ISSN 0798 1015

REVISTA ESPACIOS

Vol. 40 (Issue 42) Year 2019. Page 6

Livestock development in Kazakhstan: peculiarities about the growth and development of young animals from meat breeds of cattle with different genotypes (research base LLP «Agrofirm Dinara - Ranch»)

O desenvolvimento da pecuária no Cazaquistão: características do crescimento e desenvolvimento de recria de bezerros de raças de bovinos de diferentes genótipos (base de pesquisa de SRL «Agrofirma Dinara - Ranch»)

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Received: 04/06/2019 • Approved: 04/12/2019 • Published 09/12/2019

Contents

ABSTRACT:
The article shows the data of growth and development of young animals from birth to 18 months, obtained by purebred breeding: Kazakh white-headed breed, Hereford breed and their crossbreed. Study of the peculiarities of the physical state of juveniles from birth to 18 months found that both young thoroughbred and mongrels always distinguished by a harmonious figure and had a well-expressed meat forms. Nevertheless, peculiarities and differences appeared at an early age. At the same time, the value in live weight differed from a maximun by the Hereford ´s bulls , and the minimum from the Kazakh white-headed peers, while crossbred animals occupied an intermediate position.
Keywords: Livestock, Economics, Kazakh white-headed breed, Hereford breed

RESUMEN:
O artigo mostra os dados do crescimento, desenvolvimento recria a partir do nascimento até 18 meses, através da retirada: «Kazakh white-headed» raça, «Hereford» raça e seus híbridos. O estudo das características físico recria desde o nascimento até 18 meses ajustou-se que, como os jovens, e os híbridos sempre diferente harmonioso físico e tiveram bom sucesso de carne do formulário. Ao mesmo tempo, características e diferenças manifestou-se já em tenra idade. Com um máximo de valor em peso diferente gobies «Hereford» e mínimo, do «Kazakh white-headed» pares, híbridos de animais ocupavam uma posição intermediária.
Palabras clave: Pecuária, «Kazakh white-headed» raça, «Hereford» raça

1. Introduction

An important task of the agro-industrial complex of the Republic of Kazakhstan is to increase meat production of livestock and especially beef. According to its biological value, it is one of the sources of human nutrition (Avilés, 2015).

Almost all over the world, measures are being taken to increase the productivity of beef cattle: new types and breeds are being created, characterized by large body sizes, and high growth rates with an optimal ratio of the main nutrients in the meat. Efficiency of crossing of the Kazakh white-headed and Hereford cattle of different genotypes of a consensus among researchers isn't present in this connection studying of the matter in the southern regions, including in "Agrofirm "Dinara-Ranch", is an actual task (Barkhudar et al. , 2018).

The aim of the study was to find ways to increase beef production by improving the productive qualities of the Kazakh white-headed cattle by the method of introductory crossing with the Hereford breed (Chapkanov, 2011).

Research problem

The study of the development of young animals of different genotypes from birth to 18 months of age. The study of the main interior indicators and their relationship with the productivity of different genotypes.

Studying the features about growth and development of young meat breeds of cattle in the conditions of "Agrofirm Dinara-Ranch" by the introductory crossing of the Kazakh white-headed breed with Hereford and obtaining crossbreeding is important as a new type of cattle, characterized by a high meat productivity, creating a stable breeding base (Frisch, 1987).

The creation of new inbreeding of types of livestock a large body, is highly productive qualities, helps the intensification of the breeding process and to create a sustainable base of tribal resources (Kalnaus, V. I. & Kalnaus, Z. E., 2009).

Genotypes of foreign selection of Herefords, involved on the improvement of local populations of this breed and of those of the Kazakh white-headed, promote the use of interbreed resources, which stabilizes the gene pool and maintains a stable heredity (Nikonova, 2018).

Development and growth are two sides of a single process of individual maturing of each animal, implying both a quantitative increase in body weight and linear dimensions, and qualitative changes associated with the formation of suitable animals for reproduction and long-term operation in order to obtain products from them. Directed rearing of young cattle cannot be carried out without a clear knowledge of these two interrelated processes.

The process of growth is a quantitative accumulation of structural elements in its body, resulting in an increase in the total mass (size) of the body and its individual organs and tissues (Nurgazy, 2016a).

The body of the animal during growth and development changes. Under normal conditions, the weight of the animal increases, its external forms undergo changes, the ratio of tissues in the body and their composition, and as a result, meat productivity, including the quality of meat. The correct assessment of biological characteristics and productive qualities of animals of different ages determines the most desirable type of beef cattle, determines the optimal age and weight of young animals before slaughter and receives carcasses from him with desirable quality indicators of meat (Nurgazy, 2016b).

The study of the laws of growth and development of farm animals is one of the important sections of Zootechnical Science, as in the process of development of the animal shows not only species and breed properties, but also inherent only to its personality with all the features of its constitution, exterior, temperament, vitality and productivity. The processes of growth and development of animals along with other numerous factors (feeding, maintenance, physiological state, etc.) are largely determined by breed characteristics. Among these factors at the same time, the age of parents-according to numerous researchers- plays an important role (Pikul, 2009).

The solution of this important task facing the agro-industrial complex of the Republic -to increase meat production- is possible by increasing productivity, as currently the genetic potential of animals is not fully disclosed due to insufficient feeding (Dzigitov, 2006).

The level of meat productivity and quality of meat products of animals is emphasized by their genetic potential and environmental conditions: mainly the level of feeding and technology content. In modern conditions of management, receiving and rational use of highly productive animals is a perspective direction of development of meat cattle breeding, which actual question is

development of receptions of feeding of young growth with use of a cheap forage of natural pastures. The greatest effect can be obtained with pasture fattening of crossbred calves.

2. Methodology

Research and production experience were conducted in " Agrofirm Dinara-Ranch" LLP, Balkhash district, Almaty region.

In the course of our work authors studied the growth and development of purebred and crossbreed young animals obtained from crossing Hereford producers (pimps) with cows of the Kazakh white-headed breed.

Three groups of bulls and heifers, obtained from purebred Kazakh white-headed, Hereford breeds and their hybrids (F1male Hereford ×female Kazakh white-headed) with feeding and final intensive stall fattening from birth to 18 months, were created from newborn young animals.

Evaluation of the growth and development of young animals was conducted according to the results of studying the indicators of live weight from birth to 18 months of age, of daily gain in body weight, as well as the absolute and relative speed of growth in certain age periods.

At the young age periods the following measurements were done:

- height at withers;
- height at rump;
- diagonal body length (measuring stick);
- chest girth behind the shoulders;
- depth of chest;
- width of chest behind shoulders;
- metacarpus (measuring tape).

On the basis of this measurements, indices related to their fitness were calculated: length of legs, elongation, hip and thoracic, thoracic, overgrown, bony.

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

Under the same influence of paratypical factors, juveniles from the two different breeds and their crossbreed from birth to eighteen months of age, as a rule, differed in size of live weight.

The variability of live weight of young animals of different genotypes according the age aspect can be traced in tables 1 and 2.

Under the same conditions of the environment productive qualities of animals are made by its genetic capabilities. This is confirmed by the experimental data obtained by the authors. Their analysis - is an indicator of intergroup differences in live weight already in newborn young animals.

At the same time its greatest indicator was characterized by bull-calves of Hereford breed. Their advantage over purebred peers of the Kazakh white-headed breed on the studied indicator was 1.6 kg ($P>0.95$), hybrids of 0.3 kg ($P<0.95$). It is also established that the minimum level of live weight at birth were heifers of Kazakh white-headed breed. Thus, they were inferior to Hereford peers in the value of the studied indicator by 1.7 kg ($P>0.95$), hybrids – by 0.4 kg ($P<0.95$). The difference in live weight at birth was insignificant (0.3 kg), (0.3) and statistically unreliable in Herefords and crossbred young animals.

Thus, heterosis for live weight were not apparent and were observed only for the intermediate inheritance of the studied parameter.

At the age of 2 months, the bulls of the crossbreed surpassed the peers of the Kazakh white-headed breed by body weight by 10.7 kg ($P>0.95$), but were inferior to the Herefords by 1.4 kg ($P<0.95$). Similarly, the heifers of the crossbreed were more than the peers of the Kazakh white-headed breed by body weight by 8 kg ($P>0.95$), but were inferior to the Herefords by 1.2 kg ($P<0.95$).

At the age of 4 months, the bulls of the crossbreed surpassed the peers of the Kazakh white-headed breed by body weight by 13.3 kg ($P>0.95$), but were inferior to the herefords by 2.4 kg ($P>0.95$). Heifers of the crossbreed at the age of 4 months were ahead of peers of the Kazakh

white-headed breed by body weight by 12.7 kg (P>0.95), but inferior to Herefords by 3.4 kg (P>0.95).

At the age of 6 months, the bulls of the crossbreed surpassed the peers of the Kazakh white-headed breed by body weight by 14.1 kg (P>0.95), but were inferior to the Herefords by 4.1 kg (P>0.95). At the age of 6 months heifers hybrids ahead of their peers Kazakh white-headed breed by body weight of 15.8 kg (P>0.95), but inferior to Herefords by 5.2 kg (P>0.95)

Table 1
Dynamics of live weight and growth rate of bulls, kg.

Age, months	Genotype								
	Kazakh white-headed			Herefords			F1		
	♂(males)			♂(males)			♂(males)		
	Indicator								
	n	X±mx	Cv	n	X±mx	Cv	n	X ±mx	Cv
At birth	40	27,0 ±0,21	4,8	45	28,6±0,31	7,2	45	28,3±0,03	6,1
2	40	68,1±1,26	11,6	45	80,2±0,56	4,6	45	78,8±1,05	8,8
4	40	112,4 ±0,76	4,2	44	128,1±0,35	1,8	45	125,7±0,19	1,0
6	39	177,3 ±1,97	6,9	44	195,5±0,97	6,3	45	191,4 ±1,56	5,4
8	39	221± 1,07	3,6	44	244,6 ±0,98	2,6	44	242,2±1,14	3,0
12	39	316,8 ± 10,6	3,3	44	353,2 ± 10,5	3,0	44	346,0 ±12,3	3,5
15	39	420,5 ±14,6	3,5	44	462,0 ±14,6	3,1	44	455,6 ±14,4	3,2
18	39	458,0 ± 15,8	3,4	44	494,2 ±15,7	3,0	44	484,5 ± 11,2	2,3

Note: calculated and compiled by the authors themselves

Table 2
Dynamics of live weight and intensity of growth of heifers, kg

Age, months	Genotype		
	Kazakh white-headed	Herefords	F1
	♀(females)	♀(females)	♀(females)

	Indicator								
	n	**X±mx**	**Cv**	**n**	**X±mx**	**Cv**	**n**	**X±mx**	**Cv**
At birth	55	25,2±0,02	5,6	50	26,9±0,20	5,3	50	26,6±0,2	5,2
2	55	64,3±0,83	9,5	50	73,5±0,97	9,2	50	72,3±0,95	9,2
4	54	96,7±1,21	9,1	50	112,8±0,69	4,3	50	109,4±0,64	4,1
6	54	158,4±1,06	4,8	50	179,4±0,15	4,2	50	174,2±1,60	6,4
8	54	193,3±2,34	8,8	49	220,5±1,81	5,7	49	218,5±2,15	6,8
12	54	280,7±9,15	3,2	49	314,3±10,5	3,3	49	306,2±12,5	4,0
15	54	325,1±11,83	3,6	49	370,6±12,1	3,2	49	360,3±12,5	3,4
18	54	374,2±12,6	3,3	49	422,4±15,1	3,5	49	411,0±16,2	4,0

Note: calculated and compiled by the authors themselves

At the age of 8 months, the predominant influence of the genotype on the manifestation of meat qualities was noted. Starting from 8 months of age manifested heterosis in live weight. The heterosis index at this age was low at 101.1%.

The insignificant value of the heterosis index on live weight is determined by a large variety of breeds involved in crossing. Kazakh white-headed breed is characterized by low live weight, precocity, while Herefords – a breed of large type, large format physique, long-haired. It was an indicator in all cases of lower level of live weight at bulls of the Kazakh white-headed breed.

It should be noted that at the age of one year they were inferior in the studied indicator to Hereford peers by 36.4 kg (11.4%, P>0.95), hybrids - 29.2 kg (9.21%, P>0.95), in 15 months. – 42 kg (10,0, P>0,95) and 35,1 kg (8,3%, P>0,95), in 18 months, respectively 36,2 kg (7,9%, P>0,95) and 26,5 kg (5,8%, P>0,95).

At 12 months of age and heifers of Kazakh white-headed breed was inferior to the studied indicator, Hereford peers 33.6 kg(11,9%, P>0,95), hybrids -25,5 kg (9,0%, P>0,95), 15 months, respectively, of 45.5 kg (a 13.9 %, P>0,95) and 35.2 kg (10,8%, P>0.95) and at 18 months is 48.2 kg (12,8 %, P>0.95) and 36.8 kg (9,8 %, P>0,95).

Analyzing the indicators of the coefficient of variation (Cv), the changeable mass of young animals from birth to 18 months of age in different genotypes is determined by a fairly low degree of phenotypic variability. There is a pattern of decrease in the coefficient of variation with age. Higher coefficients of variation are available in bulls of different genotypes in comparison with heifers. This suggests that among the bulls is a tough selection when you assign them to the tribe. A relatively high variation of the trait in crossbred young compared with purebred bulls (1,0-8,8%), heifers (3,0-9,2%).

In general, the analysis of indicators of variability of live weight of young animals in different genotypes shows that young Hereford breed has the best adaptive properties of their body to the specific conditions of the sandy deserts of the Southern Balkhash. This is evidenced by the indicators of the average value and coefficient of variation of their live weight.

An important indicator, the magnitude of which can be judged on the intensity of growth of the animal, is the average daily increase in live weight. The data obtained by the authors indicate certain intergroup differences in the intensity of growth already in the suction period.

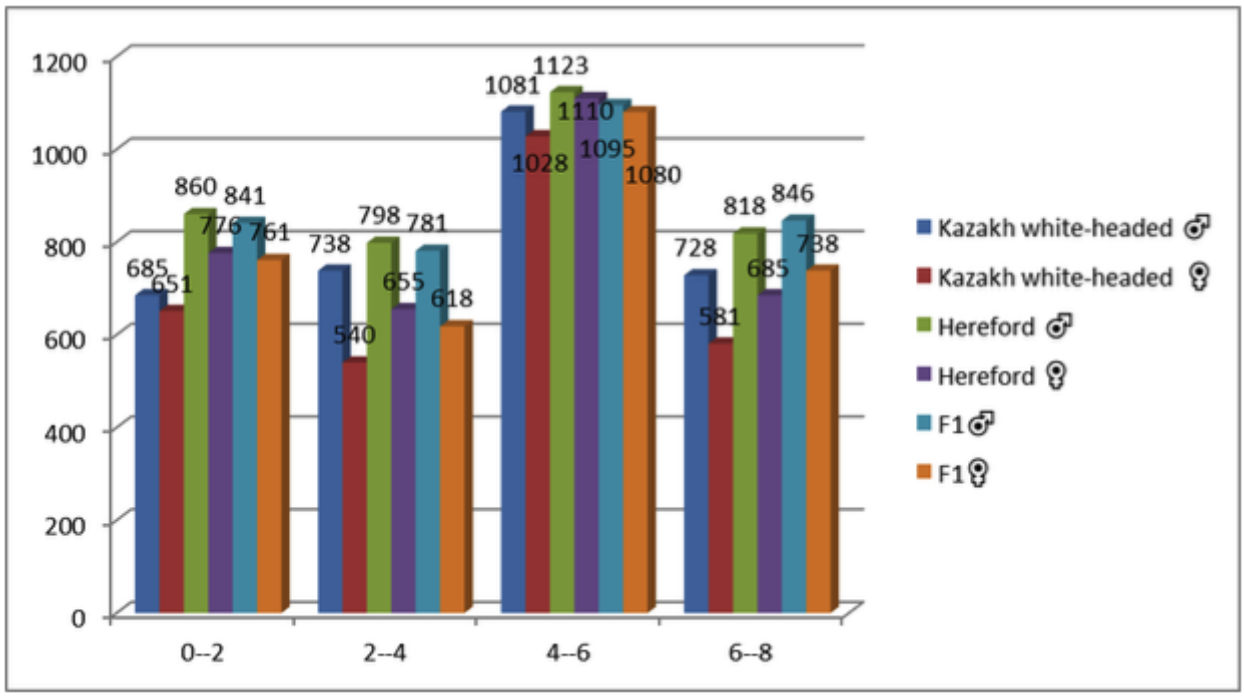
The maximum value of the average daily increase in live weight also differed bulls Hereford breed (figure 1). So, their advantage on average daily growth of live weight over peers of the Kazakh white-headed breed during the period from birth to 2 months was 175 g (25,5%), and hybrids – 19 g (2,25%). At the same time the maximum value of the studied index differed and heifers of Hereford breed. So, their advantage on average daily growth of live weight over contemporaries of the Kazakh white-headed breed in the period from birth to 2 months, was 125 g (19.2%), and hybrids – 15 g (1.9%). These differences are due to the higher milk content of Hereford cows.

After 6 months of age in the post-weaning period, due to the stress of young animals, due to weaning from mothers, the intensity of growth of animals of all groups decreased. Moreover, to a greater extent it was typical for purebred Hereford heifers. Thus, from 4 to 6 months of age, there was a decrease in the average daily increase in live weight in them was 42 g (3.7%), whereas in hybrids 28 g (2.55%), heifers of the Kazakh white-headed breed 82 g (7.3%), whereas in hybrids 30 g (2.7%). This is probably due to the lower stress resistance of Hereford cattle.

Of course, the decrease in the live weight of young animals is not a pedigree property, but a consequence of not full provision of the body's need for nutrients in the content of their pastures. Nevertheless, the degree of loss of live weight of young animals during this period to a certain extent can be the result of their adaptability to these conditions of grazing.

Analyzing the parameters of the coefficient of variation of live weight, it should be emphasized that we have not been able to establish a strict pattern of its change associated with age or belonging to a particular genotype. It can only be pointed out that within the genotype, the degree of phenotypic variability of the live mass is more pronounced in the pasture period than in the stall period. Since all animals were kept in the same herd feeding conditions and their content can be considered the same. Therefore, the value of the coefficient of variation of live weight at a given age - genotypic differences of individuals. From these positions the live weight of animals during this period at the pasture maintenance is of certain interest for selection, as criterion of fitness of an individual genotype.

Figure 1
Average daily increase in live weight of young animals, g.



Note: compiled by the authors themselves

A slight decrease in the intensity of growth of bulls and heifers in the post-weaning period was probably influenced by a complex of stress factors:

- the psychophysiological state after weaning from mothers,

- the restructuring of their digestive system in connection with the transition from milk-grass to concentrate-silage-hay type of feeding,
- the technological stress factor associated with the transfer of animals from 24-hour maintenance to pasture to the tethered system with limited movement.

In the later age period (6 to 8 months) there was an increase in the intensity of growth in bulls of different genotypes. At the same time, bull-calves of the Kazakh white-headed breed were inferior to Hereford peers by average daily gain of live weight in the analyzed age period by 90 g (12.3%), hybrids by 118 g (16.2%). Also, heifers of the Kazakh white-headed breed were inferior to Hereford peers by the average daily increase in live weight in the controlled age period by 104 g (17.9%), hybrids by 157 g (27%).

In general, for the entire period of cultivation the highest level of the average daily increase in live weight differed Herefords, the smallest – bulls of the Kazakh white-headed breed, hybrids had an intermediate position.

The maximum value of the average daily increase in live weight also differed bulls Hereford breed (tab. 3,4).

Table 3
Average daily live weight gain of bulls, g (n-15)

Age, months	Genotype					
	Kazakh white-headed		Herefords		F1	
	indicator					
	X±mx	Cv	X±mx	Cv	X ±mx	Cv
8-12	798±3,03	0,3	905±2,17	0,2	865±2,45	0,2
12-15	1152±2,25	0,2	1208±3,64	0,3	1217±3,84	0,3
15-18	416±2,79	0,6	357±3,50	0,9	321±2,47	0,7
6-15	900±3,35	0,3	987±3,42	0,3	978±2,0	0,2
6-18	779±3,90	0,5	829±2,44	0,2	814±3,43	0,4
0-18	798±2,56	0,3	862±2,26	0,2	844±2,92	0,3

Note: calculated and compiled by the authors themselves

Table 4
Average daily gain of live weight of heifers, g(n-15)

Age, months	Genotype					
	Kazakh white-headed		Herefords		F1	
	indicator					
	X±mx	Cv	X±mx	Cv	X ±mx	Cv
8-12	728±2,85	0,3	781±2,29	0,2	730±2,14	0,2
12-15	493±2,53	0,5	625±2,91	0,4	601±2,91	0,4

15-18	545±2,81	0,5	575±2,43	0,4	563±2,96	0,5
6-15	617±2,00	0,3	708±3,23	0,4	689±3,24	0,4
6-18	599±1,58	0,2	675±2,82	0,4	657±2,87	0,4
0-18	646±2,20	0,3	732±3,16	0,4	711±3,78	0,5

Note: calculated and compiled by the authors themselves

So, their advantage on average daily growth of live weight over peers of the Kazakh white-headed breed in the period (8-12 months.) there was an increase in the intensity of growth in bulls of different genotypes. Thus young growth of the Kazakh white-headed breed conceded to Hereford peers on average daily gain of live weight in the analyzed age period on 107 g (13,4 %, P>0,95), hybrids on 40 g (4,6 %, P>0,95).

The maximum value of the studied indicator differed heifers Hereford breed. So, their advantage on average daily growth of live weight over contemporaries of the Kazakh white-headed breed in the period from (8-12 months.) was 53 g (7.2%, P>0.95), and hybrids - 51 g (6.9%, P>0.95).

The most objective indicator to characterize the degree of variability of weight with age of the animal is the coefficient of variation (Cv) which shows that the variability of live weight with age varies slightly and there are no differences between the studied animals of different genotypes.

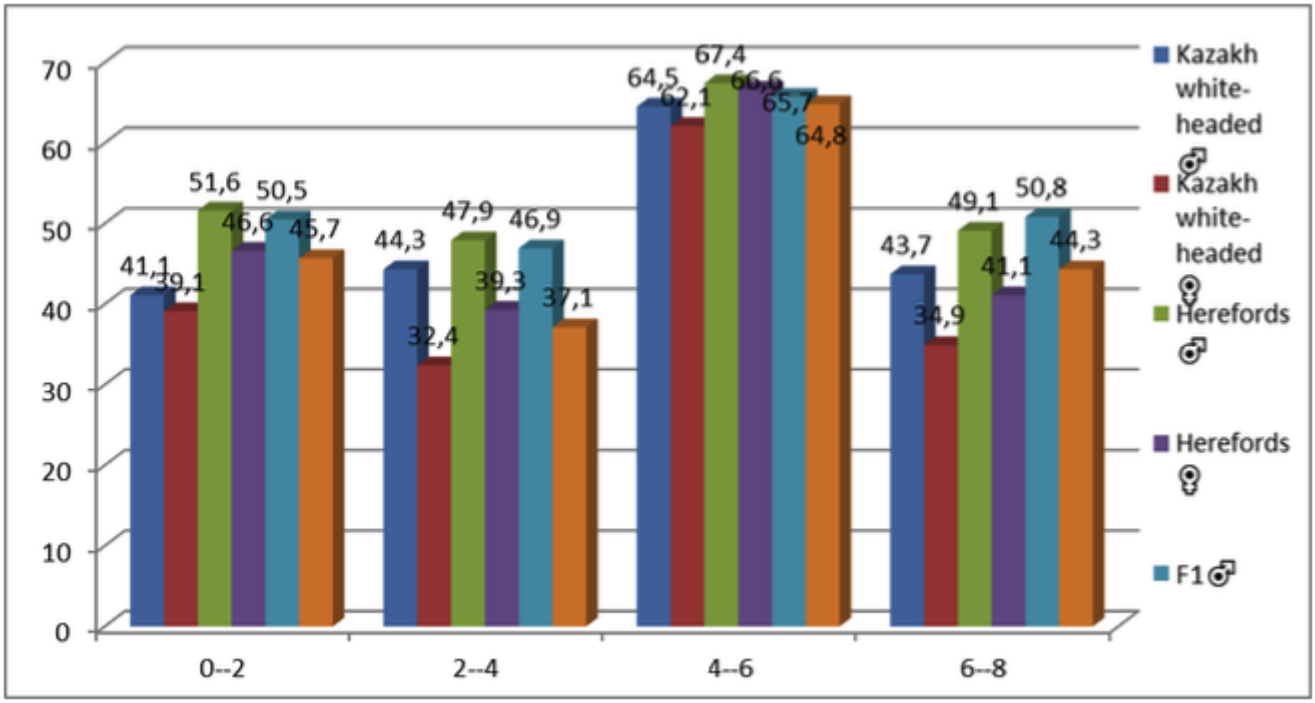
When transferring to the summer pasture content, the intensity of growth and development of young animals of different genotypes decreased, the minimum level was characterized by bull-calves of the Kazakh white-headed breed. When translated into winter and stabling organization final fattening the intensity of the growth and development of the castrati increased significantly. At the same time, after 18 months of age, despite the high level and usefulness of feeding, the average daily weight gain in young animals of different genotypes decreased. This is due to the intensification of the fat deposition process in the body of bulls. In general, for the entire period of cultivation the highest level of the average daily growth of live weight differed Hereford bull-calves, the smallest – bull-calves of the Kazakh white-headed breed, hybrids occupied an intermediate position. Thus, the advantage over peers Kazakh white-headed bulls when grown from birth to 18 months of age on average daily weight gain was 64g (8.0 %, P>0.95), crossbred bulls 46 g (5.8 %, P>0.95). And crossbred bulls surpassed peers of the Kazakh white-headed breed in size of the studied indicator on 46 g (5,7%, P>0,95). The advantage of Hereford heifers over the peers of the Kazakh white-headed breed when grown from birth to 18 months of age by the average daily increase in live weight was 86 g (13.3 %, P>0.95), and crossbred heifers 21 g (3.0%, P>0.95). In turn, crossbred heifers surpassed peers of the Kazakh white-headed breed in the value of the studied indicator by 65 g (10.0%, P>0.95).

Thus, despite the observed fluctuations in the average daily increase in body weight, due to the influence of paratypical factors on the body of young animals and different rate of reaction of heifers of different genotypes to their changes, as well as the influence of puberty and features of puberty and the formation of reproductive function, young of different genotypes normally grew and developed.

In General, heifers of different genotypes have a different nature of changes in body weight, growth rate, relative growth rate and the coefficient of increase in body weight with age. Thus, on a complex of these indicators crossbred and Hereford heifers were preferable.

By the absolute growth of live weight bulls Hereford superior Kazakh white-headed breed and hybrids from birth to (6 months). Hereford bulls exceeded the Kazakh white-headed breed at birth to 2 months of age by 10.5 kg (25.5%), hybrids by 1.1 kg (2.1%). Heifers - Herefords exceeded the Kazakh white-headed breed by 7.5 kg (19.1%), hybrids by 0.9 kg (1.9%) (figure 2).

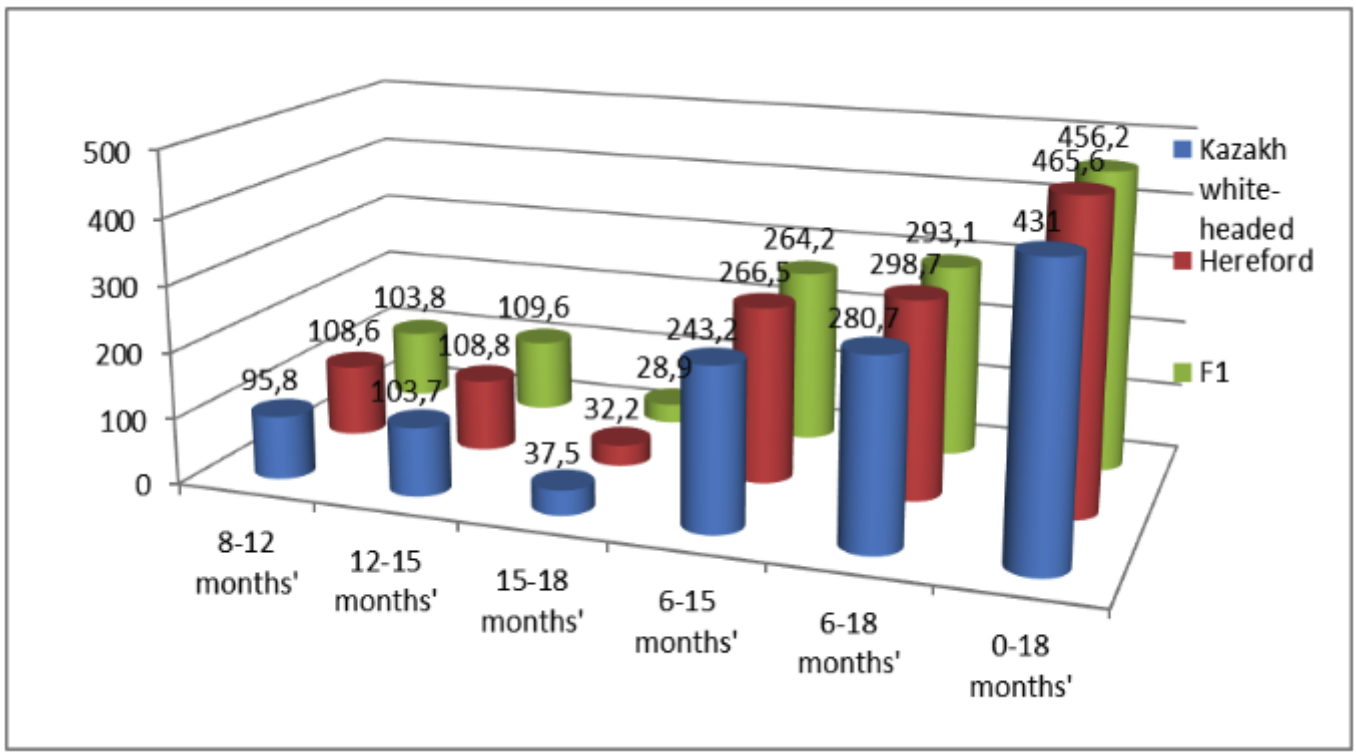
Figure 2
Change in absolute growth of
young animals (0-8 months), kg.



Note: compiled by the authors themselves

From 4 to 6 months of age, Hereford bulls exceeded the Kazakh white-headed breed by 2.9 kg (4.4 %), hybrids by 1.7 kg (2.5%). Hereford heifers exceeded the Kazakh white-headed breed by 4.5 kg (7.2%), hybrids by 1.8 kg (2.7%). From 6 to 8 months of age, Hereford bulls exceeded the Kazakh white-headed breed by 5.4 kg (12.3%), slightly inferior to hybrids by 1.7 kg (3.4%). Heifers Herefords exceeded the Kazakh white-headed breed by 6.2 kg (17.7%), hybrids slightly inferior to 3.2 kg (7.78%). Thus, despite the marked fluctuations in the absolute increase in body weight, due to the influence of paratypical factors on the body of young and different rate of reaction of young different genotypes to their changes, as well as the influence of puberty and features of puberty and the formation of reproductive function, young different genotypes normally grew and developed. The absolute increase in live weight of bulls during the experiment period averaged 431 kg per head of Kazakh white-headed breed, 465.6 kg of Hereford breed, 456.2 kg of hybrids (figure 3).

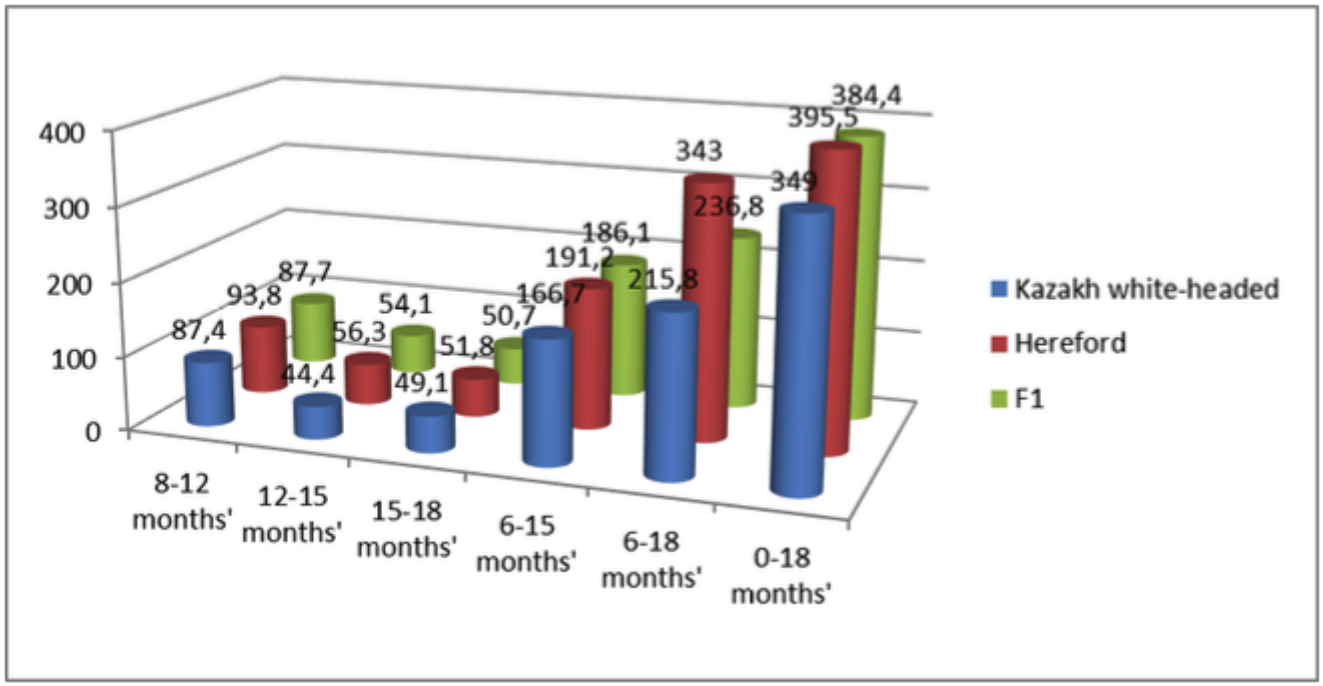
Figure 3
The change of the absolute gain
of calves (8-18 months), kg



Note: compiled by the authors themselves

The absolute increase in live weight of heifers during the experiment period averaged 349 kg per head of Kazakh white-headed breed, 395.5 kg of Hereford breed, 384.4 kg of hybrids (figure 4).

Figure 4
The change of the absolute growth
of heifers (8-18 months), kg



Note: compiled by the authors themselves

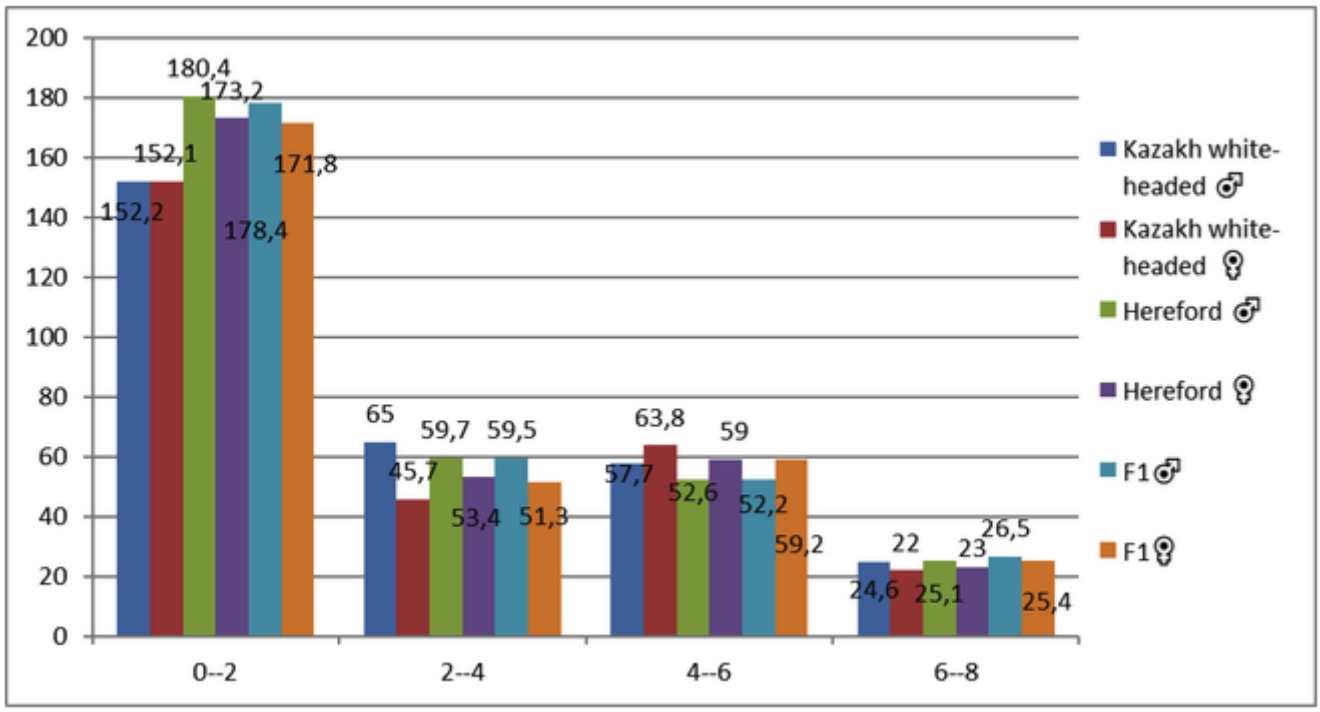
At the same time, the superiority in absolute growth of live weight in bulls and heifers obtained during the introductory crossing over the control was observed almost throughout the experimental period. In this respect, Hereford bulls and heifers differed most favorably, so the superiority in absolute growth in Hereford bulls in comparison with the Kazakh white-headed bulls was 34.6 kg or 8% (P>0.95), in hybrids respectively 9.4 kg or 2 % (P>0.95). The difference in this indicator when comparing the Kazakh white-headed breed with the breed of hybrids was in favor of the hybrids 25.2 kg or 5.8 %) (P>0.95). In Hereford heifers in comparison with Kazakh white-headed heifers was 46.5 kg or 13.3%, in hybrids respectively 11.1 kg or 2.9 % (P>0.95). The difference in this indicator when comparing the Kazakh white-headed breed with hybrids was in favor of hybrids 35.4 kg or 10.1 %) (P>0.95).

It should be noted that the intensity of growth and development of animals of different genotypes was relatively high except for the first month of experience, when there was an impact on them of the negative stress factor - weaning mothers.

For all tested animals of different genotypes, the authors calculated the relative growth rate in different periods of cultivation.

In the period of cultivation from birth to weaning the greatest relative growth rate differed bulls Hereford. At birth they surpassed peers of the Kazakh white-headed breed and hybrids by 28.2 %; 2 %. Heifers surpassed peers of the Kazakh white-headed breed and hybrids by 21.1 %; 1.4 %. This is due to the greatest impact on the productivity of bull-descendants Hereford indicator of the breeding value of cows-mothers as milk. Since, of course, high growth energy is a condition for obtaining animals with large live weight at a young age (figure 5).

Figure 5
Relative growth rate, %



Note: compiled by the authors themselves

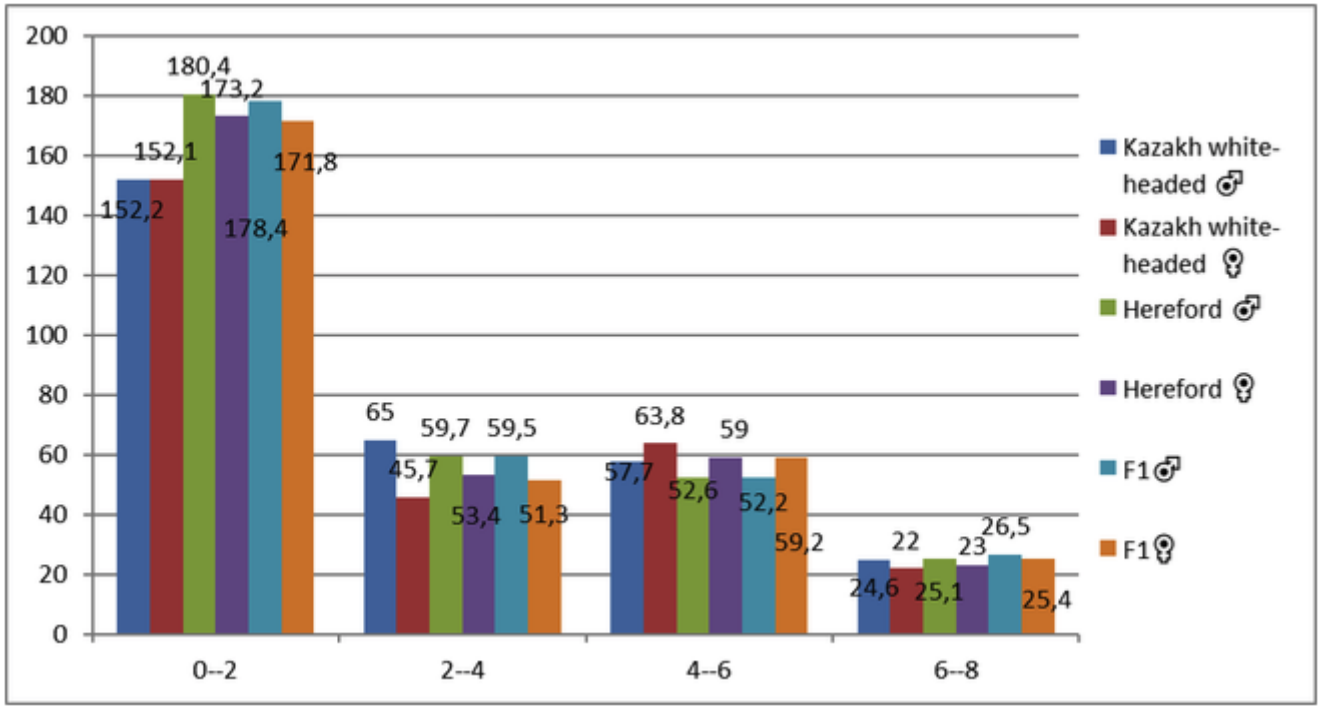
Thus, the live weight of young animals and the intensity of its growth and development are due to various factors. Under the same conditions of the environment productive qualities of animals are determined by its genetic capabilities. This is confirmed by our experimental data. Their analysis indicates intergroup differences in live weight already in newborn young animals.

It is established that in the suction period (from birth to 6 months.) Herefords were characterized by the lowest relative growth rate. At peers of the Kazakh white-headed breed and hybrids the size of the studied indicator was higher and was at the same level. After weaning in some age periods Herefords on the relative growth rate exceeded Kazakh white-headed peers, but in all cases inferior to hybrids. According to the coefficient of increase in live weight, certain intergroup differences are also established.

After weaning from mothers, at the age of 8 months there was some advantage of bulls of the Kazakh white-headed breed and Hereford breed over hybrids: 0,5 - 1,5% – on bulls, 5,1-2,4% – on heifers. This is probably due to the better adaptation of these genotypes to economic and climatic conditions. For the entire period of cultivation in groups of bulls and in groups of heifers, the relative growth rate is approximately equal. This indicator regardless of the breed of animals of all genotypes decreased with age, and this decrease was initially more intense, then slowed down. This is probably due to some slowdown in metabolic processes occurring in the protoplasm of cells of the growing organism, an increase in the specific mass of differentiated cells and tissues, as well as the proportion of reserve substances.

From birth to 18 months of age, the relative increase was 1596% in Kazakh white-headed bulls, 1628% in Hereford breed and 1612% in crossbreeds (figure 6).

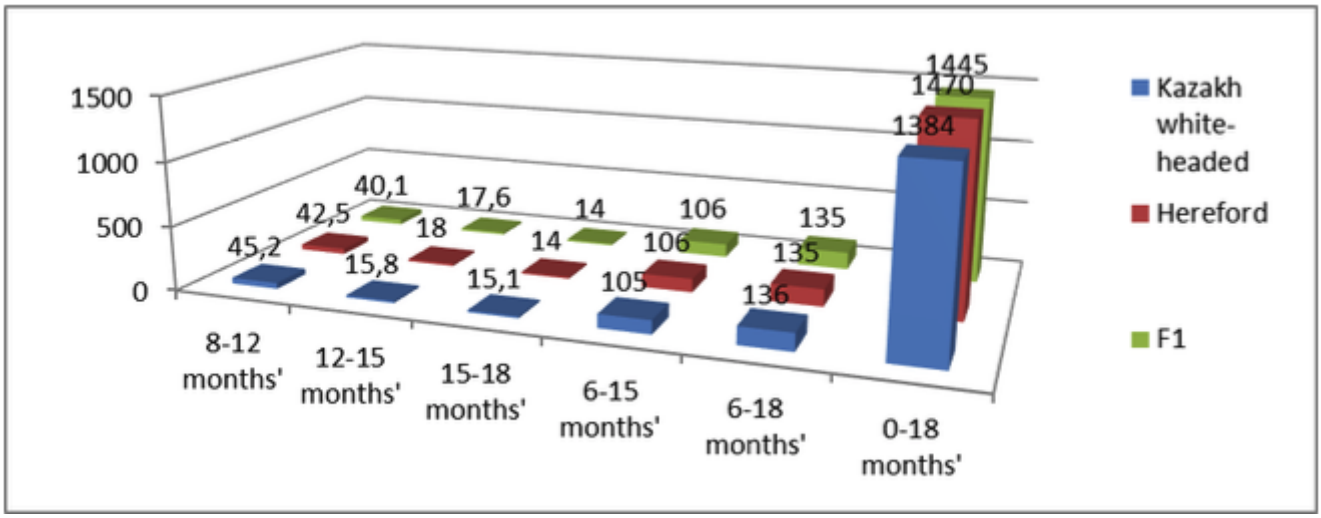
Figure 6
Change in the relative growth of bulls



Note: compiled by the authors themselves

From birth to 18 months of age, the relative increase was in heifers Kazakh white breed 1384 %, Hereford breed – 1470 % and hybrids – 1445 % (figure 7).

Figure 7
Change in the relative growth of heifers



Note: compiled by the authors themselves

Thus, in the process of growing bulls from birth to 18 months of age, the energy of growth was higher in the bulls of the Hereford breed and less in the Kazakh white-headed breed, and the hybrids occupied an intermediate position between them. A similar pattern is established on heifers of different genotypes.

Thus, purebred crossing has a significant impact on the growth and development of young animals. Crossbred bulls and heifers in conditions of intensive cultivation paid better for the feed with an increase, which contributes to an increase in the production of high-quality beef.

It is known that the study of the exterior features of the animal by taking body measurements and calculating body indices is judged on its development, constitutional features and, to a certain extent, productive qualities.

At the same time, it is of particular importance in beef cattle breeding, especially in regions with a sharply continental climate. Only when using well-developed, constitutionally strong animals achieves the effectiveness of the industry.

Study of the peculiarities of physique of young animals has allowed to establish that as a young purebred and hybrids differed harmonious physique and had a well-expressed meat form. At the same time, the differences were determined at an early age. At the same time, the maximum value of all measurements was characterized by bull-calves of the Hereford breed, and the minimum - Kazakh white-headed peers, hybrids occupied an intermediate position, approaching the main measures to the Herefords.

Indicators of live weight give a fairly objective characteristic of the growth of the body as a whole, but to fully disclose the features of its development, they cannot. The study of the exterior features of the animal helps to fully represent the development of his physique, constitutional strength and body size, productivity.

The results of our studies have shown that with the growth of bulls there is an uneven increase in individual measurements of exterior articles (table 5).

Table 5
Dynamics of the main exterior measurements
of bulls of different genotypes, cm.

Measurement	Genotype								
	Kazakh white-headed			Hereford			F1		
	Age, months.								
	8	12	15	8	12	15	8	12	15
Height at withers	106,8	110,5	113,7	109,5	114,0	116,8	108,0	112,3	115,2
Height in sacrum	108,3	113,0	115,6	111,6	116,1	119,3	110,1	114,5	117,4
Chest width	34,7	38,4	45,1	36,5	42,4	45,7	35,4	40,0	45,2
Width in maclocks	36,2	42,2	45,2	36,7	43,5	45,3	36,5	42,0	45,2
The depth of chest	53,7	58,6	63,3	53,9	59,7	64,1	53,7	59,5	63,9
Oblique length of the body	118,2	131,0	138,6	119,0	133,4	140,4	118,4	132,2	140,2
Oblique rear length	42,4	42,8	48,5	42,6	46,4	49,4	42,4	44,9	49,0
Chest girth	160,6	167,9	179,2	161,3	172,4	180,7	160,8	170,8	180,4
Width at hip joints	19,5	42,0	44,4	36,9	43,1	44,9	36,8	41,8	44,0
Width at ischial tuberosity	36,3	12,7	13,0	12,0	12,6	13,0	12,1	12,5	13,2
Girth of pastern	12,1	20,5	20,7	19,5	20,5	20,9	19,5	20,5	20,7

Note: calculated and compiled by the authors themselves

During the period from 8 to 15 months of age in young Kazakh white-headed breed height at the withers was increased by 6.5, height in the sacrum by 6,7%, chest depth – by 19,0%, chest width – by 29,9%), chest girth – by 11,6%, oblique torso length – by 17,3%, width in maclocks– by 24,9%, width in the sciatic hips – by 7,4%, width in the hip joints – by 22,3%, at 7,1%. Similar dynamics was observed in the linear growth of animals and bulls of Hereford breed and hybrids.

Thus, it can be noted that with age in young animals more intensively increased latitudinal measurements of the trunk in comparison with high-altitude.

In the analysis of indicators of linear measurements in bulls of different genotypes, aged 15 months. intergroup differences were determined.

So, differing higher live weight of calves of Hereford breed, and hybrids surpassed their peers of the Kazakh white-headed breed height at the withers by 3.1 and 1.3; width of chest is 0.6 and 0.1; depth of chest is 0.8 and 0.6; the height at the sacrum by 3.7 and 1.8; the width in maclocks 0.1; oblique body length is 1.8, and 1.6; the oblique length of the backside of 0.9 and 0.5; bust 1.5 and 1.2. Thus, on the value of the measurements of the depth of the chest a slight superiority has sons Hereford bulls of the national selection. They had advantage on this indicator in comparison with peers of the Kazakh white-headed breed on 0,8 and hybrids – on 0,6.

For a more complete understanding of the nature of the growth of experimental animals, we have calculated body indices.

With the growth and development of animals of different genotypes indices of elongation, dislocation increased significantly. So, the index of elongation from 8 months. up to 15 months. increased from 108.6-121.8, and muscle burning index – respectively from 128.1-135.8.

Age-related changes in the values of the indices of pelvic, thoracic and bony are less pronounced.

Intergroup differences are most clearly expressed in bulls of Hereford breed, in bulls of Kazakh white-headed breed indices of physique are less pronounced and crossbred bulls in terms of indices of physique occupy an intermediate position.

It should be noted that there were no significant differences in the basic number of body indices (table 6). However, at the age of 15 months. Hereford bulls had higher indices of such indices as long-legged, thoracic and pelvic.

Table 6
Indices of bulls of different genotypes

Indexes	**Genotype**								
	Kazakh white-headed			**Hereford**			**F1**		
	8	**12**	**15**	**8**	**12**	**15**	**8**	**12**	**15**
Long legs	49,7	47,0	44,3	50,7	47,6	45,1	50,2	47,0	44,3
Stretching of the body	110,6	118,5	121,8	108,6	117,0	120,2	109,6	117,7	121,7
Chest part	64,6	65,5	71,2	67,7	71,0	71,2	65,9	67,2	70,7
Overgrown	101,4	102,2	101,6	101,9	101,8	102,1	101,9	101,9	101,9
Muscle knocks	135,8	128,1	129,3	135,5	129,2	128,7	135,8	129,1	128,6
Skinny (bone)	11,3	18,5	18,2	17,8	17,9	17,8	18,0	18,2	17,9
Hip and thoracic	95,8	90,9	99,7	99,4	97,4	100,8	96,9	95,2	100,0

Note: calculated and compiled by the authors themselves

However, the growth of the experimental calves and the increase of live weight, they were observed less long-legs characteristics, the body became less hit and more stretched.

Thus, Hereford bulls differed in comparison with purebred peers of the Kazakh white-headed breed by higher weight and linear growth.

Thus, the analysis of the obtained materials showed that the young of different genotypes in specific environmental conditions normally grew and developed. Thus, young growth of all groups differed in a proportional constitution and rather well-expressed meat forms. It was especially characteristic for the bulls of the Kazakh white-headed breed and hybrids.

3.1. Discussion of results

Study of the peculiarities of physique of youngsters from birth to 18 months has allowed to establish that as a young purebred and hybrids differed harmonious physique and had a well-

expressed meat form. At the same time, the differences were already at an early age. At the same time, the maximum value in weight was the bulls of Hereford, and the minimum - Kazakh white-headed peers, crossbred animals occupied an intermediate position.

Growing bulls from 8 months of age to slaughter, show increased growth energy and higher meat productivity. At the age of 15 months. Kazakh white-headed bulls had a live weight of 420.5 kg, Hereford bulls 462.0 and hybrids of 455.6 kg.

The average daily increase in live weight from birth to 18 months varied bulls Hereford breed 862 g, crossbreeds 844 g, bulls Kazakh white breed 798, Respectively, the average daily increase in live weight in heifers from birth to 18 months was Hereford breed 732 g, crossbreeds 711 g. and heifers Kazakh white breed 646 g.

Absolute increase in live weight of bulls for the period of experience (0-18 months.) averaged on the head of the Kazakh white breed of 431 kg, Hereford 465,6 kg, hybrids 456,2 kg. Absolute live weight gain of heifers during the period of experiment (0-18 months.) averaged on the head of the Kazakh white-headed breed 349 kg, Hereford breed 395.5 kg, 384.4 kg hybrids.

From birth to 18 months of age the relative increase was 1596% breed, Hereford breed – 1628 % and hybrids – 1612 %. From birth to 18 months of age, the relative increase was in heifers Kazakh white breed 1384 %, Hereford breed – 1470 % and hybrids – 1445 %.

At the age of 15 months, differing higher live weight, the bulls of Hereford breed, and hybrids are ahead of their peers Kazakh white breed, respectively, by the height at the withers by 3.1 and 1.3; width of chest is 0.6 and 0.1; depth of chest is 0.8 and 0.6; the height at the sacrum by 3.7 and 1.8; the width in maclocks 0.1; oblique body length is 1.8, and 1.6; the oblique length of the backside of 0.9 and 0.5; bust 1.5 and 1.2. Thus, on the value of the measurements of the depth of the chest a slight superiority has sons Hereford bulls of the national selection. They had advantage on this indicator in comparison with peers of the Kazakh white-headed breed on 0,8 and hybrids – on 0,6.

4. Conclusions

Analyzing the results, the authors conclude that the animals of all groups grew and developed well, differed in proportional fitnessand pronounced meat type.

At the same time, the hybrid young had better developed meat forms. Genetic factors have left an imprint on the formation of the exterior of the crossbred young, which inherited from the original parent forms: a wide trunk, well-developed, deep chest and rear third of the trunk, as well as the greatness and well-executed ham.

Acnowledgements

The authors Express their gratitude to the limited liability partnership "Agrofirma" Dinara-Rancho " for the opportunity to conduct large-scale research in the field of peculiarities of the growth and development of young animals of meat breeds of cattle with different genotypes.

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7. this protruding forward and toward the tubercle of the iliac of wing bone of the animal (https://ru.wiktionary.org)

Revista ESPACIOS. ISSN 0798 1015
Vol. 40 (Nº 42) Year 2019

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