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## THE INFLUENCE OF THE SLAUGHTER AGE ON THE MEAT PRODUCTIVITY OF KALMYK CATTLE

### ANNOTATION

Meeting the growing demand of the population for meat is one of the priorities of modern animal husbandry. Particular attention is paid to the growth of cattle meat production, which occupies a leading position in the meat balance of the country.

The article deals with the study of the slaughter quality of meat of Calmyk bulls of different lines belonging to Seaman - 120541 and Stroy - 2520 at the age of 15-18 months and the change in the quality of slaughter depending on age. The morphological and chemical composition of the carcasses of bulls of different affiliations was studied, and the index and energy value of meat were determined. The chemical composition was examined at the National Accreditation Center of the Committee for Technical Regulation and Metrology of the Ministry of Trade and Integration of the Republic of Kazakhstan. According to the results of the study, the Sailor-120541 bulls were distinguished by high indicators. In the course of the work, the results of the chemical analysis of the average sample of meat showed that the chemical composition of meat varies depending on the age and genotype of each bull of different lines.

The research work was carried out within the framework of the scientific and technical program BR 10764981 "Development of technologies for effective management of the selection process for the conservation and improvement of genetic resources in meat husbandry" (2021-2023) by Moskovsky LLP in the farm where it grows the Kalmyk breed of meat.

**Key words:** linear affiliation, slaughter quality, Kalmyk breed, carcass.

**Introduction.** The formation of productive qualities in animals occurs as a result of all the changes in the body in the process of individual development. To the factors of formation of meat, productivity can be attributed feeding, age, sex, heredity, housing, acclimatization, and individual characteristics of cattle. According to the data of scientists A.V. Zarkевич (1961); E. N. Dorotyuk (1981), in the winter period the skin of Kalmyk breeds significantly thickens under the influence of dermo and reticulum. In the cold season, the thickness of collagen fibers in the retinaculum (fibers tightly adhering to each other) increases approximately 2 times, which increases the ability of the skin to retain a large amount of heat. In connection with this, a powerful glandular apparatus appears on the skin of Kalmyk breeds, and sebaceous and sweat glands develop 2-3 times more than in other breeds. This makes the cattle more resistant to cold and serves as a cooling agent in the heat [1, 2]. Increasing the production of livestock products, including cattle meat, is a priority task of farms. It should be taken into account that in any farm the breed of beef cattle (structure) has defects of structure [3, 4]. In this regard, to systematize the

production of cattle meat and improve the available breeds of LLP "Moskovsky" in 2012 imported bulls-producers of Kalmykian breeds from the Republic of Kalmykia.

**Objective of the study.** For a more detailed study of the meat productivity of imported beef cattle breeds for the Northern Territory and to identify differences in the slaughter age of animals, control slaughters at different age periods were carried out.

**Materials and methods of research.** The object of the study is bulls of the Kalmyk breed at the age of 15 and 18 months. The research work 2021-2023 was carried out in conditions of LLP "Moskovskiy" of the North-Kazakhstan region. Slaughter quality was studied at the slaughter of 3 heads from each group at the age of 15 and 18 months from descendants of factory lines Moryak - 120541, 3 heads of descendants of factory lines Strojny - 2520 at the age of 15 and 18 months.



Figure 1 – 15-month old progeny of the bull breeder of the breeding line Sailor 120541 taken for research

In the course of the work, experiments were carried out by general scientific methods on the basis of comparative analysis and theoretical information generalizations, zootechnical, and anatomical data [5,6].

To estimate meat yield from each producer, 3 steers were taken by analogy to the controlled slaughter conducted at the slaughterhouse of the breeding farm according to the method of VNIIMS, VIZH (1977). The slaughter qualities were determined by live weight before slaughter, by the weight of the steamed carcass, weaner weight, slaughter weight, slaughter yield, and morphological composition of the carcass [7, 8]. For this purpose, after cooling for a day at a temperature from 0 to +4°C, the right half carcass was separated from the bone, and the relative composition of meat and fat, bones, tendons, and cartilage was determined, as well as the yield was determined meat tissues per 1 kg of bone (fleshiness index) [9 ]. Chemical parameters of meat and amino acids of the long muscle of bulls' backs were determined according to the general methodology (GOST 34132-2017) [10].

**Results of the study.** «One of the main problems in our country is to provide the population with meat, including beef. Human consumption of meat products is 86 kg per year according to scientifically based nutritional standards. 43-45% of this amount falls on beef [11].

Formation of meat productivity is realized as a result of morphological and physicochemical changes in the organism of animals in the process of growing and fattening. Factors influencing the formation of meat productivity include feeding, breed, sex, age, adaptability, housing conditions, and personal characteristics of animals.

The live value of animals is an additional indicator of meat productivity and can not fully reflect their meat qualities. A full assessment of meat productivity can be given on the basis of qualitative and quantitative indicators of meat productivity obtained from the results of slaughter [12].

The level of meat productivity of cattle is clearly determined by their live weight. However, we can fully assess the specificity of meat production and meat formation only through the number of meat products obtained as a result of animal slaughter.

According to the results of the control, the indicators of meat productivity of bulls are shown in Table 1.

Table 1 – Results of control slaughter of Kalmyk bulls of different ages and sires, ( $\bar{x} \pm S_x$ )

| Indicators | Moryak- 120541 |          | Strojny-2520 |          |
|------------|----------------|----------|--------------|----------|
|            | 15 month       | 18 month | 15 month     | 18 month |
|            |                |          |              |          |

|                                  |            |            |            |            |
|----------------------------------|------------|------------|------------|------------|
| Live weight before slaughter, kg | 364,7±3,55 | 414,3±9,12 | 354,1±9,89 | 407,7±10,5 |
| Weight of fresh carcass, kg      | 195,6±0,9  | 223,2±5,68 | 189±4,8    | 218,9±5,84 |
| Abdominal fat mass, kg           | 14±0,12    | 12,2±0,38  | 10,4±0,34  | 9,1±0,23   |
| Slaughter weight, kg             | 209,6±0,62 | 235,4±1,0  | 199,4±0,72 | 228±1,15   |
| Meats yield, %                   | 53,3       | 53,8       | 53,3       | 53,7       |
| Abdominal fat yield, %           | 2,5        | 2,9        | 2,9        | 3,4        |
| Slaughter yield, %               | 57,5       | 56,8       | 56,3       | 55,9       |

Based on the results obtained, it can be concluded that meat productivity increases with age. During the study, the weight of steers Moryak-120541 was higher than the weight of steamed carcass of 15-month-old steers Stroiny-2520 by 6.6 kg - 1.3%, and 18-month-old steers - by 4.3 kg - 1.01%. higher. In addition, the slaughter yield of steers slaughtered at 18 months of age is characterized by their development (taking into account grazing) [13].

It has been noticed that the performance of the bull producer Stroiny-2520 at 15 months of age is 3.6 kg or 1.3% less than that of the bull producer Moryak-12054 in terms of fat yield. Accordingly, 18-month-old bulls of Moryak -12054 had a higher index by 3.1 kg or 1.3%.

One of the important indicators characterizing the slaughter result is slaughter yield [14, 15]. According to the study, the slaughter yield of bulls of producer Moryak-12054 was higher than that of bulls of producer Stroiny-2520 by 1.2 kg or 1.02% at 15 months and by 0.9 kg or 1.01% at 18 months. The highest slaughter yield was observed in 15-month-old steers of Moryak -12054 - 57.5%.



Figure 2 – Carcasses of Kalmyk bulls slaughtered at Karasu Et slaughterhouse

Carcasses of slaughtered bulls were cooled for a day and weighed by parts [17].

The morphological composition of carcasses was determined based on the results of cutting the right half of carcasses (Table 2).

Table 2 – Morphological composition of the right half carcass of Kalmyk steers of different ages of different ages, ( $\bar{x} \pm S_x$ )

| Indicators                    | Moryak- 120541 |           | Strojny -2520 |            |
|-------------------------------|----------------|-----------|---------------|------------|
|                               | 15 month       | 18 month  | 15 month      | 18 month   |
| Weight of fresh carcass, kg   | 195,6±0,9      | 223,2±5,7 | 189 ±4,8      | 218,9±5,9  |
| Weight of chilled carcass, kg | 192,4±0,6      | 220,6±5,6 | 186,6±4,7     | 216,6±5,88 |
| Half carcass weight, kg       | 94,6±0,5       | 109,1±2,9 | 92±2,4        | 107±2,95   |
| Meat and fats, kg             | 76,4±2,73      | 89,3±3,12 | 75,1±2,61     | 87,3±2,89  |
| %                             | 81,8           | 81,9      | 80,7          | 81,6       |
| Bone yield,kg                 | 16,8±2,21      | 18,1±2,43 | 15,6±2,03     | 17,9±2,31  |
| %                             | 17,8           | 16,8      | 17            | 16,1       |
| Tendon yield, kg              | 1,3±0,14       | 1,6±0,17  | 1,2±0,12      | 1,7±0,17   |

|                |         |          |          |          |
|----------------|---------|----------|----------|----------|
| %              | 1,4     | 1,5      | 1,3      | 1,6      |
| Meat index, kg | 4,5±0,1 | 4,9±0,16 | 4,8±0,13 | 4,9±0,16 |

The morphological composition of carcasses of bulls of different ages of each producer showed that meat quality indicators increased with age. In the experiment, bulls-producers Moryak -120541 of different ages differed from bulls-producers Stroiny-2520 by a more effective ratio of meat and bone parts in the carcass. 18-month-old male bull Moryak -120541 had 81.9% absolute weight of pure meat part.

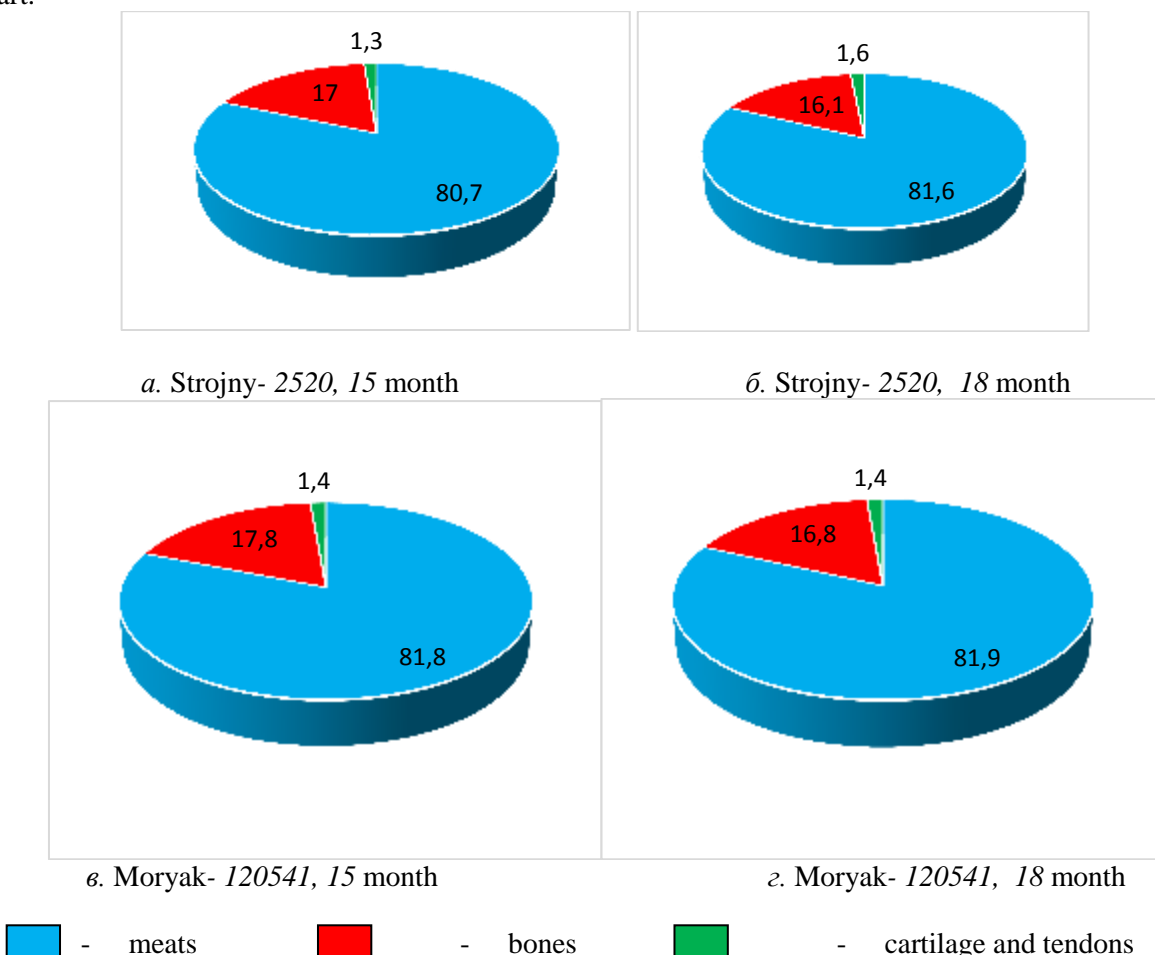


Figure 3 – Morphological composition of the right half carcass of experimental steers

The bone mass of 18-month-old bulls of producer Moryak-120541 is 0.7% less than that of bulls of producer Stroiny-2520.

The meat index of the cattle breeds in the beef direction is estimated as average (4.7-5.3) [16].

In terms of the productivity index, the performance of 18-month-old steers Sailor-120541 and Stroiny-2520 had the same result of 4.9 kg.

As a result of the research, the breeding lines of the Kalmyk breed reached these indices from the 15th month, which indicates that the Kalmyk breed retained its meat productivity due to the ability to quickly adapt to any situation, to acclimatize under extreme conditions [18,19].

An important indicator of meat productivity, along with slaughter productivity and morphological composition, is the chemical composition and caloric content of meat [20,21]. When evaluating meat, much attention is paid to the study of its quality (Table 3).

Table 3 – Chemical composition (%) and energy value (MJ) of meat, ( $\bar{x} \pm S_x$ )

| Indicators | Moryak- 120541 |              | Stroiny-2520 |            |
|------------|----------------|--------------|--------------|------------|
|            | 15 month       | 18 month     | 15 month     | 18 month   |
| Dry matter | 23,69±0,28     | 25,49 ±0,34  | 23,2 ±0,24   | 25,1 ±0,60 |
| Moisture   | 76,31 ±3, 67   | 74,51 ± 3,37 | 76,8 ±3,58   | 74,9 ±3,41 |

|                                 |             |             |             |            |
|---------------------------------|-------------|-------------|-------------|------------|
| Protein                         | 20,01 ±1,53 | 20,6 ± 1,65 | 19,83 ±1,39 | 20,02±1,56 |
| Fats                            | 3,71 ±0,36  | 4,53 ± 1,3  | 3,16±0,23   | 4,03 ±0,7  |
| Ash                             | 0,83 ±0,10  | 0,88 ± 0,13 | 0,91±0,16   | 0,85 ±0,12 |
| Nutritional value of meat, kcal | 1165        | 1217,5      | 1106,9      | 1195,2     |
| 1 kg energy value, MJ           | 4,8         | 5,1         | 4,6         | 5,0        |

According to the data of chemical analysis of the average meat sample, there was no reliable difference in protein indices, and also the intensity of fat accumulation was higher in 15- and 18-month-old steers of the producer Moryak-120541 than in bulls of the producer Stroiny-2520. Due to their high-fat content, they are also high in calories [22].

According to the results of the chemical composition of the obtained meat, no significant interbreed differences in the content of dry matter and moisture in the meat were revealed.

Among 15-month-old experimental groups, meat moisture content of meat of bulls-producers of Stroiny-2520 was 1% higher than that of bulls-producers of Moryak-120541, and meat moisture content of bulls-producers of Stroiny-2520 was 1% higher among 18-month-old bulls-producers.

Compared to the experimental groups with higher meat fat content in 15- and 18-month-olds, 3.71-4.53% was also observed in Sailor-120541.

**Conclusion.** Meat productivity of Kalmyk breeds of cattle bred in the North-Kazakhstan region was characterized by satisfactory indicators. It should be noted that the slaughter yield of each bull producer was in the desired value from the point of view of meat productivity.

According to the conducted research, one of the most important indicators characterizing the result of slaughtering is slaughter yield. The highest slaughter yield was observed in 15-month-old bull producer Sailor-120541 - 57.5 %, it was higher than in 15-month-old bull producer Stroiny-2520 by 1.2 %, and in 18-month-old bull producer - by 1.6 %. This is an important factor determining the productivity of the Sailor-120541 bull, which is well adapted to local weather conditions and is effective for marketing meat. As was said above, the Kalmyk breed of cattle, introduced and bred in areas of Northern Kazakhstan, has high enough indicators of meat productivity. When evaluating the quality of meat for carcass completeness, the producer Sailor mark -120541 received a fairly high price. According to the energy composition of meat, calculated on the basis of the concentration of fat and protein in the meat, the indicators of 18-month-old steers-producers Sailor-120541 amounted to about 5.1 MJ. The results of the chemical analysis of the average meat sample showed that the chemical composition of meat varies depending on the age and genotype of each producer.

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## ТҮЙІН

Халықтың етке өсіп келе жатқан сұранысын қанағаттандыру қазіргі заманғы мал шаруашылығының бірінші кезектегі міндеттерінің бірі болып табылады. Елдің ет балансында жетекші орын алатын ірі қара етін өндірудің өсуіне ерекше мән беріледі. Мақалада 15-18 айлық жастағы қалмақ тұқымының Моряк- 120541 және Стройный- 2520 аталық іздерінен тараған бұқашықтардың сойыс сапасын зерттеу және жасына байланысты сойыс сапасының өзгеруі қарастырылған. Әр аталық із бұқашықтары ұшасының морфологиялық және химиялық құрамы зерттеліп, еттілік индексі мен энергетикалық құндылығы анықталды. Химиялық құрамы Қазақстан Республикасының сауда және интеграция министрлігінің техникалық реттеу және метрология комитетінің Ұлттық Аккредиттеу Орталығында сараптамадан өтті. Зерттеу нәтижесі бойынша Моряк - 120541 аталық із бұқашықтары жоғары көрсеткіштерімен ерекшеленді. Жұмыс барысында, орташа ет сынамасының химиялық талдау нәтижелері әр аталық із бұқашықтарының жасына және генотипіне байланысты еттің химиялық құрамы өзгеретінін көрсетті. Зерттеу жұмысы BR 10764981 "Етті мал шаруашылығындағы генетикалық ресурстарды сақтау мен жетілдірудің селекциялық процесін тиімді басқару технологияларын әзірлеу" (2021-2023 ж.)

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### **РЕЗЮМЕ**

Удовлетворение растущего спроса населения на мясо является одной из первоочередных задач современного животноводства. Особое внимание уделяется росту производства мяса крупного рогатого скота, занимающего лидирующие позиции в мясном балансе страны.

В статье рассматривается исследование убойного качества мяса бычков калмыцкой породы разной линейной принадлежности Моряк - 120541 и строй - 2520 в возрасте 15-18 месяцев и изменение качества убоя в зависимости от возраста. Был изучен морфологический и химический состав туш бычков разной принадлежности, определен индекс и энергетическая ценность мяса. Химический состав прошел экспертизу в Национальном аккредитационном центре Комитета технического регулирования и метрологии Министерства торговли и интеграции Республики Казахстан. По результатам исследования, бычки Моряк - 120541 отличались высокими показателями. В ходе работы результаты химического анализа средней пробы мяса показали, что химический состав мяса меняется в зависимости от возраста и генотипа каждого бычка разных линии. Исследовательская работа выполнена в рамках научно-технической программы BR 10764981 "Разработка технологий эффективного управления селекционным процессом сохранения и совершенствования генетических ресурсов в мясном животноводстве" (2021-2023 гг.) ТОО «Московский» в хозяйстве, где выращивает калмыцкую породу мясного направления.

