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PRODUCTIVE AND BREEDING QUALITIES OF KALMYK BREED CATTLE

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One of the key and complex tasks in the agricultural sector is to increase the production volumes of high-quality beef. Beef cattle breeding is becoming one of the most profitable sectors of the agro-industrial complex today, not only in Kazakhstan, but also abroad. The urgent need to increase beef production volumes emphasizes the importance of expanding the country's export potential, which in turn helps strengthen food security [1,2].

The formation of meat productivity is determined by a complex of morphological and physicochemical changes in the body of livestock during its growth and fattening. The key factors influencing this process are the quality of feeding, genetic predisposition, gender, age, nutritional status, housing conditions and individual characteristics of animals [3].

The genetic predisposition of the Kalmyk breed plays a key role in its meat productivity. This breed is characterized by hereditary traits that contribute to the efficient accumulation of fat and high quality meat.

The genetics of the Kalmyk breed ensure optimal development of muscle mass and uniform distribution of intramuscular fat, which contributes to pronounced marbling. It also affects the growth rate and fattening efficiency, ensuring high rates of weight gain while maintaining meat quality.

Hereditary factors include resistance to diseases and tolerance to adverse conditions, which has a positive effect on productivity and meat quality [4].

The Kalmyk breed, which has valuable adaptive and productive characteristics, can significantly benefit from breeding programs. However, the long interval between generations in cattle slows down the process of obtaining genetically improved offspring.

This creates difficulties for targeted breeding work based on traditional methods, which requires a long time to achieve significant results in improving meat productivity [5].

Key consumer characteristics of meat products, such as taste, aroma, tenderness, marbling and juiciness, are critical for assessing the quality of Kalmyk meat. After slaughter, glycogen in meat tissue is converted into lactic acid, which helps soften connective tissue during long-term storage. As animals age, changes in meat composition are observed: a decrease in moisture content and an increase in fat, which leads to changes in protein composition and an increase in the content of connective proteins [6,7].

Increasing the productivity of meat breeds, including Kalmyk, is of great economic importance. Selection approaches aimed at improving genetic potential are an effective strategy for improving the quality of livestock.

The Kalmyk breed of cattle is one of the oldest breeds of cattle, representing significant breeding and economic importance. A characteristic feature of the breed is the absence of an occipital ridge on the head. Adult cows weigh 450–480 kg, bulls – 800–950 kg. Calves weigh 20–25 kg at birth. The Kalmyk cattle breed is characterized by seasonal dynamics of live weight and fatness. In conditions of insufficient feeding in winter, adult cows can lose 30-60 kg of weight and have an average fatness before going out to pasture. Kalmyk cattle have good reproductive capacity, easily tolerate calving and are characterized by high fertility. The average calf yield is 89 per 100 mothers, which exceeds similar indicators of other meat breeds.

The average daily gain of the Kalmyk cattle breed is about 1070 g. This indicator reflects the average increase in the animal's weight per day during the fattening period and characterizes the efficiency of feeding and growth. Breeding bulls undergoing their own productivity testing at the age of 8 to 15 months, on average, gain 900–1000 g of live weight per day [8].

The Kalmyk cattle breed, due to its unique breeding and productive qualities, is an important resource for achieving these goals. Research into the genetic and morphological characteristics of this breed allows for the optimization of breeding and fattening processes, which in turn contributes to improving the economic performance of beef cattle breeding. Today, the Kalmyk cattle breed is a significant part of beef cattle breeding in Kazakhstan. An important aspect for assessing its productivity is understanding the total population, which allows us to draw conclusions about the distribution of livestock by different categories and its impact on productivity indicators (Table 1).

Table 1 - Distribution of Kalmyk cattle by category in Kazakhstan

Category	Number of heads	Percentage of total population
Cow	28688	46%
Heifer	18764	30.1%
Bull	2779	4%
Bullock	12194	19%
Total	62405	100%

Based on the data from the table regarding the distribution of the Kalmyk cattle population, it shows that in Kazakhstan the cow category predominates, which makes up the largest share of the population - 46%. This indicates that adult cattle capable of reproduction and ensuring productivity occupy a key place in the herd structure. At the same time, a significant number of young animals, including heifers and bullocks, make up approximately 50% of the total herd. Heifers up to 18 months old, weighing about 300-350 kg, and bulls of the same age, weighing from 400 to 600 kg, play an important role in the future of the herd, as they will be used for reproduction and further increase in the herd.

The number of bulls, at 4.5% of the total herd, is relatively small, indicating a smaller proportion of producers compared to cows. As part of the analysis of the productive and breeding qualities of Kalmyk cattle, a bonitation aimed at assessing the main breeding characteristics was carried out at LLC «Agrofirma Turikpen», located in the Moyynkum district of the Zhambyl region. The total number of Kalmyk cattle in the «Agrofirma Turikpen» LLC, located in the Moyynkum district of the Zhambyl region, is 6961 heads.

To assess the breeding qualities of Kalmyk cattle, 200 heads of cattle were assessed at the farm of LLC «Agrofirma Turikpen». During the assessment, the breeding qualities of bulls and heifers of various age groups were assessed, which made it possible to more accurately determine their compliance with the established standards. The assessment of breeding qualities was carried out for the purpose of analyzing and classifying cattle into the categories elite-record, elite and 1st class (Table 2).

Table 2 - Distribution of probonitized animals by classes

Group of animals	Total	Class		
		elite-record	elite	1st grade
Total	200	59	105	36
Heifers over 18 months	54	21	14	19
Bulls from 6 to 12 months	35	6	29	-
Heifers from 6 to 12 months	111	32	62	17

In the course of the conducted probonitation, out of 200 heads of cattle, the distribution by classes is as follows: 59 heads are classified as “elite-record”, 105 as “elite” and 36 as “1st class”. This indicates a high percentage of cattle corresponding to the “elite” and “elite-record” standards, which is evidence of the high breeding quality of most animals. Of the 54 heifers over 18 months old, 21 heads correspond to the “elite-record” class, which is 38.9% of the total number of older heifers. 14 heifers are classified as “elite” (25.9%), and 19 as “1st class” (35.2%).

In the category of bulls from 6 to 12 months, out of 35 heads, 6 belong to the class "elite-record" (17.1%), 29 heads - to the class "elite" (82.9%). The absence of bulls in the class "1st class" indicates that all bulls in this age group correspond to either a high level of breeding qualities.

There are 111 heifers from 6 to 12 months old, of which 32 (28.8%) belong to the “elite-record” class, 62 (55.9%) to the “elite” class and 17 (15.3%) to the “1st class” class.

Measuring live weight is a key indicator of livestock productivity and health. For the Kalmyk breed, which is known for its high meat productivity, accurate live weight data allows for effective assessment of their development and compliance with breeding standards.

Live weight analysis of bulls and heifers at TOO Agrofirma Turikpen is carried out to determine growth and assess compliance with breeding criteria. The table below illustrates the average live weight of animals depending on their age and compliance with grading classes (Table 3).

Table 3 - Average live weight of bulls and heifers by age groups

Age, months	Total heads, bulls	Average live weight, kg	Bonitization class, bulls	Total heads, heifers	Average live weight, kg	Bonitization class
7 months	2	195	elite	14	174	elite
8 months	2	214	elite	63	192	elite
9 months	31	237	elite	34	216	elite

These data show that both bulls and heifers demonstrate stable growth in live weight with age, maintaining a high bonitization class. This confirms their high productive qualities and good adaptability to growing conditions.

Monitoring and measuring live weight is important for assessing animal growth and development, allowing for evaluation of feed efficiency, genetic potential and production capabilities.

The morphological composition of the carcasses of the Kalmyk breed is a key factor in its high meat productivity. The genetic characteristics of the breed provide developed muscles and optimal distribution of fat, which increases the proportion of meat and its quality. Intramuscular fat contributes to marbling, making the meat more tender and juicier.

For a more visual representation of the morphological composition of the carcass of the Kalmyk breed, below are the key indicators reflecting the percentage content of the main components of the carcass and their influence on the quality of meat products (Table 4).

Morphological composition of the Kalmyk breed carcass and its impact on the quality of meat products. The main components of the carcass include muscle tissue, which makes up 60-65% and provides high slaughter yield and meat quality; fatty tissue (15-20%), which affects marbling and juiciness; and bone tissue (12-15%), which reduces the overall meat yield.

Connective tissue makes up only 2-4% of the total carcass weight, but its quantity and quality play an important role in the toughness of the meat, especially with age, when the content of collagen and elastin increases.

Table 4 - Morphological composition of the carcass of the Kalmyk breed

Mascara component	Percentage content	Description
Muscle tissue	60-65%	Well-developed muscles ensure high slaughter yield and meat quality.
Adipose tissue	15-20%	Includes subcutaneous and intramuscular fat, which affects the marbling and juiciness of meat.
Bone tissue	12-15%	Low bone content provides a higher meat yield relative to the total carcass weight.
Connective tissue	2-4%	The amount of collagen and elastin increases with age, which affects the toughness of the meat.
Moisture	Decreases with age	Decreases with age of the animal, which leads to an increase in fat deposits.

Analysis of data on bonitation and live weight demonstrates that Kalmyk cattle have good productivity indicators and breeding characteristics, which is confirmed by high scores in various classes.

The established growth and weight indicators indicate good adaptive potential of the breed, which makes it a valuable asset for beef cattle breeding.

The results of the study highlight the need for further improvement of breeding and feeding methods to maximize the productive qualities of Kalmyk cattle.

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