Adaptive properties of Tuvinian short-fat-tailed sheep of the steppe type in the conditions of the Republic of Buryatia

S Biltuev, V Achituev, B Zhamyanov, E Dymbrylova and B Achituev
Buryat State Academy of Agriculture, 8 Pushkin Street, Ulan-Ude, 670010, Russia

E-mail: dymbrylova_enzheno@mail.ru

Abstract. The article discusses the results of the authors' study on the assessment of the adaptive properties of steppe type sheep of the Tuvinian short-fat-tailed breed in the conditions of the Republic of Buryatia because of studying their productive qualities and some biological characteristics.

1. Introduction
In the Russian Federation, in providing the population with one of the main food products - meat, a significant role is assigned to large agricultural holdings and industrial enterprises that manufacture and process livestock products. They contain animals: year-round stall in premises or stall-pasture, on balanced feeding rations in terms of basic nutrients and biological substances. However, in the regions of the country in which the natural and economic conditions do not allow for intensive livestock raising, year-round grazing of animals has gained priority [1-3].

These fully include the Republic of Buryatia and Tyva with a sharply continental dry climate, which have significant tracts of dry steppe, foothill and mountain pastures, which can be most effectively used by sheep. With the transfer of the Russian economy to market relations, coarse-wooled sheep are most widespread here, whose share in the total livestock is over 90%. Breeds and types of coarse-wooled sheep adapted to local climatic and forage conditions have been created - Buryat coarse-wooled, steppe and mountain types of Tuvan short-fat-tailed sheep [4-6].

In 2012, steppe-type sheep of the Tuvinian short-fat-tailed breed were brought to the Iro agricultural enterprise in the Selenginsky district, located in the steppe zone of Buryatia.

Purpose of the study: to reveal the productive qualities of these sheep in the steppe zone of the Republic of Buryatia and to establish the possibilities of their use for breeding in regions with similar natural and climatic conditions.

2. Materials and methods
The experimental part of the work on the study of live weight, shearing and properties of wool of breeder rams, ewes, lambs safety, meat productivity of young stock at the age of 7 months in Tuvan short-fat-tailed sheep, was carried out in a comparative aspect with sheep of the Buryat coarse-wool breed.

The experiments were carried out by the peasant farm "Dorzhiev I.F." Selenginsky district (formerly SEC "Iro"), LLC "Shibertui" Bichursky districts located in the steppe zone of the Republic of Buryatia and in the laboratories of the Buryat State Agricultural Academy named after V.R. Filippov, East Siberian State University of Technology and Management, Buryat Republican Scientific and Production Laboratory in the period from 2017-2020.
The development of body articles in brood rams and ewes of the compared breeds was determined by taking measurements and calculating the body index in 5 heads from each group. Seasonal variability in live weight in brood rams and ewes of Tuvin short-fat tailed (n = 20 and 325 heads) and Buryat coarse-wooled sheep (n = 15 and 450 heads) was revealed by individual weighing in mid-May after wintering and at the end of October at the end of summer-autumn feeding.

Wool productivity was determined by individual weighing with an accuracy of 0.1 kg, length, fineness and morphological composition of wool - according to generally accepted methods and VASKhNIL (1970), GOST 17515-93, GOST and VTO-8-04.

The slaughter of animals was carried out according to the VIZH method (1978), sampling and study of the chemical composition of meat according to GOST R 51447-99, GOST 25011-2017, GOST 23042-2015, taste of meat and broth - GOST 9959-91, GOST 9959 -2015 [6-7].

The processing of experimental data was carried out using the methods of biometrics (N.A. Plokhinskii, 1969, E.K. Merkurieva, 1970) and the computer program "Excel" [5].

3. Results

Animals of the steppe type of the Tuvinian short-tailed breed, in comparison with the Buryat coarse-haired, differed in measurements of height at the withers, oblique body length and girth of the metacarpus. The size of the height in the sacrum, the width of the chest, the depth of the chest, the girth of the chest, the width in the maklaki and the width in the ischial tuberosities were practically the same.

Both the breeder rams and the ewes of the Buryat coarse-wooled breed surpassed Tuvin short-fat-tailed sheep analogues in terms of herd height at the withers by 1.37 and 5.92 cm, in cannon girth - by 0.79 and 1.05 cm, oblique body length - by 3.67 and 2.33 cm, at the same time, the steppe type sheep of the Tuvin short-fat-tailed breed, in comparison with the Buryat coarse-haired, were characterized by better downsizing and massive constitution and thinner bones (table 1).

| Physique indices Leggy | Sheep producers | Ewes | Tuv's short-fat-tailed breed |
|------------------------|----------------|------|-----------------------------|
| Stretching             | 55.92          | 55.10| 56.83                       |
| Pelvic                 | 97.73          | 94.56| 90.33                       |
| Pectoral               | 105.30         | 113.51| 114.12                       |
| Downfall               | 60.21          | 63.64| 71.39                       |
| Bony                   | 122.70         | 136.00| 141.07                       |
| Massivenes             | 12.07          | 11.22| 11.64                       |
| Awful ass              | 119.91         | 128.60| 127.43                       |
| Overgrown              | 85.48          | 85.14| 78.67                       |
| Physique indices       | 99.78          | 102.45| 100.64                       |

One of the indicators of the adaptability of sheep to year-round grazing in regions with a sharply continental cold climate can be the seasonal variability of their live weight.

In our studies, ewes and rams-producers of the Tuvin short-fat-tailed breed during the summer-autumn feeding period for juicy, rich in nutrients and biologically active substances increased their live weight by 8.43 and 9.09 kg, or by 0.15 and 2.07 kg less than that of the Buryat coarse-haired. It should be noted that the spring live weight in Tuvin short-fat-tailed brood rams and ewes was at the level of the breed standard requirements. In Buryat coarse-wooled sheep, their spring live weight was 8.9 - 19.36 kg higher than the minimum requirements for the breed (table 2).
Table 2. Changes in live weight of Tuvan short fat tailed and Buryat coarse-wooled sheep during the summer-autumn feeding period.

| Breed                        | Tuvan short fat tailed | Buryat coarse-haired |
|------------------------------|------------------------|----------------------|
|                              | Rams        | Ewes    | Rams     | Ewes     |
| Number of heads              | 20          | 325     | 15       | 450      |
| Live weight, kg:             |             |         |          |          |
| spring                       | 62.52±1.84  | 42.30±0.18 | 64.38±0.79 | 48.90±0.37 |
| autumn                       | 70.95±1.52  | 51.39±0.15  | 72.96±2.4  | 60.06±0.25  |
| Difference:                  |             |         |          |          |
| kilogram                     | 8.43        | 9.09    | 8.58     | 11.16    |
| percent                      | 13.48       | 21.49   | 13.33    | 22.82    |

At the same time, in terms of the absolute increase in live weight for the period of summer-autumn feeding, the sheep of the compared breeds differed slightly - by 0.48-1.34%.

In the Buryat coarse-wooled sheep, 441 live lambs from ewes obtained during lambing were weaned at the age of 4 months saved 95%. These indicators in Tuvan short-fat-tailed ewes were 309 heads and 93.8% or 1.2% less than in Buryat coarse-haired.

They also had minor differences in the level of wool production and its properties. In breeder rams, ewes, year-olds and bright steppe type Tuvan short-fat-tailed sheep, the shear of wool in physical mass was 1.50; 1.35; 1.20; and 1.15 kg or 0.15, respectively; 0.05; 0.10 and 0.10 kg more than in Buryat coarse-wooled sheep.

The wool of Tuvan short-fat-tailed sheep contained 81.1-86.6% down, transitional hair - 3.5-6.56%, awn - 7.9-13.4%, including dead hair - 3.7-5.8%, in the Buryat coarse-haired - respectively 80.2-88.5; 4.2-6.7%; 6.13-13.0%; 3.5-5.3%, the difference between them in the content of different types of fibers was insignificant.

Currently, on the international market, young lamb obtained from young animals at the age of 5-8 months is in stable consumer demand due to its high nutritional value and taste. Young sheep of the steppe type of Tuvinian short-fat-tailed and Buryat coarse-wooled breeds reach good meat condition by 7 months of age (table 3).

Young growth of the compared breeds had practically the same pre-slaughter weight with a difference of only 0.4 kg. At the same time, the rolls of the Buryat coarse-wooled breed surpassed the Tuvan short-fat-tailed peers in carcass weight by 1.58 kg, pulp weight - 1.2 kg, bones and tendons - 0.20 kg, yielding to the latter in terms of internal fat weight by 0.13 kg, calorie content of meat by 6.45%.

In young Buryat coarse-wooled sheep, the sum of the absolute mass of internal organs and leaked blood was greater than that of Tuvan short-fat-tailed peers by 0.21 kg with the same relative weight of 11.08%. At the same time, both in absolute weight and relative weight of the stomach and intestines, the young Tuvan short-fat-tailed breed surpassed the Buryat coarse-haired by 60 g and the intestines by 30 g, and in their relative development by 0.52% and 1.33%, and also along the length of the large intestine - by 0.07 m and the small one - by 1.16 m.

4. Discussion
Analysis of the data of the studies carried out to study the productive qualities of Tuvan short-fat-tailed sheep showed their high adaptive capabilities to the conditions of the steppe zone of the Republic of Buryatia. When kept in new conditions that differ from their usual habitat, they in terms of the development of the main economically useful traits of live weight, reproductive ability, shearing and wool quality corresponded to the requirements of the breed standard.

A number of researchers [1-4; 8-12] note high adaptive properties of Tuvan short-fat-tailed sheep to various natural feeding conditions, to the degree of intensity and direction of selection.
Table 3. Slaughter qualities, morphological composition of carcasses, and nutritional value of meat of young sheep of different breeds.

| Index                        | Breed                  | Tuvinian short-fat-tailed breed | Buryat coarse-haired breed |
|------------------------------|------------------------|--------------------------------|----------------------------|
| Pre-slaughter live weight, kg| steam room             | 37.50±0.55                      | 37.1 ± 2.25                |
| Carcass steam room weight, kg| chilled                | 16.90±0.45                      | 18.48 ± 0.97               |
| Internal fat mass, kg        |                        | 1.22±0.07                       | 1.09±0.12                  |
| Slaughter weight, kg         |                        | 18.12±0.46                      | 19.57±0.95                 |
| Lethal output, percent       |                        | 48.36±1.74                      | 52.74±0.71                 |
| Pulp mass, kg                |                        | 12.23±0.39                      | 13.43±0.33                 |
| Meat factor                  |                        | 3.09                            | 3.23                       |
| Content in meat, percent     | squirrel               | 69.54±5.3                       | 68.63±5.4                  |
| Calorie content, kcal/100g   | fat                    | 14.58±2.95                      | 18.36±2.96                 |
| Energy value, ml/100g        | ash                    | 14.78±1.39                      | 11.81±1.46                 |
| Taste qualities, score       | meat                   | 7.4±0.28                        | 8.1±0.22                   |
|                             | bouillon               | 7.75±0.19                       | 8.05±0.20                  |

5. Conclusion

Under the conditions of the steppe zone of the Republic of Buryatia, Tuvan short-fat-tailed ewes, when grazing in the winter cold on the rags of last year's grass stand and feeding during the period of deep pregnancy and the first days of lactation with hay at the rate of 0.8-1.0 kg per head, retain their hereditary ability and productivity. With the transfer to summer-autumn feeding and grazing on juicy pastures rich in nutrients and biologically active substances, the winter losses of live weight are fully restored. Super-repair young animals after weaning from queens at the age of 4 months and feeding up to 7 months reaches a live weight of 37.3 kg and gives carcasses weighing 16.9 kg with a slaughter yield of 48.8% and a pulp yield of 76.4%, their meat, like that of Buryat coarse-haired peers, is characterized by high nutritional value and taste. When evaluated on a 9-point scale of taste of meat and broth, young Tuvan short-fat-tailed breed received 7.9 and 7.75 points, and Buryat coarse-haired 8.1 and 8.05 points, respectively.

Thus, sheep of the steppe type of the Tuvan short-fat-tailed breed have the ability to show a state of dynamic equilibrium with the changing environmental conditions of the Republic of Buryatia, while retaining the ability to realize hereditarily determined reproductive properties and productivity.

According to a number of researchers, the adaptive potential of the breed, which determines the preservation in time of the optimal genetic structure, providing adaptation to specific conditions of existence, is supported by purposeful selection of animals [5; 9].

References

[1] Amerkhanov Kh A, Biltuev S I and Orus - ool V S 2010 Natural and climatic conditions of the place where the steppe type of sheep was raised (Moscow) 90
[2] Biltuev S I, Mongush Zh N and Shimit L D 2015 Feeding capacity and slaughter qualities of young steppe type sheep of Tuvan short-fat-tailed breed of different line. Bulletin of the Buryat State Agricultural Academy. V.R. Filippova 2(39) 134-7
[3] Biltuev S I, Yuldashbaev Yu, Achituev V A, Zhymyanov B V, Shimit L D and Irinchinova T P 2019 Creation of types and breeds of sheep in specific ecological conditions of Siberia
Karpenko Y L and Seden D L 2017 Meat productivity of Tuvan short-fat-tailed sheep raised in the conditions of the Mayak peasant farm. Tuvan State University Bulletin 2 194-9

Lushchenko A E and Kirienko N N 2004 Ecological and genetic objects of fine-wool sheep improvement (Krasnoyarsk) 298

Merkurieva E K 1970 Biometrics in animal husbandry (Moscow) 238

Methodology for assessing the meat productivity of sheep 1978 (Dubrovitsy: VIZH) 45

Methodology for assessing the meat productivity of sheep 1970 (Dubrovitsy: Ministry of Agriculture of the USSR, VASKHNIIL) 187

Shilov I A 1967 On the mechanisms of translational homeostasis and animals. Advances in modern biology 2 333-51

Shimit L D, Dvalishvili V G and Biltuev S I 2016 Meat productivity of Tuvan sheep depending on the breeding area. Tuvan State University Bulletin 2 172-8

Biltuev S, Achituev V and Zhamyanov B 2019 Feeding capacity and meat productivity of sheep of different breeds in the Republic of Buryatia. IOP Conference Series: Earth and Environmental Science 395 012115

Shimit L, Biltuev S, Achituev V, Zhamyanov B and Mongush Z 2020 Changes in live weight and biochemical blood indicators in Tyvan short-fat tailed sheep breed depending on the breeding zone and season of the year. E3S Web of Conferences 176 01009