Meat Productivity and Exterior Features of Russian Meat Merino Sheep of Linear Origin

E N Chernoba	extsuperscript{1}, O N Onischenk	extsuperscript{1} V I Konoplev	extsuperscript{1} and L P Semkiv	extsuperscript{2}

	extsuperscript{1}Stavropol State Agrarian University, per. Zootechnical, 12, Stavropol, Russian Federation
	extsuperscript{2}Yaroslav-the-Wise Novgorod State University, ul. B. St. Petersburgskaya 41, Veliky Novgorod, Russian Federation

E-mail: bay973@mail.ru

Abstract. The article studied the meat productivity and exterior features of rams of the Russian meat merino breed. It was found that animals of group II (line SM-11) had superiority over their peers in group I (nonlinear) in terms of basic measurements. The experimental linear rams of group II exceeded their peers in group I: in height at the sacrum and withers by 0.8 and 1.6%, depth of the chest – 7.5%, oblique body length – 2.3%, chest girth – by 3.4 and cannon girth – by 3.0. This indicates the best development of linear animals. In terms of slaughter qualities, the superiority was also on the side of the animals of the II group. So, group II rams had the best result above the animals of group I respectively, by carcass weight - by 13.1% (P <0.05), by carcass weight – by 12.5% (P <0.05), by chilled carcass weight – by 12.4% (P <0.05), by carcass slaughter yield – by 1.7 abs. %. The sectional cut of the carcasses was carried out in accordance with GOST 7596-81. Deboning of meat from bones showed that the rams of the II group in terms of boneless meat yield (73.9%) exceeded their peers of the I group by 1.7 abs. %. The coefficient of meat content, namely the ratio of boneless meat to bones, was the highest in group II, 2.83, which is 0.23 units higher than in group I.

1. Introduction

Lamb is currently one of the main sources of organic raw materials in human nutrition, because this is one of the industries where all kinds of dubious additives of foreign origin are not used in the diets of sheep. It is the high taste and nutritional qualities of sheep meat, naturalness and organicness that have an advantage over meat products of other types of animals. Therefore, even though the price of lamb is 3 times more expensive than meat from broilers and 1.5 times higher than the price of pork, the population of the country often prefers lamb. As it has a high selling price, it can be cost effective. Lamb, which is obtained from young animals aged 6 to 8 months, is considered economically profitable [4].

World experience shows that sheep breeding is based not only on obtaining wool, but, first, attention is paid to the predisposition of animals to an increase in live weight and receiving high-quality mutton. Therefore, it is necessary to develop a national program for the development of sheep breeding and the creation of new highly productive breeds, types, lines of animals that meet the requirements of the world market for wool productivity and early maturity, to be competitive not only in the domestic but also in the foreign market [5].

The most important factor in the effective and stable development of sheep breeding in the Stavropol Territory is the presence of a developed and reliable breeding base. Improving the breeding and productive qualities of animals always remains an urgent and priority task, the solution of which is to
ensure the successful development of the industry (“Development of sheep and goat breeding in the Russian Federation until 2030”, Order of the Government of the Russian Federation of February 2, 2015 no. 151-r).

The cultivation of fine-wooled sheep during the Soviet period was aimed at obtaining thin, uniform, and high-quality wool, which was necessary for the country’s textile industry, providing its population with natural, environmentally friendly wool products, so sheep breeding was profitable. At present, breeding sheep only to obtain wool is ineffective, due to the lack of a sales market, therefore, the breeder’s task is to create a herd of sheep with high wool and meat characteristics [5].

Purposeful, painstaking work with the entire flock is required to create and improve fine-wooled sheep with desirable meat and wool qualities. It is necessary to get early maturing animals with low costs for their rearing, and at the same time pay special attention to the quality of wool [8]. Animals characterized by high meat qualities have special exterior features. One of the selection techniques in pure-bred sheep breeding when obtaining high-quality mutton is linear breeding, which can improve the quantitative and qualitative performance indicators of the herd.

Therefore, the purpose of the research was to study the exterior and meat qualities of sheep of the meat-wool direction of the Russian meat merino breed of linear origin.

It is possible to judge the degree of development of animals, their maturity, constitutional type, direction of productivity by the exterior of the animal [6, 7].

Special attention in sheep breeding is paid to the study of meat productivity, slaughter yield and nutritional value of mutton. Continuous work is underway with the aim of selling young lamb to the commodity market [4].

Animals of the Russian meat merino breed are characterized by high early maturing qualities, but even with them it is necessary to carry out strict selection, reject those animals that do not meet breed standards and work with those animals that meet or exceed the requirements of the breed standard.

2. Research methods
For the study, we selected the uterus of the Russian meat merino (RMM) breed of 3 years old in the amount of 120 heads, in which there were 60 linear ewes (line SM-11) and non-linear animals with average indicators for the herd. Each group was assigned 2 rams, typical for each group (table 1).

| Group | Selection options | breed |
|-------|-------------------|-------|
|       | ewes              | rams  |
|       | № line  | n    | № line | n    |
| I (control) | RMM (nonlinear) | 60 | RMM (nonlinear) | 2 | RMM (nonlinear) |
| II (experimental) | RMM (line SM -11) | 60 | RMM (line SM -11) | 2 | RMM (line SM -11) |

The exterior was studied according to certain measurements of the articles of the animal at 13 months age (n = 10).

A control slaughter of 3 rams from each group was carried out to study meat productivity and interior features of animals at 9.0 months of age. For this, the main indicators were determined – slaughter weight and slaughter yield.

Graded cutting was carried out in accordance with GOST 7596-81 to determine the graded composition. In addition, deboning was carried out to determine the yield of boneless meat and bones.

The main measurements of the rams at 13 months of age were taken with age to characterize the growth and exterior changes in physique.

According to the exterior parameters, to a certain extent, it is possible to assess the breed characteristics and productive qualities of animals [9, 10]. Animal breeders and scientists attached great importance to the exterior features of animals. It is possible to determine the breed, directions of
productivity and even features of origin and judge the genetic capabilities of the organism in certain breeding zones of our country by the exterior. The results of the measurements of the exterior allow making the following conclusion that the experimental groups of animals had the most optimal indicators for the breed, with the superiority of the experimental group of linear animals SM-11 in some indicators with a significant difference. It was found that at the age of 13 months, the experienced rams of the II group exceeded the height at the withers by 1.6%, the height at the rump bone by 0.8%, the oblique length of the body by 2.3%, the depth of the chest by 7.5%, and the girth of the chest by 3.4%, cannon girth – by 3.0%.

Indicators of meat productivity most clearly characterize animals, to which type they belong. The main indicator is the slaughter yield. In animals of early maturing meat breeds, it ranges from 60 to 70% [9–13].

It is no secret that lamb is the main source of development for the sheep breeding industry at this stage. Therefore, for the effective management of the industry, it is required to know breeding methods based on the results and recommendations of scientists to increase the live weight and meat qualities of animals in a certain direction of productivity and genetic predisposition.

A control slaughter was carried out from each group taking 3 typical rams to study the meat qualities of the experimental groups of animals at 9.0 months of age. Animals in live weight corresponded to the average for the group. Before slaughter, animals were starved, which implies keeping animals without feed to empty the stomach and intestines from the contents within 24 hours. After starvation, weighing was carried out to find out the pre-slaughter weight of the animals. After the slaughter, the slaughter weight, and the slaughter yield were determined. Further, to study the yield of boneless meat and bones, high-quality cutting of carcasses was carried out, followed by deboning in accordance with GOST 7596-81 “Meat. Cutting lamb and goat meat into cuts. Technical conditions” [2].

During the slaughter, the animals were drained of blood, the head was removed. The skin was removed after incisions and cuts in strictly designated places. The internal organs, edible and inedible, were removed from the carcass after the incision of the abdominal wall of the abdomen along the white line. Next, the front and hind legs were cut off at the wrist and hock joints, and the weight of the carcass was determined by weighing (table 2).

| Indicators                      | Group           |
|--------------------------------|-----------------|
|                                | I (control)     | II (experimental) |
| Live weight before starvation, kg | 50.5±0.66     | 54.6±0.75         |
| Pre-slaughter live weight, kg   | 48.8±0.58      | 52.8±0.68a        |
| Carcass weight, kg              | 20.6±0.36      | 23.3±0.63a        |
| Interior fat mass, kg           | 0.84±0.01      | 0.89±0.02         |
| Slaughter weight, kg            | 21.5±0.35      | 24.2±0.63a        |
| Slaughter yield, %              | 44.1           | 45.8              |
| Chilled carcass weight, kg      | 20.1±0.35      | 22.6±0.64b        |

a *P<0.05; b **P<0.01

The results of the slaughter of rams presented in the table indicate that animals of group II significantly exceeded their peers in group I by 7.0% in pre-slaughter weight (P <0.01), in carcass weight by 13.1% (P <0.05), in carcass weight by 12.5% (P <0.05), by chilled carcass weight by 12.4% (P <0.05), by carcass slaughter yield, group II rams had the best result over group I animals, respectively, by 1.7 abs. %.

Meat productivity of sheep depends on feeding, keeping, breed data, viability in certain
environmental conditions. Therefore, when breeding certain genotypes, the special attention is paid to safety and fitness, the ability to reveal their genetic potential to the fullest in a certain area of their breeding.

Meat productivity also determines the economic indicators of raising animals. Under equal conditions of feeding and keeping, with high meat indicators, those animals that show the best results in the yield of class I cuts and the yield of boneless meat from the carcass will be economically profitable.

Varietal and morphological composition of carcasses, the ratio of edible and inedible parts of the carcass most accurately shows which direction of productivity the experimental animals belong to (table 3).

| Group          | Yield, % | Coefficient of meatiness | Output of cuts by grades, % |
|----------------|----------|--------------------------|-----------------------------|
|                | Boneless meat |             |                           |
| I (control)    | 72.2     | 2.60                     | 88.1                        |
| II (experimental) | 73.9     | 2.83                     | 89.5                        |
|                | Bones    |                          | 8.1                         |
|                |          |                          | 11.9                        |
|                | I        |                          | 10.5                        |
|                | II       |                          | 6.1                         |

After deboning of chilled carcasses, animals of group II in terms of boneless meat yield (73.9%) exceeded their peers in group I by 1.7 abs. %, and according to the coefficient of meat content, the superiority was by 0.23 units. Studying the yield of cuts by grades in the experimental groups, it was found that the rams of the II group of had more cuts of the 1st grade (89.5%) than those of the peers of the I group by 1.4 abs. %.

3. Conclusion

Thus, the young growth of the SM-11 line had the best growth and development, high slaughter qualities and the best varietal and morphological composition of carcasses.

Hence, when working with a breed, it is necessary to create lines of animals that have the best productive and quality indicators, in comparison with the average indicators for the herd. Linear breeding in purebred sheep breeding is the most effective technique or way of breeding new types in a breed and breeding new breeds.

The research results obtained on the meat productivity of crossbred young animals from imported sheep, as well as the characteristics of the productivity of sheep of the Russian meat merino breed from different breeding farms, are confirmed by the article by O.N. Onishchenko [5]. The article argues that, despite the high meat characteristics of the offspring of imported origin, sheep of the Russian meat merino breed are not inferior in terms of meat characteristics to well-known brands. And the most important advantage of Russian meat merino sheep over imported meat breeds is their high adaptability to these climatic conditions and high quality wool.

References

[1] Amerkhanov Kh A, Egorov M V and Selionova M I 2018 Russian meat merino: monograph (Stavropol, All-Russian Research Institute of Sheep and Goat Breeding) 130 p
[2] GOST 7596-81 Meat. Cutting mutton and goat meat for retail trade 2006 (Moscow: Standartinform) 12 p
[3] Kopylov I A 2015 Efficiency of using rams-producers of different genotypes in a herd of sheep of the soviet merino breed SPK of collective farm-breeding plant im. Lenina, Arzgir region Prospects and achievements of agricultural products Proceedings of International scientific-practical conf., dedicated to the 85th anniversary of the Faculty of Technological Management (Stavropol: StSAU) 57–61
Onishchenko O N 2020 Meat productivity of crossbred young stock from imported sheep, as well as characteristics of the productivity of sheep of the Russian meat merino breed from different breeding plants Prospective developments of young scientists in the field of production and processing of agricultural products Proceedings of All-Russian (national) scientific-practical. conf. for students, graduate students and young scientists (Stavropol: StSAU) 149–154

Agarkova N A, Chernobay E N, Onishchenko A R, Onishchenko O N and Efimova N I 2020 Productive qualities of sheep when optimizing the level of feeding Bulletin of Kursk State Agricultural Academy 1 94–97

Selionova M I and Bobryshova G T 2017 Priorities for the development and scientific support of sheep and goat breeding in Russia Proceedings of the North Caucasian Research Institute of Livestock (Stavropol: Stavropol Research Institute of Livestock and Forage Production) 1 6 166–171

Selionova M I, Chizhova M P and Dubovskova L N 2015 Blood groups in the breeding of beef cattle Bulletin of beef cattle 1 (89) 14–17

Skorikh L N 2016 Exterior features of young sheep of various genotypes Proceedings of the All-Russian Research Institute of Sheep and Goat Breeding (Stavropol: All-Russian Research Institute of Sheep and Goat Breeding (Stavropol) Vol. 3 1 14-17

Trukhachev V I, Oleinik S A, Chernobai E N, Marynich A P and Sklyarov S P 2018 Meat and interior features of ewes obtained from parents of different age Agriculture for the next 100 years. Proceedings of the 26th NJF Congress 130–133

Trukhachev V I, Moroz V A, Chernobai E N and Ismailov I S 2016 Meat and Interior Features Rams of Different Genotypes Research Journal of Pharmaceutical, Biological and Chemical Sciences. January-February RJPBCS 7 (1) 1627–1630

Trukhachev V I, Oleinik S A, Chernobai E N, Antonenko T I and Konoplev V I 2018 Selected methods of formation desirable phenotype of different sheep breeds Agriculture for the next 100 years. Proceedings of the 26th NJF Congress 125–129

Chernobai E N, Voblikova T V, Agarkova N A and Efimova N I 2020 Sheep productivity in relation to coarse fiber in new-born lambs of different genotypes IOP Conference Series: Earth and Environmental Science 613 22–28

Trukhachev V I, Moroz V A and Chernobai E N 2017 The productive features of sheep in different types of breeding Research Journal of Pharmaceutical, Biological and Chemical Sciences 5 653–659