.

A significant contribution to the study of the problem of increasing beef production using imported into the country of early-maturing Aberdeen-Angus breeds with high adaptive skills, quality of meat, made a A. F. Shevkhuzhev, M. Mambetov, N. Chapaev.

A number of researchers (Zadnepryansky, I. P., Shvidenko, V. I., Randa-Lyn, D. A.,) suppose that all the desired results can be achieved faster by crossing with the best breeds of the domestic and world gene pool.

Beef breed for crossing with dairy and dairy-beef breeds is determined based on the accumulated experimental data in the region of crossing, as reflected in the works of Carrillo, J. A., Siewerdt F. O., Cruz G. D., Rodriguez-Sonchez, J. A.

Currently, meat cattle breeding effectively uses the genetic resources of the Aberdeen-Angus breed, which is characterized by high meat productivity and good quality of meat.

The subtlety of the backbone and the good development of those parts of the body that give the most valuable meat, provide Aberdeen Angus high yield of lean meat. Carcasses have lean cuts, with a small layer of "watering", a large output of "marble" fine-fiber meat, characterized by excellent culinary properties, and a relatively small number of bones (Mambetov M. M., Khapaev N. Ah. Bushueva I. S.).

D. A. Randelin found that the Aberdeen - Angus bulls at the end of the suction period live weight was 224 kg and up to 15 months they had the highest growth rate – from 973 to 1216 g per day. The greatest increase was observed in 12-13 months.

Domestic and foreign scientists have obtained numerous positive results by crossing Aberdeen Angus with other breeds (Zadnepryansky, I. P., Shvidenko, V. I., Randa-Lyn, D. A., Lopes, J. S., Roratoetal P. R., Carrillo, J. A., Siewerdt F. O., Cruz G. D., Rodriguez-Sonchez, J. A., J. W. Oltjenetal).

Aberdeen-Angus cattle is characterized by high growth energy and reaches a live weight at the age of 15 months, an average of 550 kg of live weight, and heifers – 450 kg. The young growth is characterized by relatively high average daily gains in live weight: in bulls – 980-1100 g, in heifers – 840-925 g. On the final intensive fattening the average daily gain of Aberdeen Angus calves reach 1500-1700 g, and live weight at 18 months of age is 650 kg, which indicates good food resources, allowing to obtain a relatively high meat productivity indexes (Shevkhuzhev A. F., M. M. Mambetov, Chapaev N.).

Aberdeen - Angus breed is characterized by unsurpassed qualities of meat and high yield of carcasses. So, if the local cattle have 50% of the meat yield, then 60% is obtained from the Aberdeen Angus breed (Ilimzhanova, Burnasheva & Gussenov, 2018).

2. Methodology

The research was carried out under the conditions of " Agrofirma Dinara - Ranch" LLP at Balkhash district of Almaty region. The use of Aberdeen–Angus bulls for industrial crossing with Kazakh white-headed bulls requires a detailed study of the fattening and meat qualities of crossbred bulls in the comparative aspect with purebred bulls. In this regard, the authors conducted a control slaughter of bulls at the age of 15 months. Before slaughter, the authors conducted animal weighing to determine the removable body weight. Then the animals were 24 hours without food with free access to water. Three hours before slaughter have deprived them of water so that the stomach was full. The bulls were weighed before slaughter to determine the pre-slaughter live weight.

To assess the meat quality of animals of different genotypes in accordance with the scheme of experience produced control slaughter of 3 animals from each group by the method of AUAASL [7], ARRIAH [8], ARRIMI [9]. At the same time, pre-slaughter live weight, mass of steamed carcass, carcass yield, mass of internal raw fat, slaughter weight, slaughter yield was taken into account.

The morphological composition of individual natural anatomical parts and the carcass as a whole was determined by boning of the right half-carcass. Half-carcasses were cooled for 24 hours at a temperature of 0 to + 4°C. Deboning was carried out in 5 natural anatomical parts: cervical, shoulder, spinal, lumbar and hip. On the basis of boning the absolute and relative content of bones, cartilage, tendons and pulp (including muscle tissue, subcutaneous and intermuscular fat), as well as the meat index (the output of the pulp part per 1 kg of bones) in some natural anatomical parts and in the carcass as a whole were established.

A comprehensive assessment of the carcasses was added its measurement and calculation of the indices of dense meat and execution of the hip.

A statistical analysis of the results of the veterinary study of the issue was carried out with the support of the veterinary service of Almaty region, the Ministry of agriculture and the Department of cattle breeding in the region.

3. Results

Creation and development of intensive beef cattle breeding in the country provides for the formation of herds of beef cattle using the gene pool of the best breeds in the world, such as Aberdeen–Angus, Kazakh white-headed breed and their hybrids. But wide introduction of these breeds in breeding programs and in commodity cattle breeding should be preceded by a comprehensive study of their productive and adaptive abilities to specific climatic conditions of the intended use. This will make it possible to achieve a more complete realization of the genetic potential of productivity of introduced breeds.

To obtain information about the slaughter and meat qualities of the Kazakh white-headed breed, Aberdeen - Angus bulls and hybrids, the slaughter of animals was carried out at the age of 15 months (table 1).

Table 1
Results of slaughter of experimental
bulls in 15 months

Indicator	Genotype					
	Aberdeen - Angus		Kazakh white-headed		F1	
	X±mx	Cv	X±mx	Cv	X±mx	Cv
Pre-slaughter weight (kg)	418,8±1,53	0,3	443,7±1,53	0,3	425,7±0,58	0,1
Steam mass carcass (kg)	229,5±0,58	0,2	248,0±1,90	0,7	235,7±3,03	1,2
Carcass output (%)	54,8±0,85	1,5	55,9±1,15	2,0	55,7±1,75	3,1
Weight of internal raw fat	13,0±0,95	7,2	15,1±0,67	4,4	14,6±0,21	1,4

(kg)						
Internal fat yield (%)	3,1±0,31	9,6	3,4±0,10	2,9	3,3±0,15	4,5
Slaughter weight (kg)	242,5±1,27	0,5	263,1±0,76	0,2	254,3±1,53	0,6
Lethal output (%)	57,9±0,06	0,1	59,3±0,90	1,5	58,2±1,20	2,0

Note: calculated and compiled by the authors themselves

15-month-old Kazakh white-headed breeds surpassed Aberdeen– Angus bulls in pre-slaughter weight by 24.9 kg ($P > 0.95$), weight of steamed carcass by 18.5 kg ($P > 0.95$), carcass yield by 1.1 abs. %, internal fat mass by 2.1 kg ($P > 0.95$), slaughter yield by 1.4 abs. % ($P > 0.95$) and hybrids by pre-slaughter weight of 18 kg ($P > 0.95$), the mass of the steamed carcass by 12.3 kg ($P > 0.95$), carcass yield of 0.2 abs. %, weight of internal fat at 0.5 kg ($P > 0.95$), slaughter yield at 1.1 abs. % ($P > 0.95$).

Meat qualities of animals are estimated by results of a boning of half-carasses (table 2).

Table 2
Results of boning of half-carasses
of bulls at the age of 15 months

Indicator	Genotype					
	Aberdeen - Angus		Kazakh white-headed		F1	
	X±mx	Cv	X±mx	Cv	X±mx	Cv
Half-carass weight (kg)	113,7±0,95	0,8	122,8±0,60	0,4	119,7±0,67	0,5
Pulp (kg)	88,7±0,15	0,1	99,8±0,10	0,1	92,3±0,21	0,2
%	78,0		81,3		80,1	
Including muscle tissue (kg)	75,0±1	1,3	82,5±0,10	0,1	74,9±0,10	0,1
%	66,0		67,2		67,0	
Adipose tissue (kg)	13,7±0,15	1,1	17,3±0,15	0,8	15,4±0,15	0,9
%	12,0		14,1		13,1	
Bones (kg)	21,4±0,15	0,7	20,3±0,06	0,2	20,4±0,10	0,4
%	18,8		16,5		15,8	
Cartilage and tendons (kg)	3,6±0,06	1,5	2,7±0,10	3,7	3,0±0,10	3,3
%	3,2		2,2		2,1	
Half-carass (%)	100,0		100,0		100,0	
Including: edible	78,0		81,3		79,1	
Not edible	22,0		18,7		17,9	
Edible index	3,55		4,35		4,29	

Meat ratio	4,14±0,01	0,2	4,92±0,01	0,2	4,23±0,01	0,2
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Note: calculated and compiled by the authors themselves.

The obtained results irrefutably demonstrate the superiority of the Kazakh white-headed breed over Aberdeen - Angus and hybrids in terms of meat quality of animals.

At slaughter of Aberdeen - Angus bulls were inferior to Kazakh white-headed bulls' analogues by 9.1 kg ($P > 0.95$) on the output of flesh in the half-carcass by 11.1 kg ($P > 0.95$) on the output of muscle tissue 7.5 kg ($P > 0.95$). According to the content of adipose tissue in the half-carcass, Aberdeen - Angus bulls were also inferior to analogues by 3.6 kg ($P > 0.95$). Their advantage over the Kazakh white-headed bulls was observed only in the content of inedible parts of the carcass - by 3.3 kg.

At slaughter, crossbred bulls were inferior to Kazakh white-headed bulls by 3.1 kg ($P > 0.95$) in pulp output in the half-carcass, by 7.5 kg ($P > 0.95$) in muscle tissue output of 7.6 kg ($P > 0.95$). By the content of adipose tissue in the half-carcass, crossbred bulls were inferior to Kazakh white-headed bulls by 1.9 kg ($P > 0.95$).

Different yield and ratio of muscle and fat tissue in animals of the studied species influenced the quality of meat. Proof of this are the values of the indices of meat, edible and the ratio of edible and inedible parts of the carcass. The minimum value of these indicators was observed in the bulls of Aberdeen - Angus breed, which were inferior to the Kazakh white-headed bulls and hybrids at slaughter at the age of 15 months by 0.78- ($P < 0.95$) and ($P < 0.95$),

The difference in the accumulation of different tissues in the structure of the average daily growth of bulls of different genotypes was also established (table 3).

The composition of the average daily growth of bulls during the final fattening is more desirable, from the standpoint of its greatest usefulness, were the animals of the Kazakh white-headed breed.

Table 3
Structure of the average daily growth of bulls during the final fattening at the age of 15 months

Indicator	Genotype		
	Aberdeen - Angus	Kazakh white-headed	F1
Average daily increase in tissue (g)			
- muscular	367	413	387
- fat	117	137	126
- bone	86	70	81
- connective	10	10	10
Just	580	630	604
Specific mass of tissue in the growth (%)			
- muscular	63,27	65,56	64,52
- fat	20,17	21,75	21,2
- bone	14,84	11,11	12,6
- connective	1,72	1,58	1,68
Subtotal	100,00	100,00	100,0

Note: calculated and compiled by the authors themselves

The nutritional and technological value of beef depends not only on the genotype of the animal, but also on the location of the natural anatomical parts of the carcass (table 4).

The greatest specific weight in a half-carcass of animals of both breeds and hybrids falls on hip (from 33,8 to 34,7 %) and back - thoracic (from 30,0 to 32,0%) parts, less than others – on lumbar (from 7,6 to 10,2%) and cervical (from 8,2 to 9,5%) parts.

The share of the most valuable for nutritional lumbar and hip parts of the carcass at slaughter of animals at the end of feeding and after the final fattening of the Kazakh white-headed breed was 7.6% and 34.7%, Aberdeen - Angus breed 10.2% and 33.8%, respectively, and crossbred bulls was 7.8% and 34.2. The less valuable the neck and shoulder part of the carcass held in the Aberdeen - Angus of 9.5 % and 16.5 %, Kazakh white-headed breed of 8.5 % and 17.2% of the crossbred bulls for 8.2 and 16.4%.

Table 4
Effect of age of slaughter on the ratio of naturally anatomical departments of bull-calves at the age of 15 months.

Indicator	Genotype					
	Aberdeen - Angus		Kazakh white-headed		F1	
	X±mx	Cv	X±mx	Cv	X±mx	Cv
Half-carcass weight (kg)	113,7±0,95	0,8	122,8±0,1	0,1	114,7±0,67	0,5
Including anatomical parts: cervical (kg)	10,80±0,06	0,5	10,44±0,01	0,1	10,62±0,09	0,8
%	9,5		8,5		8,2	
shoulder (kg)	18,76±0,44	2,3	21,12±0,02	0,1	19,66±0,02	0,1
%	16,5		17,2		16,4	
back - thoracic (kg)	34,11±0,70	2,0	39,30±0,45	1,1	35,49±0,60	1,6
%	30,0		32,0		31,4	
lumbar (kg)	11,60±0,03	0,2	9,33±0,02	0,1	9,05±0,02	0,2
%	10,2		7,6		7,8	
hip (kg)	38,43±0,39	1,0	42,61±0,80	1,8	39,88±0,11	0,2
%	33,8		34,7		34,2	

Note: calculated and compiled by the authors themselves.

Thus, it is established that the introduced in the LLP "Agrofirma Dinara-Ranch" Kazakh white-headed breed, Aberdeen– Angus and their hybrids when grown with the use of fattening and final fattening exhibit a high growth energy, reaching to 18 months of age live weight 521,8 and 490 kg, showing high slaughter and meat quality.

The information presented in this section boils down to the fact that the animals of the Kazakh white-headed breed in many economic and biological properties superior Aberdeen Angus breed and crossbred bulls meat productivity and have every reason to become the main breed in the formation of beef cattle in the regions of the southern Balkhash in terms of LLP "Agrofirma Dinara-Ranch".

Qualitative characteristics of beef. In all countries, both abroad and in our country, the population prefers to eat the meat of young animals with small fat layers and high protein content. There are a huge number of factors that affect the quality of meat.

The tasks of our research included the assessment of the chemical composition, physical, chemical and commodity - technological properties of the meat of bulls of the studied breeds at slaughter in 15 months. Otherwise, it was necessary to study the effect of the genotype and age of animals at slaughter on the quality of beef.

The results of the performed studies indicate an increase in the dry matter content in the average meat sample with age (table 5).

As the chemical analysis showed, in the average sample of meat (minced meat) obtained at slaughter, the animals of the Kazakh white-headed breed in 15 months of dry matter was more by 3.54 %, protein by 0.52 %, fat by 3.03% than the animals of the Aberdeen– Angus breed. Also crossbred bulls were inferior to Kazakh white-headed bulls' dry matter was more by 2.14 %, protein by 1.2 %, fat by 2.15 %.

Table 5
Chemical composition of meat - minced carcasses of bulls, at slaughter at 15 months of age ($X \pm mx$).

Indicator	Genotype					
	Kazakh white-headed		Aberdeen - Angus		F1	
	$X \pm mx$	Cv	$X \pm mx$	Cv	$X \pm mx$	Cv
Dry matter (%)	30,10±0,1	0,6	33,64±0,56	1,6	31,54±0,40	1,2
«Crude» protein (%)	19,48±0,17	0,8	20,00±0,15	0,7	18,88±0,26	1,4
«Crude» fat (%)	9,62±0,03	0,2	12,65±0,05	0,3	10,5±0,20	1,9
Ash (%)	1,00±0,1	0,5	0,99±0,01	1,1	1,05±0,06	1,5
Ratio: protein/fat	2,02		1,58		1,98	
protein/dry matter	0,647		0,595		0,456	
"maturity" factor of meat (%)	15,76		19,06		15,90	

Note: calculated and compiled by the authors themselves

At slaughter at 15 - month age these indicators continued to remain higher Kazakh white-headed breed.

The age aspect of animals of different genotypes showed an increase in dry matter, fat and ash, but at the same time decreased the amount of protein.

Food, taste and energy value of meat are determined by the content and ratio of protein and fat. In 15 months, the ratio of protein/fat respectively of 2.02 and 1.98 m and the protein/dry matter 0,456 0,647 and was higher in bulls of the Kazakh white-headed breed, Aberdeen– Angus, the ratio was lower and the ratio of Mature superiority over the bulls the Aberdeen–Angus and crossbred bulls took an intermediate position.

The optimal value of meat maturity is considered to be 20-25% (Kosilov V. I., Buravov A. F., Salikhov A. A.). These requirements are fully consistent with the meat of bulls Aberdeen– Angus breed at 15 months of age. Among the indicators characterizing the quality of beef, the chemical composition of the longest back muscle is used. Chemical analysis data showed that this muscle in the bulls of both groups contains more protein, but less dry matter and fat, when compared with the average sample of meat carcasses.

Thus, there were no significant differences in the chemical composition of the meat samples of the longest back muscle in the age aspect. Significant interbreed differences in 15-month age were

observed only in dry matter content. As for the protein content, we can note only the presence of a tendency to increase it in the longest muscle of Aberdeen Angus bulls.

Higher protein/fat and protein/dry matter ratios were observed in 15-month-old bulls of different genotypes.

As you can see, the meat products obtained from the slaughter of the Kazakh white-headed breed and Aberdeen Angus bulls and hybrids are of good quality and have a high content of protein and fat.

A higher content of protein and intramuscular fat in the muscle tissue of Aberdeen Angus bulls is an indicator of the high taste and marbling of beef.

In the study of physical and chemical parameters of the samples of the longest back muscle there were no significant interbreed and age differences in acidity and water-holding capacity in animals of the Kazakh white-headed breed and Aberdeen-Angus breed and hybrids (table 6).

Table 6
Physical and chemical properties of meat samples of the longest back muscle ($X \pm mx$).

Indicator	n	Genotype					
		Aberdeen - Angus		Kazakh white-headed		F1	
		$X \pm mx$	Cv	$X \pm mx$	Cv	$X \pm mx$	Cv
Acidity, pH, acidity (unit)	15	5,89±0,09	1,4	5,92±0,07	1,2	5,87±0,02	0,3
Moisture holding capacity (%)	15	58,25±0,57	0,9	57,04±1	1,7	58,29±0,01	0,02
Color intensity of the extinction units	15	284,63±0,56	0,2	305,14±0,31	0,1	296,55±0,84	0,2
Meat tenderness (kg/ cm ²)	15	3,03±0,01	0,3	2,54±0,01	0,3	2,91±0,02	0,5
Loss of juice when cooked (%)	15	37,00±0,54	1,4	40,86±0,08	0,1	39,76±0,05	0,1

Note: calculated and compiled by the authors themselves

The acidity of the meat of animals of different genotypes is at the level of quality of the meat.

The results obtained in the studies show a high water-holding capacity of the meat of bulls of different genotypes.

According to the moisture-holding ability of meat, there is a slight tendency to increase at the age of 15 months and in favor of animals of different genotypes.

Increase in pre-slaughter age significantly increases the intensity of the color of meat: bulls Kazakh white-headed breed is 305.14 units., bulls Aberdeen - Angus breed – 284.63 and crossbred bulls 296.55 units. Darker color has the meat of the Kazakh white-headed breed, which in 15 months exceeded Aberdeen - Angus analogues by 7.2% ($P > 0.95$) and crossbred bulls by 2.8% ($P > 0.95$).

In assessing the taste and technological properties of meat determine its tenderness. The most tender meat is characterized by Aberdeen - Angus.

An important culinary indicator of beef quality is the loss of moisture during heat treatment. Higher losses were observed in the meat of the Kazakh white-headed breed, in which at the age of 15 months moisture loss by 2.12% ($P > 0.95$) exceeded the Aberdeen - Angus breed and crossbred animals by 2.19% ($P > 0.95$).

Thus, Aberdeen– Angus cattle meat productivity, as expected, is characterized by generally better physical, chemical and commodity -technological characteristics of meat, compared with similar indicators of the Kazakh white breed.

A more complete judgment about the quality of meat gives its organoleptic evaluation. To clarify the organoleptic properties of beef and broth tasting was conducted on a five-point scale. The results of the tasting are summarized in table 7.

Table 7
The results of the tasting of
the meat and broth, score

Indicator	Aberdeen - Angus		Kazakh white-headed		F1	
	X±mx	Cv	X±mx	Cv	X±mx	Cv
Meat	4,77±0,02	0,3	4,16±0,01	0,1	4,28±0,02	0,4
Broth	4,43±0,03	0,5	4,00±0,02	0,3	4,17±0,03	0,6
On average	4,60		4,08		4,23	

Note: calculated and compiled by the authors themselves

The greatest number of points for the appearance, taste, tenderness and juiciness received beef Aberdeen - Angus breed regardless of the age of slaughter. Their advantage over the Kazakh white-headed breed at slaughter in 15 months on a total assessment of quality of meat was equal respectively to 14,6 % and hybrids of 11,4% ($P > 0,95$). Advantage of animals of Aberdeen - Angus breed over peers of the Kazakh white-headed breed by results of an assessment of quality of broth of bull-calves at slaughter at 15 - month age made 10,75% ($P > 0,95$) and crossbred bull-calves at 18 - month age 6,2 % ($P > 0,95$).

In general, the quality of meat and broth bulls Aberdeen– Angus breed 15 months exceeded by 12.75% of peers Kazakh white-headed breed and crossbred bulls 8,7 %.

3.1. Discussion of results

It can be considered established that the meat of Kazakh white-headed, Aberdeen – Angus bulls and hybrids grown in LLP "Agrofirma Dinara-Ranch" using feeding and final fattening, has high physical and chemical, culinary and technological, organoleptic characteristics. At the same time, meat of higher quality was obtained from Aberdeen - Angus bulls.

When fattening the Kazakh white-headed, Aberdeen – Angus bulls and hybrids with the use of feeding and final fattening, the greatest intensity of growth was shown by the Kazakh white-headed bulls, who reached 457.4 kg and 519.8 kg by the age of 15 months, while the Aberdeen–Angus bulls had a live weight of 430.6 kg and 490.0 kg.

Aberdeen Angus bull-calves Kazakh white-headed counterparts are superior for meat quality. Carcass weight at the age of 15 months is 229.5 kg, flesh– 78%, the index of edible – 3.55%.

The muscle tissue of Aberdeen – Angus bulls was characterized by the best chemical composition, physical and chemical parameters.

The score obtained in the organoleptic evaluation of meat and broth, bulls Aberdeen Angus breed exceeds 12.75 indicator of Kazakh white-headed bulls and crossbred bulls 8,7 %.

High intensity of growth and the best meat qualities of bulls Aberdeen - Angus due to the greater activity of their metabolic processes in the body in comparison with the Kazakh white-headed bulls.

The meat qualities of Aberdeen – Angus bulls had an advantage over the Kazakh white-headed bulls and crossbred bulls: pre-slaughter weight, weight of steamed carcass, slaughter weight, weight of raw fat, slaughter yield, meat ratio, the amount of flesh in the carcass, meat yield.

Aberdeen – Angus bulls were inferior in slaughter qualities to Kazakh white-headed bulls and crossbreeds not only at slaughter at the age of 15 months, but even at 18 months, after the final fattening.

From the breeds of cattle bred in "Agrofirma "Dinara-Ranch" LLP the greatest growth rate, at cultivation and fattening of bull-calves, the Kazakh white-headed breed is allocated, they are followed by Aberdeen – Angus breed. The leading in this process, taking into account the intensity of growth, high meat qualities, adaptive abilities and the number of available livestock is the Aberdeen - Angus breed.

4. Conclusions

Meat obtained during the control slaughter from the experimental steers was in accordance with the requirements of I category. Kazakh white-headed bulls surpassed the peers of Aberdeen-Angus breed by 18.5 kg or 8.06% and hybrids by 12.3 kg or 5.2% by weight of steamed carcass. The output of internal fat was higher in bulls of the Kazakh white-headed breed. Bull-calves of the Kazakh white-headed breed surpassed the peers of Aberdeen-Angus breed by number of pulp by 11,1 kg – 12,5 % and bulls of hybrids by 7,5 kg – 8,1 %.

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