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## The Realization Of Reproduction Function In Beef Heifers Of Different Ecological Types.

Kayumov Foat Galimovich<sup>1</sup>, Gerasimov Nikolay Pavlovich<sup>1\*</sup>, Tret'yakova Ruziya Foatovna<sup>1</sup>, Kusch Evgeniy Dmitrievich<sup>1</sup>, Sleptsov Ivan Ivanovich<sup>2</sup>, Il'ina Yelena Nikolaevna<sup>2</sup>, Rakhimzhanova Il'mira Agzamovna<sup>3</sup>, and Lyapin Oleg Abdulkhakovich<sup>3</sup>.

<sup>1</sup>Federal Research Centre of Biological Systems and Agro-technologies of the Russian Academy of Sciences, 29, 9 Yanvarya St, Orenburg 460000, Russia

<sup>2</sup>Yakut State Agricultural Academy, Yakutsk, Russia

<sup>3</sup>Orenburg State Agrarian University, 18, Chelyuskintsev St., Orenburg, 460014, Russia

### ABSTRACT

The aim of the study was a comparative assessment of reproductive traits formation and development in Kalmyk heifers of different ecological types. The impact of heredity factor on reproductive traits formation was studied on two groups of heifers: the first group – ecological type "Aita" (20 heads), the second group – ecological type "Voznesenovskiy" (20 heads). The control rearing of experimental animals was carried out under the same conditions of feeding and maintenance in breeding farm "Druzhba", Stavropol Territory, Russia. The relatively earliest reaching of sexual maturity was recorded in "Voznesenovskiy" type of heifers outperforming the "Aita" group by 7.8 days (2.53%). Significant intergroup differences have not been established in terms of first and fertile insemination in Kalmyk heifers of different genotypes. Cows of ecological type "Aita" differed by late calving age about 2.6 days (0.31%) after analogs. Heifers of "Voznesenovskiy" ecological type was characterized by the maximum live weight at all stages of formation and realization of reproductive function. The greatest difference in growth weight was reached at calving age of experimental animals and was 21.1 kg (4.92 %;  $P < 0.001$ ). The impact of heredity on the live weight variability increased with age of experimental heifers, reaching a maximum to calving period. The course of pregnancy and calving passed without significant deviations from physiological norms in studied ecological types of heifers and cows.

**Keywords:** Kalmyk breed, heifers, ecological type, reproductive traits, calving, sexual maturity.

*\*Corresponding author*

## INTRODUCTION

The characteristic of beef heifers by reproductive traits is important in assessing the efficiency of breeding of individual herds, types and breeds [1]. The selection by reproductive traits in mature herds, supplemented by an assessment of growth performance, exterior features, milk production will contribute to the creation of competitive native populations of beef cattle [2]. However, the reproductive functions of heifers are characterized by low heritability, which significantly complicates the breeding strategy construction to improve the efficiency of the industry [3]. The evaluation of reproductive traits is especially important in formation of new highly productive populations for organization of extended reproduction in newly created breeding herds [4].

The aim of the study was a comparative assessment of reproductive traits formation and realization in Kalmyk heifers of different ecological types.

## MATERIAL AND METHODS

The impact of heredity factor on reproductive traits formation was studied on two groups of heifers: the first group – ecological type "Aita" (20 individuals), the second group – ecological type "Voznesenovskiy" (20 individuals). Animals were divided into groups according to the territory of their origin. Heifers of the ecological type "Aita" are imported from the Republic of Kalmykia with dry steppe climate, their analogues of "Voznesenovskiy" type are bred in the Stavropol Territory with mild climate. The control rearing of experimental animals was carried out under the same conditions of feeding and maintenance in breeding farm "Druzhba", Stavropol Territory, Russia.

The age and live weight were studied at first estrus, puberty completing, at first and fertile insemination, during calving period. The study used data from monthly weighing of animals. Registration of reproduction cycle elements was carried out visually by changes in the behavior of experimental animals, pregnancy diagnosis was studied by rectal examination.

The following protocol was used for estrus induction and synchronization: once Nitamin and Selerolum in doses of 10 ml, three times Surfagon in doses of 10 ml, 10 ml and 2 ml, twice Magestrofan in dose of 2 ml [5].

The recto-vaginal technique was used for artificial insemination. In this case, disposable syringes for 2 ml, catheter up to 42 cm, disposable gloves were used. The sterile catheter is connected to the syringe through a coupling.

**Statistical analysis.** Data were processed with one-way analysis of variance with using Statistica 9.0 software Generalized Linear Models procedures (Statsoft Inc., 2009). Least squares differences and probability values for differences were calculated using Tukey's test.

## RESULTS

The different origin of experimental animals caused the unequal age during the realization of separate reproductive cycles (Table 1). Heifers of "Voznesenovskiy" ecological type differed by an earlier period of puberty. Beginning of the puberty period they came on 3.9 days (1.61%) before the "Aita" analogues. The reaching of relatively early puberty was also diagnosed in "Voznesenovskiy" the group of heifers.

**Table 1 - Age of heifers at different periods of the reproduction cycle, days (LSM ± SE)**

| Reproductive cycle |            | Aita       | Voznesenovskiy |
|--------------------|------------|------------|----------------|
| Puberty            | beginning  | 242,4±3,23 | 238,5±2,54     |
|                    | completing | 307,9±3,74 | 300,1±3,50     |
| Insemination       | first      | 544,5±2,98 | 543,6±3,30     |
|                    | fertile    | 556,3±3,54 | 553,5±3,12     |
| Gestation          |            | 276,3±2,11 | 276,5±1,70     |
| Calving            |            | 832,6±3,75 | 830,0±3,20     |

Artificial insemination for experimental heifers was organized after the estrus synchronization at the age of 18 months. At the same time, significant intergroup differences have not been established in terms of the first and fertile insemination in Kalmyk heifers of different ecological types. A somewhat greater density of estrus arrival was recorded in "Voznesenovskiy" group of animals. They exceeded the analogues for the age of the first insemination by 0.9 days (0.17%) and fertile - by 2.8 days (0.50%).

The duration of pregnancy was relatively stable and did not have significant differences due to the ecological type. However, certain features were revealed for the calving age caused by the difference of fertilization date of experimental animals. So, "Aita" heifers were characterized by the later calving, exceeding the analogues by 2.6 days (0.31%).

Genotypic features and variability in age of reproduction cycle formation predetermined differences in weight growth at some stages of reproductive function in experimental animals (table. 2).

**Table 2 – Live weight of heifers at different periods of the reproduction cycle, kg (LSM ± SE)**

| Reproductive cycle |            | Aita       | Voznesenovskiy |
|--------------------|------------|------------|----------------|
| Puberty            | beginning  | 217,1±2,97 | 220,2±3,22     |
|                    | completing | 252,5±3,27 | 256,8±3,41     |
| Insemination       | first      | 360,8±5,18 | 376,3±4,87*    |
|                    | fertile    | 365,8±5,46 | 381,1±4,97*    |
| Calving            |            | 429,2±5,39 | 450,3±4,61***  |

Within a row means with superscript \* differ (P < 0.05), \*\*\* - (P < 0.001)

The intergroup differences in live weight were insignificant and statistically unreliable during puberty. Some advantage on weight growth was fixed on the side of "Voznesenovskiy" type of heifers at this stage of ontogenesis. Thus, their superiority over analogues was 3.1 kg (1.43 %; P>0.05) when the first sexual cycles appeared, by the end of the puberty period the difference increased to 4.3 kg (1.70 %; P>0.05).

By the time of the mating campaign, the differences in live weight became more significant. At the first insemination, the advantage of "Voznesenovskiy" ecological type was 15.5 kg (4.30%, P < 0.05). The intergroup differences remained at the same level (15.3 kg, 4.18%) with fertile insemination.

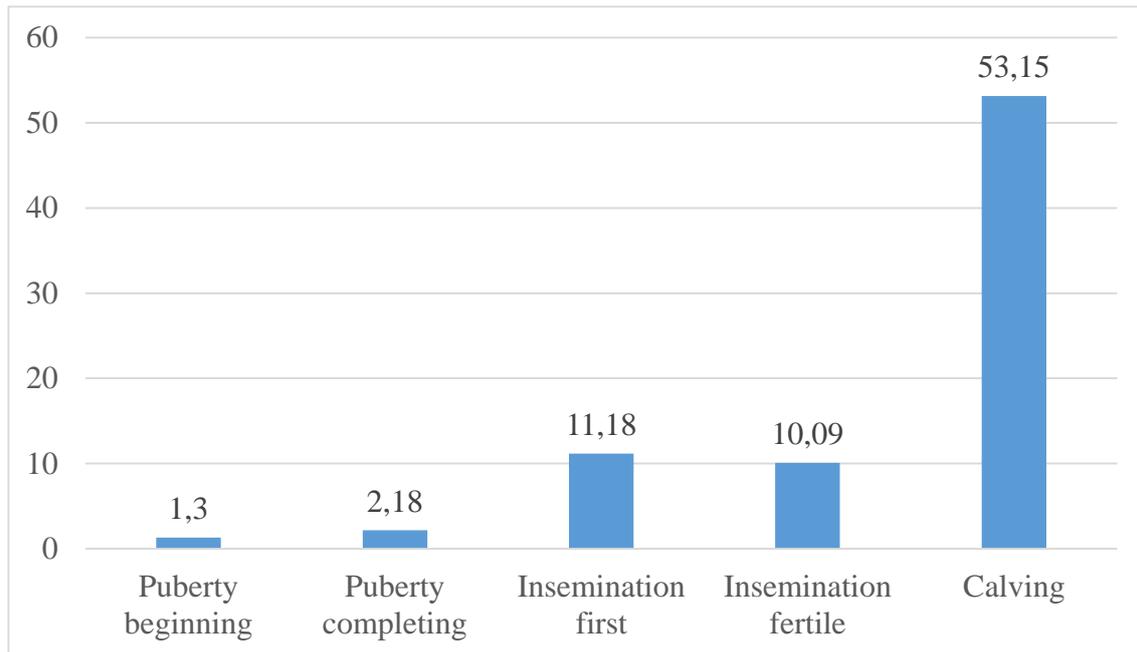
The maximum variability of weight growth, due to the ecological type, was recorded at the calving period of experimental animals. Leadership on live weight was strengthened on the side of "Voznesenovskiy" group of animals, exceeding the analogs by 21.1 kg (4.92%, P < 0.001).

Pregnancy and calving of cows different ecological types passed without significant deviations from physiological norms. It should be noted that Kalmyk cows are distinguished by outstanding maternal qualities and relatively easy calving associated with small newborn calves.

Analysis of the weight growth variability at some stages of the reproductive cycle allowed determining the effect of ecological type of experimental heifers (Fig. 1).

The results of the analysis indicate an increase in the genotypic conditionality of live weight dynamics during ontogenesis. Thus, an unreliable determination of genotype (at 1.30%) was established when

registering the first estrus cycle in experimental animals. The influence of heifers' origin increased to 2.18 % by the time of completing puberty, also with an unreliable value.



**Figure 1. The influence of heifers' ecological type on live weight during realization of reproduction function, %**

### DISCUSSION

Selection and breeding work with Kalmyk cattle continues with the strengthening of the intra-breed variability of main economic traits by creating isolated populations and typing of the existing stock. Special attention is paid to the adaptive and reproductive properties of animals. In this regard, in recent years two ecological types have been created in Kalmyk breed: "Aita" in the Republic of Kalmykia and "Voznesenovsky" in the Stavropol Territory [6-7].

Currently, a comparative assessment of productive potential realization is conducted by the new types of animals under the same conditions of feeding and maintenance [8]. This work involves the evaluation of reproductive function formation in studied genotypes. The results of the study showed that ecological type of heifers significantly influenced the age and body weight at different stages of reproduction cycle.

Experiments with the Kazakh white-headed [9] and Simmental breeds led to similar conclusions [10-11]. In addition, research on Hereford animals recorded an increase in type influence on weight growth during various periods of reproductive function formation [12]. At the same time, the importance of early breeding use of beef heifers with optimal parameters of weight growth is noted [13]. This will increase the duration of economic use of the most genetically valuable individuals of the mature herd, which will contribute to efficiency growth of meat industry [14].

### CONCLUSION

Studies have established the relative precocity of "Voznesenovsky" ecological type of heifers in the Kalmyk cattle. They were characterized by maximum weight growth at certain stages of the reproductive cycle, significantly exceeding analogues in the period of first insemination by 15.5 kg (4.30 %;  $P < 0.05$ ) and calving by 21.1 kg (4.92 %;  $P < 0.001$ ). The effect of ecological type on the live weight increased with age, reaching a maximum to calving (53.15 %;  $P < 0.001$ ).

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**REFERENCES**

- [1] Dzhulamanov K.M., Urynbayeva G.N. Breeding evaluation and selection of breeding pairs in the stud flock // Herald of beef cattle breeding. 2016. № 4(96). P. 53-57.
- [2] Dzhulamanov K., Garmaev D., Dubovskova M., Kolpakov V., Urynbayeva G. Evaluation and selection of Hereford cows // Bulletin of Buryat State Academy of Agriculture. 2016. № 2 (43). P. 10-15.
- [3] Surundayeva L.G., Kayumov F.G., Mayevskaya L.A., Kalashnikov N.A. Indicators of productivity of breeding stock of new beef type "Aita" of the Kalmyk breed with different genotypes // Herald of beef cattle breeding. 2015. № 4(92). P. 74-80.
- [4] But K.N., Matveev O.A. Efficiency of applying biologically active substances to correct the reproductive function of Kazakh white-head cows // Izvestia Orenburg State Agrarian University. 2011. № 3 (31). P. 364-366.
- [5] But K.N., Gerasimov R.P., Selin S.V., Matveev O.A. The results of reproductive function and hormonal relationships regulation in beef cows under different medical correction protocols // Herald of beef cattle breeding. 2011. № 4(64). P. 27-42.
- [6] Surundayeva L.G., Kayumov F.G., Mayevskaya L.A. Broodstock performance of the new Aita beef line of Kalmyk cattle of different genotypes // Izvestia Orenburg State Agrarian University. 2016. № 2 (58). P. 94-97.
- [7] Kayumov F.G., Surundayeva L.G., Barinov V.E. Breeding the meat cattle of the type "Aita" // Vestnik of Russian agricultural sciences. 2015. № 5. P. 59-61.
- [8] Shevkhezhev A.F., Kayumov F.G., Gerasimov N.P., Smakuev D.R. The variability of productive traits estimation in Kalmyk cattle // Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2017. Vol. 8. № 5. P. 634-641.
- [9] Makaev Sh.A., Zhambulov M.S. The reproductive traits in Kazakh white-head heifers // Herald of beef cattle breeding. 2011. № 2(64). P. 33-37.
- [10] Litovchenko V.G., Tyulebaev S.D., Kadysheva M.D. Dynamics of live weight and age of dams of different genotypes at the period of growth and the reproduction function development in cattle // Izvestia Orenburg State Agrarian University. 2012. № 6 (38). P. 96-98.
- [11] Mischenko N.V., Tyulebaev S.D. Reproductive capacity of Simmental dams with different genotypes // Izvestia Orenburg State Agrarian University. 2011. Vol. 3. № 31-1. P. 156-158.
- [12] Dzhulamanov K.M., Gerasimov N.P. Selection and genetic evaluation of breeding value in mature herds with different genotypes // Herald of beef cattle breeding. 2012. № 4(78). P. 37-41.
- [13] Amerhanov H.A. Charolais beef cows productivity // Zootekhnika. 2015. №8. P. 23-25.
- [14] Gabidulin V.M. Economic longevity and productivity of Russian Polled cows // Izvestia Orenburg State Agrarian University. 2013. № 1 (39). P. 82-84.