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Features Of Formation Of Qualitative Indicators Of Beef When Using New Feed Additive.

^{1,2}Gorlov Ivan Fyodorovich*, ^{1,2}Slozhenkina Marina Ivanovna,

¹Randelin Alexander Vasilyevich, ¹Nikolaev Dmitry Vladimirovich, ¹Grebennickova Yulia Dmitrievna, ¹Goryaeva Khongr Badmaevna, ³Fedorov Yuri Nikolaevich, ⁴Mosolova Darya Aleksandrovna, and ⁵Belyaev Alexander Ivanovich.

¹The Volga region scientific research institute of manufacture and processing of meat-and-milk production, Volgograd

²Volgograd state technical university, Volgograd

³All-Russian research and technological Institute of biological industry, Moscow

⁴Russian Economic University named after G.V. Plekhanov, Moscow

⁵ FSC Agroecology RAS, Volgograd

ABSTRACT

The article examines the effect of the «KoreMix» feed additive on the formation of quality indicators of beef obtained from Kalmyk breed. The purpose of the research is to establish the patterns of formation of quality indicators of beef, depending on the introduction of a new feed additive «Koremix» in feeding calves of the Kalmyk breed. The results of an experimental study were carried out in the conditions of the NAO breeding plant "Kirov" of the Republic of Kalmykia. The object of study were Kalmyk bull-calves of 10 months of age. For the study, two groups of Kalmyk gobies were formed, 30 animals each. The animals were fed separately in groups. The bulls of the control group received a general ration. Animals of the experimental group received a general ration with a new feed additive "KoreMix" in the amount of 2,5 kg per ton of concentrates. In this case, the rations of feeding experimental animals are designed to obtain 900-950 g of average daily weight gain. As a result of the control slaughter of the experimental bulls, it was established that, by the mass of the steam carcass, the animals of the experimental group are 5.62% higher than their peers of the control group ($P>0,95$); carcass output – by 1,45%; the mass of internal fat – by 20,56% ($P>0,999$); the output of raw fat – 0,52%; slaughter weight – by 6,35% ($P>0,99$), and slaughter yield – by 1,97%, respectively. According to the results of the analysis of the morphological composition of the calves of Kalmyk breed carcasses, it was found that animals fed the KoreMix feed supplement in the rations of feed ration by 7,28% more than the control group's peers ($P>0,99$); pulp yield – by 1,14%; by bone mass – by 0,49%; on meat index – by 0,34%, respectively. The study of the fatty acid composition of beef obtained from experimental animals showed that in the meat of the bulls of the experimental group there was an advantage in the content of fatty acids in comparison with their peers of the control group in caprylic (C8: 0) by 0,67%; palmitic (C16: 0) – by 0,43%; myristic (C14: 0) – by 1,11%; cis-10-pentadecene (C15: 1) – by 1,15%; palmetine (C16: 0) – by 0,43%; oleic (C18: 1) – by 4,96%; linoleic (C18: 2) – by 0,24%; timnodone (C20: 5) - by 0,44%; gondoin (C20: 1) - by 1,39%; erucate (C22: 1) – by 0,81%, respectively. In general, all the essential amino acids in the meat of bulls of the experimental group contained 9,8%, which is more compared to beef obtained from animals of the control group by 0,64%. The inclusion of the Kalmyk breed of the new «KoreMix» feed additive in the diets of feeding calves allowed to significantly improve the slaughter and quality indicators of beef.

Keywords: feed additive, bull-calves, Kalmyk breed, live weight, slaughter weight, slaughter yield, fatty acid and amino acid composition.

*Corresponding author

INTRODUCTION

By implementing the state program for the development of agriculture and regulation of the markets for agricultural products, raw materials and food for 2013–2020, it was noted that in 2017, target indicators were achieved in almost all indicators, including beef [1-3].

One of the most important stages of increasing the production of meat products is a systematic approach to the growth of livestock in beef cattle breeding, which involves the use of repair livestock, capable of gaining up to 345-370 kg of live weight by the age of 18 months [3-4].

Of particular interest is the use of new biologically active substances (biostimulants) in cattle feeding that have a specific effect on the digestive system of animals, which improves the digestibility of nutrients and affects the increase in meat productivity of animals due to their antimicrobial, sorption, antioxidant properties [5-9].

Known studies aimed at providing diets with the missing nutrients, micro- and macroelements, which allows to enrich livestock products with necessary elements in an environmentally safe bioavailable form [7-14]. In addition, the effect of feeding on the lifetime formation of animal productivity is known [15].

Thus, a comprehensive study of the effect of the «KoreMix» feed additive on the formation of quality indicators of beef obtained from Kalmyk livestock is promising and highly demanded.

The purposes of the research is to establish the patterns of formation of quality indicators of beef, depending on the introduction of a new feed additive Koremix in feeding calves of the Kalmyk breed.

By conducting research, the following tasks were solved:

- to study the effect of the «KoreMix» feed additive on the digestibility and digestibility of nutrients in the rations;
- to study the chemical and biochemical indicators of the quality of beef;
- to establish the patterns of formation of quality indicators of beef, depending on the introduction of the new feed additive "KoreMix" in feeding the calves of the Kalmyk breed.

MATERIAL AND METHODS

The study of the presented studies was carried out in the conditions of the LLA p / z "Kirov" of the Republic of Kalmykia. For this, two groups of calves of the Kalmyk breed of 30 animals each were formed. At the time of the formation of the experimental groups, the gobies were 10 months old. The animals were fed separately in groups. The bulls of the control group received a general ration (RR), which consisted of 7,5–9,0 kg hay of grass and forbs, 2,5-4,0 kg of barley straw, 2,8–4,6 kg of concentrated feed, feed phosphate – 9,1-20,8 g, mineral premix – 32,5-48,5 g, salt – 37,7-48,9 g. Animals of the experimental group received a PR with a new feed additive "KoreMix" in the amount of 2,5 kg per ton of concentrate. In this case, the rations of feeding experimental animals are designed to obtain 900-950 g of average daily weight gain. The nutritional value of the rations of animals was 6,3-9,5 ECE, 62,5-94,0 MJ.

The experimental bulls participated in the study from 10 to 16 months of age, almost 180 days.

Animals were kept separately in experimental groups. For each group, a separate walking yard was fenced in. For the implementation of the feeding of animals used special group feeders (troughs).

The «KoreMix» feed additive contains a concentrate of biogenetic silicon concentrated by Saccharomyces cerevisiae yeast strains and lactic acid microorganisms *Bacillus subtilis*. The regulatory and technical documentation for the «KoreMix» feed additive (TU 9296-220-10514645-16) was developed and approved in the prescribed manner.

The control slaughter of experimental animals was carried out at the meat processing plant in the village of Yashkul of the Republic of Kalmykia. To establish the meat productivity of bulls, 3 heads were taken

from each experimental group. At the same time, slaughter indicators (pre-slaughter live weight, steam carcass weight, carcass output, slaughter weight, slaughter yield) of animals at the age of 16 months were studied using the following methods of VASKHNIL and VIZh (1977).

The boning and trimming of the right half-carcasses obtained from the experimental gobies of the Kalmyk breed was carried out according to GOST 31797-2012 taking into account muscle and bone tissue, the meat content index and the pulp yield per 100 kg of body weight were determined.

The evaluation of the chemical composition of muscle tissue was carried out according to the following standard methods: moisture content in beef according to GOST R 51479-99 by drying the sample to constant weight on equipment that allows keeping the temperature at 103 ± 2 °C; the amount of adipose tissue - by extracting the dried sample with ether vapor on the Soxhlet apparatus; protein using the level of total nitrogen according to the Kjeldahl method with Conway distillation in isometric cups.

Determination of biochemical parameters in the meat of experimental bulls was performed on an automatic analyzer "OlympusAU-400".

The presented experimental materials were processed using the methods of variation statistics with the determination of the reliability of the difference according to Student-Fisher for three levels of probability calculated using the software "STATISTIKA-6" [17].

RESULTS

After 180 days of cultivation of the experimental bulls of the Kalmyk breed, a control slaughter was carried out with 3 heads from each group (Table 1).

Table 1: Control slaughter of experimental animals (n = 3)

Indicator	Groups	
	Control	Experimental
Pre-slaughter weight, kg	$388,85\pm2,49$	$401,31\pm3,15^*$
Mass of steam ink, kg	$211,57\pm1,98$	$224,17\pm2,04^*$
Output, %	54,41	55,86
Mass of internal fat, kg	$9,12\pm0,13$	$11,48\pm0,10^{***}$
Fat yield, %	2,34	2,86
Slaughter weight, kg	$220,69\pm1,76$	$235,65\pm1,92^{**}$
Output, %	56,75	58,72

As a result of the control slaughter of the experimental bulls, it was established that, by the mass of the steam carcass, the animals of the experimental group are 5,62% higher than their peers of the control group ($P>0,95$); carcass output – by 1,45%; the mass of internal fat — by 20,56% ($P>0,999$); the output of raw fat – 0,52%; slaughter weight – by 6,35% ($P>0,99$), and slaughter yield – by 1,97%, respectively.

For a more complete picture of the localization of meat tissue in the carcasses of experimental animals, their morphological composition was studied (Table 2).

Table 2: The morphological composition of the carcasses of experimental animals (n = 3)

Indicator	Groups	
	Control	Experimental
Chilled carcass meat, kg	209,36±1,70	222,62±1,88**
Mass of pulp, kg	167,13±1,18	180,25±1,35**
Pulp yield, %	79,83	80,97
Bone weight, kg	36,70±0,36	36,88±0,48
Bone yield, %	17,53	16,57
Tendon weight, kg	5,53±0,07	5,49±0,09
Tendon yield, %	2,64	2,46
Meat index, %	4,55	4,89

According to the results of the analysis of the morphological composition of the calves of Kalmyk breed carcasses, it was found that animals fed the «KoreMix» feed supplement in the rations of feed ration, by 7,28% more than the control group's peers ($P > 0,99$); pulp yield - by 1.14%; by bone mass – by 0,49%; on meat index – by 0,34%, respectively.

The study of the chemical composition of the animal flesh showed that in the average sample of the flesh, the animals of the experimental group had a higher dry matter content than the peers of the control group by 0,65% ($P > 0,95$); protein – by 0.19%, fat – by 0,38% ($P > 0,95$), respectively.

An analysis of the chemical composition of the longest back muscle revealed that in the beef obtained from the animals of the experimental group of dry matter there was also an advantage over the control group's peers by 1,95% ($P > 0,99$), protein – by 1,86% ($P > 0,99$) and fat – by 0,09%, respectively.

The study of the fatty acid composition of beef obtained from experimental animals showed that in the meat of the bulls of the experimental group there was an advantage in the content of fatty acids in comparison with their peers of the control group in caprylic (C8: 0) by 0,67%; palmitic (C16: 0) – by 0,43%; myristic (C14: 0) – by 1,11%; cis-10-pentadecene (C15: 1) – by 1,15%; palmetinic (C16: 0) – by 0,43%; oleic (C18: 1) – by 4,96%; linoleic (C18: 2) – by 0,24%; timnodone (C20: 5) – by 0,44%; gondoin (C20: 1) – by 1,39%; erucic (C22: 1) – by 0,81%, respectively.

It should be taken into account that in the meat of bulls of the experimental group, for a number of saturated, monounsaturated and polyunsaturated fatty acids, a significant advantage was found in comparison with peers of the control group, which allows to make a conclusion about its better digestibility from the point of view of physiology, provided by a high content of the studied acids.

One of the most important indicators affecting the nutritional value of beef, is the content of a complex of amino acids. When studying the amino acid composition of the longest back muscle obtained from the bulls of the experimental group, it was found that the essential amino acid lysine (1,93%) is more by 0,23% compared to the control group; histidine (0,64%) – by 0,06%; methionine (0,75%) – by 0,16%; arginine (1,30%) – by 0,04%; threonine (0,89%) - by 0,06%; valine (0,83%) – 0,14%; isoleucine (1,04%) – by 0,09%; leucine (1,65%) – by 0,27%; phenylalanine (0,77%) – by 0,13%, respectively. In general, all the essential amino acids in the meat of bulls of the experimental group contained 9,8%, which is more compared to beef obtained from animals of the control group by 0,64%. By content of replaceable amino acids in beef, the same tendency of the advantages of the experimental group over the control group was observed with an insignificant difference.

CONCLUSION

The inclusion of the Kalmyk breed of the new feed mix «Koremix» in the rations of feeding bulls allowed to significantly increase the slaughter rates in comparison with the peers of the control group.

In terms of quality, beef obtained from animals of the experimental group had an advantage in comparison with the peers of the control group in chemical, biochemical and amino acid compositions.

Thus, we can conclude about a rather significant positive effect of the use of the «KoreMix» feed additive in feeding the calves of the Kalmyk breed.

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