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Research Article

**GROWTH DYNAMIC AND MEAT PRODUCTIVITY OF
YOUNG ABORIGINAL HORSES OF THE REPUBLIC OF TYVA**Sayana Mongush¹, Raisa Irgit¹, Ekaterina Oorzhak¹, Vladimir Dvalishvili²,
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L.K. Ernst, Moscow, Russia.**Article Received:** February 2019**Accepted:** March 2019**Published:** April 2019**Abstract:**

The growth dynamics and meat productivity of young stock of aboriginal horses bred in different natural and climatic zones of the Republic of Tyva were studied. The superiority of animals of the central forest-steppe zone over the peers of the southern dry-steppe zone in terms of live weight, absolute, average daily and relative increase in live weight during all age periods, slaughter parameters and morphological composition at the age of 30 months has been established. The advantage of young stock of the southern dry-steppe zone is established only by the content of first-class cuts in the varietal composition of carcasses. Aboriginal horses of the Republic of Tyva, bred in different climatic zones, combine good growth rates and high meat productivity. It is recommended to carry out the rearing of young stock with feeding in the summer months and subsequent sale at 30 months of age, which will increase the production of horse meat.

Key words: *horses, growth, live weight, horse meat, carcass, morphological composition.*

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INTRODUCTION:

Horse breeding is a rather promising branch of animal husbandry in the Republic of Tyva. Studying the economic and biological characteristics of Tuvian horses in the conditions of vast natural pasture lands suitable for year-round herding and grazing keeping without additional costs for feeding and building capital premises makes it possible to effectively use them for the production of horse meat, horse milk and koumiss with minimal labor and resources. This creates objective prerequisites for the development of horse breeding in a productive direction, which in modern conditions is important and promising for the development of the industry. Horsemeat contains a significant amount of nitrogen-containing substances with a reduced content of intramuscular fat. Based on this, doctors consider horse meat as a dietary product and is recommended for the treatment of a number of diseases.

By breed, the livestock of horses in Tuva is represented mainly by Tuvian aboriginal horses, constituting 65.2%. The remaining breed accounts for 34.8%. They are represented by Mongolian, Don, Budenovskiy breeds and their crossbreeds of different generations, among which cross-breeds of upland breeds occupy 32.5%, trotters - 24.9% heavy ones - 2.3%.

Cultivation of hybrids in the districts of the republic is largely determined by the climatic conditions. In agricultural areas (central zone), the largest share is made up of crossbred breeds, and in areas with developed grazing livestock - mountain, steppe, and mountain-taiga zones - aboriginal horses and riding breeds.

According to the Ministry of Agriculture and Food of the Republic of Tyva, over 1,000 private farms are engaged in breeding Tuvan horses in the republic. Along with Tuva, in personal subsidiary farms they also breed Russian trotting horses in the Beldir farm in the Dzun-Khemchik district, Siva Niva of the Pii-Khemskey and SEC Sovetskaya Tuva in the Kaa-Khemskey districts, and the Mongolian in Erzinsky, Tes-Khemskey, Mongun-Tayginsky and Ovursky districts.

The main livestock of herd horse breeding is concentrated in Erzinsky, Tes-Khem, Ovyur, Bai-Taiginsky, Sut-Khol, Barun-Khemchik and Kyzyl districts with a large array of natural lands overgrown with low forest and bushes [2, 3, 4].

The biological characteristics and productivity of Tuvian aboriginal horses remain poorly understood. In this regard, research in this area are very relevant.

The purpose of these studies is to study the growth and meat productivity of young stock aboriginal Tuvian horses bred in different natural and climatic zones of the Republic of Tyva.

MATERIALS AND METHODS:

The experimental part of the work was carried out in the state unitary enterprise "Choduraa" of the Tes-Khemskey district (southern dry steppe zone), AKH Sesslerlyg of the Pii-Khemskey district (central forest-steppe zone) of the Tyva Republic, in the laboratory of integrated research of the Tuva state university.

The object of the research was the horses of the Tuvian aboriginal breed.

To study the growth in each zone, 4 groups of colts (10 heads) and fillies (10 heads) of spring and summer terms of birth were formed, totaling 40 heads.

Observations were carried out from the moment of birth to 30 months of age.

Experimental animals were marked, and were in the general herd. The live weight of the experienced livestock was established by weighing at birth, at 3, 6, 12, 18, 24, and 30 months of age. The growth rate of the live weight of young animals was determined by the Brody formula (1945).

Meat productivity was studied by controlling slaughter at the age of 2.5 years (3 heads from each zone, average in live weight and fatness) at a meat processing plant in the city of Kyzyl using the VIZH method (1968). The study of the morphological composition of the carcass was carried out by deboning the right half. The chemical composition of meat was determined in the agrochemical laboratory of Kyzyl by the methods of the VIZH (1969). The calorie content of the meat was calculated by the formula V.M. Alexandrova (1951), the energy value - according to the standard technique.

RESULTS AND DISCUSSION:

The growth and development of foals in the harsh conditions of winter grazing are sharply delayed, often in this season there is a decrease in their mass. The most noticeable differences between stallions and mares appear after their puberty, when stallions overtake the fillies in terms of linear growth and live weight. The manifestation of sexual dimorphism in horses, like other animals, largely depends on the growing conditions of the young. Unfavorable feeding and housing conditions most significantly affect the development of males, which have increased potential growth abilities [1, 5, 6].

Studied in the experiment, the livestock of young animals grown in two different climatic zones, with identical conditions of maintenance, had different data on live weight, height and meat productivity.

Live weight is one of the main economic and biological features that characterize the growth, development and productive qualities of animals.

Table 1 presents the dynamics of live weight of young stock from birth to 30 months of age.

The research results showed statistically significant indicators of the difference in live weight between the grasshoppers of different climatic zones at the age of 1 month (2.1 kg) ($P \leq 0.001$) and from 6 to 30 months of age ($P \leq 0.001$) in favor of the grasshoppers of the central forest steppe zone.

Table 1: Body weight dynamics of young horses, kg

Age. month	Natural and climatic zone			
	central forest-steppe		southern dry steppe	
	fillies	stallions	fillies	stallions
At birth	38,4±0,17	42,0±0,18	37,6±0,14	41,4±0,24
1	77,0±0,17	76,1±0,19	74,9±0,21***	75,3±0,15**
3	115,4±0,17	118,1±0,23	115,2±0,22	115,8±0,29***
6	140,1±0,19	148,6±0,23	136,3±0,22***	146,1±0,42***
12	191,2±0,19	196,5±0,22	187,2±0,15***	192,5±0,14***
18	260,9±0,17	266,1±0,28	249,2±0,18***	263,9±0,11***
24	311,1±0,17	312,2±0,22	305,0±0,16***	306,0±0,15***
30	368,8±0,24	375,9±0,25	363,5±0,16***	369,6±0,22***

Note: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$ - the difference is significant between the indices of stallions and fillies of different climatic zones.

Statistically reliable indicators of the difference in live weight at the age of 1 month (0.8 kg), 3 (2.3 kg), 6 (2.5 kg), 12 (4.0 kg), 18 (2.2 kg), 24 (6.2 kg) and 30 months (6.3 kg) in favor of the colts of the central forest-steppe zone ($P \leq 0.01$ - $P \leq 0.001$).

The results of the study of the absolute and relative growth rate of live weight of young stock from birth to 30 months of age are presented in tables 2-4.

Table 2: Absolute increase in live weight of young stock by age, kg

Age. month	Natural and climatic zone			
	central forest-steppe		southern dry steppe	
	fillies	stallions	fillies	stallions
0-1	38,6±0,31	34,1±0,35	37,3±0,28**	33,9±0,49
1-3	38,1±0,33	42,0±0,25	40,3±0,20***	40,4±0,43**
3-6	24,7±0,32	30,5±0,28	21,0±0,20***	30,3±0,30
6-12	51,0±0,46	47,4±0,31	50,9±0,18	46,4±0,34
12-18	69,7±0,30	69,6±0,30	62,0±0,23***	71,4±0,30***
18-24	50,2±0,34	46,1±0,41	55,8±0,44***	42,1±0,36***
24-30	57,7±0,19	63,7±0,52	58,5±0,28	63,6±0,54
0-30	330,4±0,29	333,9±0,37	325,9±0,23***	328,2±0,77***

Note: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$ - the difference is significant between the indices of stallions and fillies of different climatic zones.

As can be seen from the data of table 2, the greatest absolute gain in live weight in foals of experimental groups was obtained in the first 6 months of life, and amounted to 101.7 and 98.7 kg for fillies, 106.6 and 104.7 kg for foals, respectively, of the central forest-steppe and southern dry-steppe zones, which is 47.3-48.0% of the total body weight gain obtained for 30 months of experience. Subsequently, the increase in

live weight in experimental animals was uneven and depended to a greater extent not on age, but on the seasons of the year. The increase in absolute growth during the summer period alternated with its sharp decrease in the winter months.

For almost all of the analyzed intervals, the grasshopper of the central forest-steppe zone was statistically significantly superior to their peers from

the southern dry-steppe zone ($P \leq 0.001$), except for periods of 1-3 months. and 18-24 months. The stallions of the central forest-steppe zone also had a significant superiority over their peers from the southern dry-steppe zone, except for the period of 18-24 months, where the superiority of the stallions of the southern dry-steppe zone was established ($P \leq 0.001$).

Analysis of the data on average daily gains of live weight indicates (Table 3) that the young growth had the maximum values of the average daily gains from birth to one month of age: 1243-1287 g of fillies and 1130-1137 g - colts.

Table 3: Average daily gain in live weight of young animals, g

Period, month	Natural and climatic zone			
	central forest-steppe		southern dry steppe	
	fillies	stallions	fillies	stallions
0-1	1287±0,20	1137±0,22	1243±0,29***	1130±0,19***
1-3	638±0,34	700±0,34	662±0,30***	663±0,22***
3-6	274±0,27	339±0,23	228±0,19***	289±0,40***
6-12	283±0,21	266±0,22	279±0,25***	284±0,31***
12-18	387±0,36	387±0,27	340±0,33***	392±0,15***
18-24	279±0,25	256±0,17	310±0,31***	233±0,25***
24-30	320±0,26	354±0,20	325±0,23***	353±0,12***
0-30	367±0,40	371±0,21	362±0,44***	365±0,23***

Note: *** $P \leq 0.001$ - the difference is significant between the figures of stallions and fillies of different natural and climatic zones.

From 1 to 3 months of age, the average daily gains had a significant decrease - 638-662 g for fillies and 663-700 g for colts. In the future, there is a further decrease in the average daily weight gain in young stock from both zones. In general, for the analyzed period of cultivation, the average daily gains of live weight for the grasshoppers of the central forest-steppe zone were 367 g, and for the grasshoppers of the southern dry-steppe zone - 362 g with a statistically significant difference ($P \leq 0.001$). Average daily gains of live weight of stallions of the central forest-steppe zone amounted to 371 g, and their peers from the southern dry-steppe zone - 365 g ($P \leq 0.001$). During all the analyzed growth periods, the differences

between fillies and stallions from different climatic zones were statistically highly reliable ($P \leq 0.001$). Table 4 shows the relative increase in live weight of the young, showing the growth rate.

The young of the central forest-steppe zone in terms of growth intensity during the winter housing, surpassed the animals of the southern dry-steppe zone.

By analogy with the peculiarities of the absolute increase in live weight, depending on the time of year, the growth delay of the young of the southern dry steppe zone is particularly pronounced during the winter season.

Table 4: The relative increase in live weight of young animals, %

Period, month	Natural and climatic zone			
	central forest-steppe		southern dry steppe	
	fillies	stallions	fillies	stallions
0-1	67,1±0,71	57,7±0,25	66,1±0,51	58,1±0,42
1-3	39,8±0,82	43,2±0,76	42,4±0,43**	42,3±0,16
3-6	19,3±0,65	22,8±0,46	16,7±0,48**	23,1±0,42
6-12	30,7±0,54	27,7±0,81	31,5±0,72	30,2±0,81*
12-18	30,8±0,21	30,1±0,62	28,4±0,46***	31,2±0,17
18-24	17,5±0,41	15,9±0,92	20,1±0,75**	14,7±0,19
24-30	17,0±0,32	18,3±0,24	21,1±0,63***	18,8±0,24
0-30	162,5±0,15	159,9±0,32	162,3±0,59	159,7±0,23

Note: * $P \leq 0.05$; ** $P \leq 0,01$; *** $P \leq 0.001$ - the difference is significant between the indices of stallions and fillies of different climatic zones.

To determine the meat productivity of the grown young stock, 3 heads were taken for slaughter from the group of well-developed upper and middle foals.

Table 5 shows the results of the study of the meat productivity of experimental young animals.

Table 5: Slaughter rates of stallions aged 30 months.

Indicator	Natural and climatic zone	
	central forest-steppe	southern dry steppe
Pre-slaughter weight, kg	375,9±9,15	369,6±10,22
Mass of steam ink, kg	196,8±8,36	182,9±8,12
Slaughter weight, kg	199,8±9,02	185,2±7,56
Slaughter yield,%	53,1±3,46	50,1±4,18
Internal fat mass: kg	2,98±0,56	2,28±0,94
%	0,79±0,08	0,62±0,06

As can be seen from the above data, the meat productivity of stallions in the central forest-steppe zone is higher than in animals of the southern dry-steppe zone. By pre-slaughter weight, the superiority of the colts from the central forest-steppe zone was 6.3 kg, or 1.7%, by mass of the steam carcass - 13.9 kg, or 7.6%, slaughter weight - 14.6 kg, or 7.9%, for slaughter yield - 3.0%. A comparative analysis of indicators characterizing meat productivity, they also have a higher content of internal fat.

During external examination of animal carcasses, the meat of the central forest-steppe zone had more

abundant fatty irrigation than the peers of the southern dry-steppe zone. Watering evenly covered the entire surface of the carcasses, including the sacrum and lower back. The meat of the stallions was dark cherry in color, dense, fine-grained structure. When the incision in the intermuscular space of the layer of fat and marbling were not observed.

The morphological composition of carcasses of stallions from two climatic zones, established by deboning individual carcass cuts with the release of muscular and fatty, connective parts and bones, is presented in Table 6.

Table 6: Morphological composition of carcasses

Indicator	Natural and climatic zone	
	central forest-steppe	southern dry steppe
Number of carcasses, pieces	3	3
Chilled carcass weight, kg	176,80±5,16	169,90±6,24
Muscle tissue: kg	147,31±3,89	140,62±4,36
%	83,32±1,16	82,77±2,04
Connective tissue: kg	13,50±0,54	12,20±0,28
%	7,64±0,12	7,18±0,20
Bone tissue: kg	15,99±0,08	17,08±0,14***
%	9,04±0,05	10,05±0,06***

Note: *** $P \leq 0.001$ - the difference is significant between the figures of stallions of different natural and climatic zones.

These tables show that the colts of the central forest-steppe zone, which had a heavier carcass, gave the greatest amount of its most valuable part - the muscle tissue. The mass of muscle tissue in the carcasses of animals in the central mountain zone was more than the colts of the southern dry steppe zone by 6.69 kg, or 4.8%. For 1 kg of bones, 9.21 kg of pulp falls on the foals of the central mountain zone, and 8.23 kg of pulp on the cubs of the southern steppe zone.

Statistically significant differences were also established for the release of bone tissue between animals from different climatic zones. Stallions of the central forest-steppe zone had a lower bone yield by 1.09 kg or 1.01% ($P \leq 0.001$).

Chilled carcasses were cut into varieties in accordance with GOST 27095-86 [106] (Table 7).

Table 7: Varietal composition of colt's carcasses

Indicator	Natural and climatic zone	
	central forest-steppe	southern dry steppe
Number of carcasses, pieces	3	3
Chilled carcass weight, kg	176,80±5,16	169,90±6,24
Grade I, kg	135,31±3,98	130,7±4,02
%	76,53±1,96	76,93±1,87
Grade II, kg	31,52±0,36	27,91±0,40**
%	17,82±0,88	16,42±1,03
Grade III, kg	10,01±0,18	11,34±0,10**
%	5,65±0,09	6,65±0,08**

Примечание: ** $P \leq 0,01$ -разность достоверна между показателями жеребчиков разных природно-климатических зон.

As can be seen from the data of table 7, the specific gravity of horse meat of the first grade of stallions of the southern dry steppe zone was 76.93%, or 0.40% more than that of the peers of the central forest-steppe zone. The higher yield of meat of the II grade was noted in the colts of the central forest-steppe zone as

compared with the peers of the southern dry-steppe zone by 3.61 kg ($P \leq 0.01$) and 1.40%. The yield of III grade meat is greater for the stallions of the southern dry-steppe zone by 1.33 kg and 1.00% ($P \leq 0.01$).

Table 8 presents the results of the study of the chemical composition and caloric content of the meat of experimental young animals.

Table 8: The chemical composition and calorie meat

Indicator	Natural and climatic zone	
	central forest-steppe	southern dry steppe
Moisture,%	70,56±5,44	71,02±6,18
Dry matter,%	29,44±1,25	28,98±2,00
Protein,%	21,80±1,08	21,60±1,56
Fat%	5,60±0,64	4,30±0,44
Ash%	2,04±0,16	3,08±0,30*
Energy value of 1 kg of meat:	-	-
kcal	1146,46±80,78	1010,32±90,10
Mj	4,80±0,23	4,23±0,19

As can be seen from the above data, the meat of the stallions of the central forest-steppe zone contained less moisture in comparison with the peers of the southern dry-steppe zone (70.56 vs. 71.02%). The differences between animals from different zones on the dry matter content was 0.46%, on the protein content were even less significant. The most significant differences were between the fat content of 1.30% and ash of 1.04% ($P \leq 0.05$).

When assessing the energy value of the highest calorific values were meat from animals of the central forest-steppe zone due to the higher fat content. The difference was 136.14 kcal and 0.57 MJ per 1 kg of meat.

CONCLUSION:

Thus, the specific natural and ecological conditions of the republic and the natural selection of horses with year-round pasture maintenance in different habitat zones led to various evolutionary differences, expressed in the complex of their growth and

productivity. The superiority of animals of the central forest-steppe zone over the peers of the southern dry-steppe zone in terms of live weight, absolute, average daily and relative increase in live weight during all age periods, slaughter parameters and morphological composition at the age of 30 months has been established. The advantage of young stock of the southern dry-steppe zone is established only by the content of first-class cuts in the varietal composition of carcasses. Aboriginal horses of the Republic of Tyva, bred in different climatic zones combine good growth and high meat productivity. It is recommended to forage foals with the subsequent sale at 30 months of age, which will increase the production of horse meat.

Large areas of natural pastures and hayfields, freed up in almost all the republics of pasture livestock, can significantly expand the number of herd horses and increase the production of high-value horse meat.

REFERENCES:

1. Rodionov GV, Yuldashbayev YuA, Mongush SD. Livestock. SPb. Fallow deer 2014.
2. Irgit RSh, Sambuu-Hoo ChS, Makarova EYu. Informational bulletin on the state of development of horse breeding in the Republic of Tyva. 2013.
3. Irgit RSh, Kan-ool BK. Prospects for the development of horse breeding in the Republic of Tyva. In the collection: Scientific support of innovative development of the agro-industrial complex of the Republic of Tyva. Tuva Research Institute of Agriculture. 2013; 22-24.
4. Irgit RSh. Local horse breeds of the Republic of Tyva: status and development prospects. In the collection: Herd horse breeding in the south of Central Siberia. Materials of the scientific and practical conference. 2014: 9-13.
5. Kostomakhin NM, Mongush SD. Exterior foals of Tuva breed of different ages. Main zootechnician. 2016; 8:38-47.
6. Mongush SD, Kostomakhin NM. Feeding characteristics and meat quality of Tuvian horses. Farm animal feeding and feed production. 2016; 8:47-55.
7. Oorzhak RT, Bolat-ool ChK, Mongush SD, Dongak MI. Meat productivity of young horses of Tuva breed. Agrarian science. 2013; 4:22-24.
8. Oorzhak RT, Mongush SD. Feeding qualities of horses of the Tuva breed bred in different climatic zones of the Republic of Tyva. Bulletin of the Tuva State University. Natural and agricultural sciences. 2014; 2:148-153.