

Research Article**Ways of Intensification of Beef Production in the Framework
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[Received: 20/11/2018; Accepted: 29/12/2018; Published: 02/01/2019]

ABSTRACT.

The priority task of the agro-industrial complex of the Russian Federation at the present stage is to solve the problem associated with the increase in meat resources, providing the population with meat products according to scientifically based food standards. Therefore, improving the meat productivity of cattle with improving the quality of products is the most important task of the state.

In order to study the features of growth, development and meat productivity, as well as some interior indicators, 3 groups of 12 bulls in each were formed.

Bull-calves up to 7 months of age were on suckling keeping under cows-mothers, and then from 7 to 18 months they were grown in the same group with loose housing on the walking and sternarea of the farm.

Young growth of all groups was kept on technology of meat cattle breeding. Feeding and keeping conditions were the same for all experimental groups of bulls.

It was found that Simmental x Abraxas hybrids on the intensity of growth and payment of feed, meat productivity and profitability of beef production were superior Simmental and Abraxas peers, which gives us reason to consider that it is necessary and appropriate to engage in interbreeding breeding stock of simmentals and bulls of Abraxas breed.

Keywords: beef, crossing, hybrids, growth, productivity.

INTRODUCTION

The priority task of the agro-industrial complex is a sustainable increase in the production of livestock products and especially beef. Increasing the level of productivity of animals is directly dependent on the conduct of breeding work, the effective use of domestic and world gene pool of cattle. The study of productivity and adaptive plasticity of animals of new genotypes is one of the most urgent tasks of zootechnical science and practice [2;4;9;10;18].

Modern requirements to animals of the meat direction of productivity are an increase in longevity and live weight of cattle, and also increase of dairy capacity of cows. In this regard, animals should have a high growth rate, high yield and quality of meat products at maintaining health, endurance and reproductive abilities [9;13;15;16].

Analysis of beef production in Russia and abroad shows that at present such breeds as Simmental and Abraxas are popular. They are able to give heavy carcasses with moderate fat deposition. And, what is very important – these valuable qualities they are able to transmit steadily to the cross-breed offspring [5;8;14;19;20].

Expanding the range of beef cattle breeding requires genetic diversity, causing a real need to create highly productive purebred and crossbred herds, characterized by good adaptability to traditional and intensive technologies in specific conditions [1;3;6;7;10;11;12;13;17].

Taking into account the need for the development of beef cattle in 1998 in the farms of Belgorod region more than a thousand heads of young beef cattle of imported selection were imported from France, including 250 heifers and 5 bulls of the Abraxas breed. At the same time, in the literature there is practically no information about the effectiveness of the use of animals of this breed in purebred breeding and interbreeding in the conditions of the Central Chernozem region of Russia. Therefore, the increase in the production of high-quality beef based on the cultivation of hybrids obtained from crossing the Abraxas cattle with Simmental is one of the urgent problems in animal husbandry.

Purpose and objectives of research

The purpose of the research was to compare the economically useful features of the bulls of the

Abraxas and Simmental breeds, as well as their hybrids of the 1st generation.

To achieve this goal, the following tasks were set:

- to make crossbreeding of Simmental cattle with specialized Abraxas breed of meat direction of productivity to obtain crossbreeding animals;
- to determine the actual consumption of feed for the periods of cultivation of experimental animals;
- to study the features of growth and development of purebred and crossbred bulls up to 18 months of age;
- to investigate hematological parameters of young animals of different genotypes;
- to evaluate the meat productivity of bulls, meat quality taking into account the efficiency of conversion of feed nutrients into food products;
- to set the optimal age for the production of bulls for meat on the basis of indicators of meat productivity and quality of slaughter products;

Methods and materials

Studies were conducted in 2016-2017 in LLC "Meat farms-Iskra" Korochansky district, Belgorod region.

The object of the research was the animals of Simmental and Abraxas breeds and their hybrids of the 1st generation.

To conduct the insemination mature cows of Abraxas breed were selected that meet the set of characteristics and are not below the standard of the breed. Simmental cows were inseminated artificially with the sperm of high-class bulls of the Abraxas breed. From the resulting offspring newborn bulls were selected. Experimental animals were selected on the basis of analogues, taking into account the breed and age.

In order to study the features of growth, development and meat productivity, as well as some interior indicators, 3 groups of bulls of 12 heads each were formed.

Bull-calves up to 7 months of age were on suckling keeping under cows-mothers, and then from 7 to 18 months they were grown in the same group in loose housing in the walking and stern platform.

Young growth of all groups was kept on technology of meat cattle breeding. Feeding and keeping conditions were the same for all experimental groups of bulls. In the formulation and conducting of laboratory, scientific and

economic experiments, as well as the organization of feeding of bulls, taking into account their productivity, the selection of average samples of feed, blood and meat products were guided by the current state standards, as well as official guidelines adopted for research of this kind.

The resulting digital material was processed by methods of variation statistics (E.K. Merkuryeva, 1971), as well as on a PC using a software package "Microsoft Word".

RESULTS AND DISCUSSIONS

In studies the bulls of Simmental, Abraxas breeds and their crosses were kept on the technology of beef cattle in loose housing on deep straw bedding.

Calves for experiment were selected from winter calving cows. From January to March, they were with their mothers in light-type premises, and from April to July they were kept with their mothers in natural pastures. Then, after weaning, from 7 to 18 months of age, bulls were grown on the paddock.

For the 18-month cultivation period (table 1) the maximum amount of feed according to their overall nutritional value were consumed by the Simmental x Abraxas hybrids. Peers of Simmental breed inferior to them on the palatability of feed by 92.4 kg of feed units (2.7 %), Abraxas—by 74.8 kg of feed units (2.1 %).

Table1 - The actual consumption of feed on average per bull from birth to 18 months, kg

Feed	Group		
	I	II	III
Milk	1285	1282	1366
Alfalfahay	725	780	790
Siftedstraw	262	302	315
Cornsilage	2860	2760	2850
Greenmassofcorn	376	390	428
Greenmassofalfalfa	492	480	514
Mixedfodder	465	465	465
Grainmixture	1045	1045	1045
Molassesfeed	72	72	72
Urea	14,8	14,8	14,8
Salt	16,2	16,2	16,2
In the feed it is contained: feed units, kg	3345,6	3363,2	3438,0
dry matter, kg	3363,6	3423,2	3502,1
digestibleprotein, kg	380,7	384,1	395,0
digestible protein for 1 feed unit, g	113,8	114,2	114,9
EE in 1 kg of dry matter, MJ	10,3	10,4	10,4

Genetic and paratypical factors had a certain influence on the live weight of bulls in different age periods (table 2).

The data of table 2 show that the newborn bulls of the presented genotypes did not differ in live weight. However, from the age of 7 months there is a tendency to increase live weight in crossbred bulls. At weaning young from mothers at the age of 7 months, purebred bulls of both groups reached the live weight that meet the requirements of the elite class.

Table2 - Dynamics of live weight of bulls, kg (M ± m)

Age, months	Group		
	I	II	III
New born	30,4±0,88	26,0±1,04	28,6±0,78
7	207,6±3,26	200,1±3,46	215,9±3,87
12	343,8±4,83	355,2±4,41	371,3±4,71
15	418,9±6,02	445,0±5,16	461,3±6,04
18	496,2±7,78	534,±7,35	549,4±9,26

However, in terms of live weight at this age they were inferior to their peers by 8.3 kg and 3.8% and by 15.8 kg and 7.3 %, respectively ($P < 0.95$). At the age of 12 months, the difference in live weight between peers of the studied groups had the same tendency.

It should be noted that at the age of 15 months the bulls of the II group reached the live weight meeting the requirements of the elite - record class. On this indicator they surpassed contemporaries of Simmental breed by 26.1 kg and 6.2 % ($P > 0.95$) and conceded to cross-bred animals by 16.3 kg and 3.5 % ($P > 0.95$). By the age of 18 months, the advantage in live weight was also preserved for animals of group III.

At this age they exceeded young growth of group I by 53.2 kg and 10.7 % ($P > 0.99$), and II – by 15.4 kg and 2.9 % ($P > 0.95$). In turn, the latter surpassed in this indicator young Simmental breed by 37.8 kg and 7.6 % ($P > 0.95$).

It should be noted that the animals of all groups by the age of 18 months reached a sufficiently high live weight (496-549 kg), and the differences that were in favor of young Abraxas breed and Simmental x Abraxas hybrids, determined by the possibility of implementing the genotype in specific conditions.

Differences in live weight are caused by unequal intensity of growth of experimental young animals. Intergroup differences in the average daily gain of live weight were established already in the suction period. Thus, the highest growth rate up to 7 months of age was observed in Simmental × Abraxas hybrids. Peers from group I were inferior to them in this indicator by 49 g and 5.5 %, respectively II – 64 g and 7.2 % ($P > 0.99$). At the same time, the advantage of Simmental animals over Abraxas on this indicator was 15 g and 1.8 %. The difference in favor of simmentals and hybrids is due to the greater milk content of their mothers. Steers of group I and II were grown under the Simmental cows with greater milk productivity than Abraxas peers.

The situation in the difference of average daily growth between animals of different groups changed dramatically in the period from 7 to 12 months. The average daily growth in young Abraxas breed increased significantly, which in this indicator exceeded Simmental peers at 126 g

and 13.9 % ($P > 0.99$), although the latter inferior slightly cross-breed animals to this feature.

Reduction of growth energy in the period from 12 to 15 months compared to the previous period (for the Simmental breed by 9.0 %, Abraxas - by 3.6 %, hybrids -6.5 %) can be explained in that the cultivation period occurred in the winter season, in which the young are kept in the walking and stern platform.

In spring and summer (from 15 to 18 months) the energy growth of animals remained the same. However, there specific differences related to the reaction of animals to changes in external conditions are marked. With a slight difference in the daily gain between the Abraxas bulls and the Simmental × Abraxas hybrids, the latter significantly exceeded the Simmental breed analogues in this indicator by 129 g and 14.0 % ($P > 0.95$). Abraxas bulls also had the advantage on this indicator over the Simmental peers at 129 g and 15.2 % ($P > 0.95$).

Analyzing the results of the growth rate of bulls of different genotypes in the period from 7 to 18 months the advantage is in Abraxas and Simmental × Abraxas bulls, who surpassed the peers of Simmental by 136 g (15.7 per).

Evaluation of meat forms of animals, confirmed by indices of physique, indicates the advantage of the severity of meat forms in animals of groups II and III.

For the development of the posterior third of the body, the advantage was in favor of the bull of Abraxas breed. Less expressed meat forms were characteristic of Simmental peers.

Slaughter figures. The main indicators characterizing meat productivity of animals are presented in table 4.

The analysis of the data of table 4 shows that already at the age of 15 months from animals of all genotypes quite full-bodied steamed carcasses were obtained. The heaviest ones are the carcasses of crossbred bulls. Peers of group II lost them on this indicator by 3.6 kg (1.4 percent), respectively, I - 32.0 kg (12.8 percent).

With a relatively large difference in the mass of carcasses between the experimental groups of animals, it was statistically unreliable.

Table 4 - The results of control slaughtering of the experimental bulls, M±m

Indicator	Age, months	Group		
		I	II	III
Removable live weight, kg	15	418,9±6,02	445,0±5,16	461,3±6,04
Pre-slaughter live weight, kg	18	496,2±7,78	534,±7,35	549,4±9,26
kg	15	400,0±13,2	430,0±19,3	445,0±11,24
Steamed carcass weight, kg	18	475,0±15,95	517,7±11,82	533,5±19,9
Carcass output, %	15	218,0±8,2	246,4±11,86	250,0±7,94
	18	269,5±11,02	303,9±9,7	307,3±16,83
Weight of internal fat, kg	15	54,5±0,26	57,3±0,2	56,2±0,42
Fat output, %	18	56,7±0,4	58,7±0,52	57,6±1,01
	15	6,4±0,38	5,6±0,38	6,1±0,44
Slaughter weight, kg	18	9,8±1,10	8,4±0,79	9,0±1,09
Lethal output,%	15	1,6±0,06	1,3±0,03	1,4±0,07
	18	2,1±0,18	1,6±0,12	1,7±0,12
	15	224,4±8,56	252,0±12,12	256,1±8,19
	18	279,3±12,1	312,3±10,4	316,3±17,9
	15	56,7±0,32	58,6±0,21	57,6±0,41
	18	58,8±0,58	60,3±0,64	59,3±1,13

It should be noted that carcasses from 18-month-old bulls were received more full-bodied, with well-developed muscles. It is noted that in comparison with slaughter in 15 months the mass of the steamed carcasses from bulls of the Simmental breed grew by 51.5 kg (12.4 per cent), Abraxas - 57.5 kg (12,3%) and Simmental x Abraxas hybrids by 57.3 kg (12.3 percent).

CONCLUSIONS

1. A promising direction of increasing the production of high-quality beef in the conditions of the Central Chernozem region is the crossing of arranged Simmental cows with bulls of the Abraxas breed and the cultivation of crossbred bulls of 1 generation to a live weight of 550 kg.
2. With the total cost of feed for 18 months 3346-3438 feed units and 381-395 kg digestible protein, 3364-3502 kg dry substances, at a concentration of metabolizable energy in 1 kg dry matter of ration of 10.3 and 10.4 MJ bulls of the Simmental breed reach a live weight 496,2 kg, Abraxas - 534,0 kg, Simmental x Abraxas hybrids - 549,4 kg with average daily gain in live weight during the period of cultivation, respectively, 852, 928 and 952 g. The advantage is of the crossbred bulls in the live weight at the age of 18 months over peers of Abraxas breed is 45.4 kg, Simmental-53.2 kg ($P>0.95$).
3. By visual evaluation of the exterior of calves and comparison of linear measurements of the body and build indexes it is established that Abraxas bulls and their crosses with Simmental had the best development of latitudinal measurements and more muscled torso. The value of the index of massiveness and muscularity the advantage was for Simmental x Abraxas hybrids. They differed in breadth and intensity of meat forms that testifies to high meat qualities of the presented genotype of animals.
4. Indicators of morphological and biochemical composition of blood in bulls of all groups indicate a high level of redox processes in their body. In the blood some differences depending on the genotype of the animals are marked, due to different individual response of the animals to environmental conditions, although these deviations do not go beyond the physiological norm.
5. Intensive breeding of bull-calves regardless of genotype allowed obtaining heavy carcasses of high quality. The mass of steam carcass of bulls of the Simmental breed at 18 months was 269.5 kg, Abraxas — 303.9 kg and Simmental x Abraxas hybrids – 307.3 kg. It is noted that in the period from 15 to 18 months the increase in the weight of the carcass amounted to 45.3; and 55.8 and 56.3 kg, respectively, which indicates the feasibility of extending growing of bullsto 18 months of age with purpose of saling animals for meat.

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