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## COMPARATIVE EVALUATIONS OF BODY STRUCTURE AND EXTERIOR INDEX OF BULLS DIFFERENT DAIRY BREEDS

### *Abstract*

*It was held a comprehensive study of animal exterior of Ukrainian black and white and red and white dairy breeds. By appropriate value of measurements, it was set indices of body structure of experimental animals. The bulls of Ukrainian black and white and red and white dairy breeds were the objects of the research, selected on the basis of counterparts.*

*Researches on indexes of body and analysis of body measurements of bulls of Ukrainian black and red-spotted dairy breeds shows that different indicators increased differently at different ages of animals. Comparative analysis of linear measurements of the exterior of bulls of Ukrainian red-spotted dairy breed in the experimental farm and at all stages of development, dominated by bulls of Ukrainian black-spotted breed, which indicates a herd difference in favor of the former and exceed with a significant difference peers in all measurements body structure. Thus, the average body structure indexes of bulls of Ukrainian black-spotted and red-spotted dairy breeds are generally characteristic of dairy-type animals. The connecting variability between the measurements that make up the body structure indexes indicates the objective motivation for their use in assessing the exterior type of animals. The obtained highly reliable correlation between the measurements that form the indexes of body structure makes it possible for their further use in the breeding work of the herd.*

**Keywords:** *Bulls; Ukrainian black-and-white dairy; Ukrainian red-and-white dairy; breed; exterior; constitution; indices of body.*

**Introduction.** The main basic cattle of Podilya Ukraine are animals of Ukrainian black-spotted and red-spotted dairy breeds, which are most adapted to the conditions of the region [1].

Numerous studies by scientists show that cattle of different breeds with intensive and proper cultivation can achieve high productivity. Thus, several scientists claim that bulls of the Ukrainian red-spotted dairy breed in comparison with the Ukrainian black-spotted dairy analogs grow and develop more intensively, thanks to which they use nutrients of rations more economically. They investigated that Ukrainian red-spotted dairy bulls in terms of exterior and body composition indices, outnumber black-spotted peers of both domestic and foreign origin by 3.4-4.7% for better meat quality [2], [9].

According to the breed, practice, the desired expression of the external type of animals is a direct indicator of the body's adaptation to environmental conditions, good health and strength of body structure, which ensure the normal functioning of the reproductive capacity of animals and their viability. The growth and development of animals determine changes in their linear size, exterior body sex measurements, and body composition indices. With the help of body sex measurements control the growth of animals, the proportionality of body structure, draw conclusions about the morphological similarity of animals, the degree of typicality, as well as solve some technological problems [8].

To have a more objective idea of the degree of development of the organism as a whole, as well as the proportions of the development of individual articles of the body, based on the measurements of the exterior, calculate the appropriate indexes [3].

They give some idea of the development of some parts of the body relative to others and characterize heifers and bulls in three-dimensional dimensions. The definition of indexes in zootechnical practice is based on the use of such measurements, which most fully correspond to the proportionality of the development of body structure in the general exterior-constitutional type of animals [4]. Body structure indexes, along with absolute measurements, complement the characteristics of the development of animals by the exterior, confirming their belonging to the type of dairy cattle and is a very valuable material for objective assessment of animals by the exterior, as their use allows to determine the type of constitution, individual features, the proportionality of organism development, condition of them [5].

**Actuality.** After conducting research on young animals of the Podilsk factory type of Ukrainian black-and-white dairy breed, a number of scientists found that with age in bulls there be a difference in body sex measurements between the offspring of three different offspring in height at withers, back height, buttocks height, chest width and width in the hips, according to the measurements of the oblique length of the torso, the depth of the chest, the girth of the chest behind the shoulder blades, the index of awl, elongation, massiveness, and meatiness [3]. The harmony of the structure of the body and its growth and development, especially in length, indicates the stretch index. Research data indicate that Holsteinized animals have slightly greater long-leggedness, elongation and less bone. This indicates the relative elongation and lightness of their torso. Body structure indices confirm that the descendants of Holstein bulls have a more pronounced milk type [2].

At the same time, foreign scientists in their studies emphasized that the long-leggedness index decreased with age due to a more intense increase in the depth of the chest compared to the height in the withers [9]. The relative development of the skeleton is given by the index of boniness, which is expressed by the ratio of the girth of the wrist to the height at the withers, while the lower index indicates its thinness and, conversely, higher - the roughness and massiveness of the skeleton. The relative development of the body of bulls is characterized by the ratio of chest girth to height at the withers, which is often used in practical selection, i.e. the mass index. An increase in the index indicates the deviation of animals to the combined type of productivity [10].

**Methodology research.** The aim of the research was a comprehensive study of animals of different breeds of exterior indicators on the development of the main articles of the body, as well as the ratio of the corresponding body structure indexes.

Clinical and experimental studies were conducted based on LLC "Start", p. Novostavtsi, Teofipolsky district of Khmelnytsky region. To learn the exterior data of bulls, a group was formed on the principle of analogs of 20 animals of the Ukrainian black-spotted breed and Ukrainian red-spotted dairy breeds at the age of 6 months. Measurements of body structure indexes were performed up to 18 months of age. The exterior of the studied animals was studied by the development of the main articles of the body. To characterize the linear growth, exterior and general development of animals using a measuring stick, compass and measuring tape took the following measurements: height at the withers, height at the waist, height at the buttocks, chest depth, chest width, chest girth at the shoulders, oblique length torso and oblique length of torso and buttocks (stick and tape), torso length, buttock girth, width in maculae (hips), width in hip joints, width in buttocks, wrist girth, head length and forehead width. Indices of body structure of animals were calculated by the ratio of the corresponding measurements. Selected animals were divided into 2 groups of 10 animals of each breed. The test bulls were kept in the same conditions, on a leash. The diets were balanced regarding nutrition and metabolic energy.

Feeding was normalized according to physiological conditions, productivity, and body weight, taking into account the season, watering is centralized. The exterior of the learn animals was studied by the development of the main articles of the body. Also, by the ratio of the corresponding measurements was calculated indices of the body structure of animals.

Biometric processing of the obtained research results was carried out by the method of variation statistics according to M.O. Plokhinsky [6]. For research, we used the data of breeding cards of cows of the dairy management system of the ORSEK-program [7].

The study was conducted according to the scheme (Fig. 1).

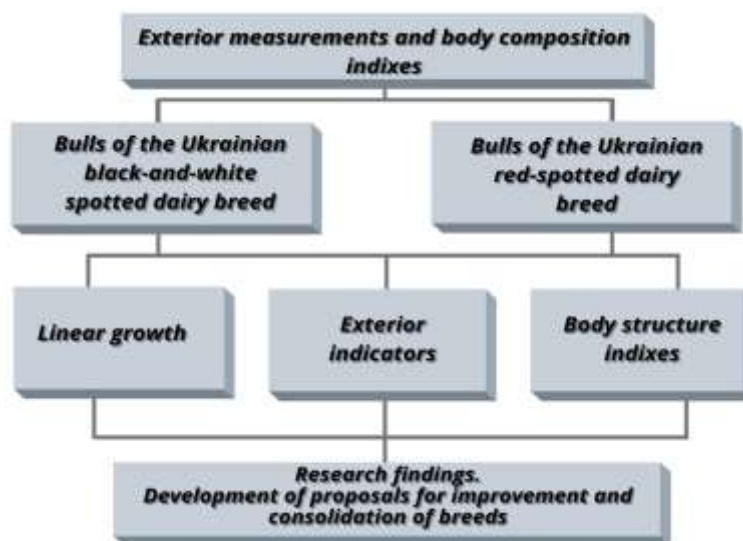


Fig. 1. The scheme of the experiment

**Results.** The analysis of measurements of bulls of Ukrainian black-spotted and red-spotted dairy breeds established that on separate indicators they differed from each other, and different measurements in a different age periods of animals increased unequally (Table 1).

Table 1. Measurements of bulls of the studied breeds ( $M \pm m$ ), sm

The name of the measurement	Groups of bulls by breed					
	Ukrainian red-spotted dairy (n = 10)			Ukrainian black-and-white dairy (n = 10)		
Age of animals, months	6	12	18	6	12	18
Height at withers	107,1±0,9	120,2±0,15	131,4±0,14	105,2±0,21	116,1±0,33	129,2±0,61
Height at the buttocks	110,1±0,42	116,8±0,21	136,1±0,22	105,8±0,31	114,2±0,40	130,0±0,12
Chest width	34,5±0,17	46,3±0,15	49,9±0,35	32,6±0,35	42,7±0,12	47,2±0,14
Chest depth	44,2±0,15	55,6±0,41	61,1±0,18	42,5±0,45	51,5±0,58	58,2±0,17
Chest girth behind the shoulder blades	127,4±0,22	149,8±0,15	170,0±0,14	124,2±0,17	147,5±0,34	167,0±0,28
Oblique length of a trunk (tape)	132,2±0,14	142,1±0,44	157,5±0,23	128,4±0,32	139,0±0,16	152,8±0,26
Width in macula	33,1±0,14	37,0±0,15	42,0±0,18	31,8±0,22	35,3±0,71	39,9±0,47
Fist circumference	18,9±0,44	21,2±0,18	26,2±0,48	16,8±0,55	19,2±0,17	21,3±0,18

Ukrainian red-spotted dairy bulls outnumbered Ukrainian black-spotted dairy bulls at all stages of development, in particular: at 6 months of age the multiplicity of height measurements

at the withers was 1.02 times higher, in the buttocks bulls of Ukrainian red-spotted dairy breed were greater than 1.04 times, chest width 1.06 times, chest depth 1.04 times, oblique body length 1.03 times; chest circumference behind the shoulder blades at 1.03; width in maklak in 1.04; wrist circumference 1.13 times; at the age of 12 months - 1.04; 1.03; 1.09; 1.08; 1.02; 1.03; 1.05; 1.11 times, at the age of 18 months - 1.02; 1.05; 1.06; 1.05; 1.02; 1.03; 1.06; 1.23 times respectively.

Measurement of body structure measurements is considered to be the most objective method of assessing the exterior, but it does not allow to fully establish the exterior-constitutional features of the development of the organism in a certain relative development of the sexes. To do this, we need to calculate the measurements, processed in the form of indices that give a complete picture of the proportionality or disharmony of body structure. Using body structure indices to characterize the typical differences of bulls of both compared breeds, the inter-herd difference between individual indices and similarity over others was established.

Analysis of the features of the exterior by the age dynamics of body structure indexes (Table 2) shows that in the age period from 6 to 18 months the long-legged index was higher in bulls of the Ukrainian black-spotted dairy breed than in peers of the red-spotted dairy breed. It should be noted that in bulls of both breeds, the long-legged index and the gender index decreased with age.

According to such indexes as thoracic, type expiression, leptosomia, overgrowth, erysomy, deep-breasted, stretched, bony, bulls of the Ukrainian black-spotted dairy breed were inferior to bulls of the red-spotted dairy breed in all studied age periods.

The index of overgrowth can determine the height of the buttocks relative to the withers. And the greater the difference between the height at the withers and buttocks, the higher the index and vice versa. With age in all animals, this index decreases. Currently, the bulls of the Ukrainian red-spotted dairy breed had a higher figure than their counterparts by 2.24% at 6 months of age, 1.19% at 12 months. and 2.96% at 18 months of age, respectively.

**Table 2. Body structure indexes of bulls of different breeds, %**

Indexes	Groups of bulls by breed					
	Ukrainian red-spotted dairy (n = 10)			Ukrainian black-and-white dairy (n = 10)		
	Age of animals, months					
	6	12	18	6	12	18
Gender	95,95	79,57	84,17	97,55	82,67	84,54
Massive	118,96	124,63	129,38	118,06	127,05	129,26
Massiv by Durst	20,16	36,58	47,93	17,79	30,57	41,98
Bones	17,65	17,64	19,94	15,97	16,54	16,49
Whipping	96,37	105,42	107,94	96,73	106,12	109,30
Stretch (format)	123,44	118,22	119,87	122,06	119,73	118,27
Pectoral	78,06	83,28	81,67	76,71	82,92	81,10
Deep-breasted	41,27	46,26	46,50	40,40	44,36	45,05
Long-legged	58,73	53,75	53,50	59,60	55,65	54,96
The severity of the type	20,49	25,58	24,87	19,93	24,12	24,25
Leptosomes	63,12	69,31	69,94	61,22	67,19	67,42
Overgrowth	102,81	97,18	103,58	100,57	98,37	100,62
Erysomy	28,25	31,76	31,81	27,54	30,58	30,89

The relative skeletal index gives an idea of the relative development of the skeleton. And, the thinner the skeleton of the evaluated animal, the smaller the index and vice versa.

According to this indicator, the bulls of the Ukrainian black-spotted dairy breed were inferior to the bulls of the red-spotted dairy breed in all age periods, which, in this case shows that the herd of Ukrainian black-spotted dairy breed develops in the direction of milk type.

The so-called value of the stretch index, or format in the relative development of height and length of the body, characterizes the development of bulls of both breeds in the direction of the milk type. It is believed that a lower index of stretch is characteristic of dairy cattle, but its value is formed by the measurement of the oblique length of the body, because animals with age have a more intense growth in length than in height.

The stretch index at 6 months of age in bulls of Ukrainian black-spotted dairy breed was 122.06% and 123.44% - compared to animals of Ukrainian red-spotted dairy breed, and at 18 months of age it decreased to 118.27 % and 119.87%, the difference was 3.79% and 3.57%. The value of this index is consistent with the results of some scientific studies and is optimal for the characterization of dairy animals.

The massiveness index is characterized by the relative development of the torso with a good ratio of chest girth to height at the withers, which is most often used in practice. A massive index in bulls of Ukrainian black-spotted dairy breed from 6 to 18 months of age increased by 11.2% and by 10.42% - in animals of Ukrainian red-spotted dairy breed, mass index by Durst increased by 24.19 and 27.77%. Also, the index by Durst indicates that the development of bulls and heifers of Ukrainian black-spotted and red-spotted dairy breeds took place harmoniously both in terms of live weight and body gender measurements.

**Discussion.** Thus, the analysis of body measurements of bulls of Ukrainian black and red-spotted dairy breeds shows that different indicators increased differently at different ages of animals. Comparative analysis of linear measurements of the exterior of bulls of Ukrainian red-spotted dairy breed in the experimental farm and at all stages of development, dominated by bulls of Ukrainian black-spotted breed, which indicates a herd difference in favor of the former and exceed with a significant difference peers in all measurements body structure. Thus, the average body structure indexes of bulls of Ukrainian black-spotted and red-spotted dairy breeds are generally characteristic of dairy-type animals. The connecting variability between the measurements that make up the body structure indexes indicates the objective motivation for their use in assessing the exterior type of animals. The obtained highly reliable correlation between the measurements that form the indexes of body structure makes it possible for their further use in the breeding work of the herd.

Therefore, in order to increase and rational use in the farms of animals of Ukrainian black-spotted and red-spotted dairy breeds should be selected according to a set of characteristics. Along with economically useful features of animals to take into account the indicators of their live weight, linear measurements of body sexes, and adaptation to the conditions of the region. The prospect of further research using body structure indexes to assess the dynamics of ontogenetic development of bulls of Ukrainian black-spotted and Ukrainian red-spotted dairy breeds will establish biological patterns of development to differentiate them in the direction of productivity in the consolidation of the herd by exterior type.

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