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AGE DYNAMICS OF CHANGES IN LINEAR GROWTH PARAMETERS OF REPLACEMENT HEIFERS UNDER DIFFERENT APPROACHES TO THE ORGANIZATION OF THEIR FEEDING TECHNOLOGY

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The dynamics of changes in body weight and parameters of linear growth of replacement heifers of the Ukrainian black-and-white dairy breed under different approaches to the organization of their feeding technology were studied. The research was conducted on replacement heifers of the Ukrainian black-and-white dairy breed with a body weight of 170 kg, since they were 6 months old. For the formation of the experimental groups, different approaches to the organization of their feeding technology were used, namely, heifers of the control group received a diet that included corn silage. In feeding the animals of the second and third (experimental) groups, respectively, 50% and 100% of such silage was replaced by mixture of corn and sorghum.

After analyzing the silage used in the experiment, no significant differences in their chemical composition were found. Therefore, the use of silage prepared from the green mass of compatible crops of corn and sorghum as part of the diets of replacement heifers did not have a significant effect on changes in their nutritional value and the content of nutrients in them, as well as the content of crude protein, provided that detailed feeding standards are met. In particular, the increase in the content of crude fiber, based on 1 kg of dry matter of the diets, was 3 and 6 g, respectively, in the animals of the second and third groups.

In the course of the experiment, no significant and probable difference was established in terms of the increase in body weight of replacement heifers from the control and experimental groups. However, at the end of the experiment, a statistically significant difference in growth intensity was established between the animals of Group III (experimental) and Group I (control), while the differences between the latter and Group II (experimental) increased to the trend level. In particular, an increase in average daily gains of heifers of experimental groups, compared to animals of the control group, on the fourth and fifth months of the experiment, respectively, by 4.0 and 6.4% and by 5.2 and 11.2% ($p \leq 0.05$). It was also established that the use of both traditional corn and corn and sorghum silage in the organization of animal feeding technology accelerates the achievement of economic maturity by heifers. It was determined that the body weight of replacement heifers, from the age of eight months, exceeded the requirements of the breed standard. In particular, the body weight of 8-month-old heifers was higher than the standard by 5.0 – 10.2 kg or 2.4 – 4.9%, at the age of 9 months it was higher by 11.0 – 15.7 kg or 4.8 – 6.9%, at the age of 11 months it was higher by 30.2 - 33.0 kg or 11.4 - 12.4%.

The variability and level of body structure indices in the age dynamics of experimental animals of the Ukrainian black-and-white dairy breed proved the positive dynamics of the formation of the exterior in the direction of the dairy type. Thus, the obtained results proved the expediency of using corn and sorghum silage in the technology of rearing replacement heifers.

Key words: replacement heifers, silage, chemical composition, nutrition, body weight, growth intensity.



ВІКОВА ДИНАМІКА ЗМІН ПАРАМЕТРІВ ЛІНІЙНОГО РОСТУ РЕМОНТНИХ ТЕЛИЦЬ ЗА РІЗНИХ ПІДХОДІВ ДО ОРГАНІЗАЦІЇ ТЕХНОЛОГІЇ ЇХ ГОДІВЛІ

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Досліджено динаміку змін живої маси та параметрів лінійного росту ремонтних телиць української чорно-рябої молочної породи за різних підходів до організації технології їх годівлі. Дослідження проводили на ремонтних телицях української чорно-рябої молочної породи живою масою 170 кг, починаючи з 6-місячного віку. За формування піддослідних груп використали різні підходи до організації технології їх годівлі, а саме телиці контрольної групи одержували раціон, до складу якого входив кукурудзяний силос. У годівлі тварин другої та третьої (дослідних) груп, відповідно, 50 % і 100 % такого силосу було замінено на кукурудзяно-сорговий.

При проведенні аналізу силосів, які використовували в досліді, не встановлено суттєвих відмінностей у їх хімічному складі. Тому використання у складі раціонів ремонтних телиць силосу, заготовленого із зеленої маси сумісних посівів кукурудзи та сорго, не мало суттєвого впливу на зміни їх поживної цінності та вмісту в них поживних речовин в них вмісту сирого протеїну, за умови відповідності деталізованим нормам годівлі. Зокрема, збільшення вмісту сирової клітковини, з розрахунку на 1 кг сухої речовини раціонів, складало 3 та 6 г, відповідно, у тварин другої та третьої груп.

Упродовж дослідів не було встановлено значної і вірогідної різниці за величинами приросту живої маси ремонтних телиць контрольної та дослідних з груп. Однак, наприкінці дослідів було встановлено статистично вірогідну відмінність за інтенсивністю росту між тваринами III (дослідної) і I (контрольної) груп, тоді як розбіжності між останніми та II (дослідної) групи зросли до рівня тенденції. Зокрема, було встановлено збільшення середньодобових приростів телиць дослідних груп, порівняно з тваринами контрольної групи, на четвертий і п'ятий місяць дослідів, відповідно, на 4,0 і 6,4 % та на 5,2 і 11,2 % ($p \leq 0,05$). Також встановлено, що застосування в організації технології годівлі тварин як традиційного кукурудзяного, так і кукурудзяно-соргового силосу сприяє прискоренню досягнення господарської зрілості телицями. Встановлено, що жива маса ремонтних телиць, починаючи з восьмимісячного віку, перевищувала вимоги стандарту породи. Зокрема, жива маса 8-місячних теличок була вищою за стандарт на 5,0 – 10,2 кг або 2,4 – 4,9 %, в 9-місячному віці 11,0 – 15,7 кг або 4,8 – 6,9 %, в 11-місячному на 30,2 – 33,0 кг або 11,4 – 12,4 %.

Мінливість та рівень індексів будови тіла у віковій динаміці дослідних тварин української чорно-рябої молочної породи засвідчили позитивну динаміку формування екстер'єру у напрямку молочного типу. Таким чином одержані результати довели доцільність використання сорго-кукурудзяного силосу в технології вирощування ремонтних телиць.

Ключові слова: ремонтні телиці, силос, хімічний склад, поживність, жива маса, інтенсивність росту.



The technology of rearing replacement heifers is based on the creation of comfortable housing conditions that will ensure better use of feed nutrients by them, as well as promote more intensive growth and development (Podobed L. I. et al., 2020). The main requirement for their cultivation technology is the need to ensure growth in accordance with regulatory requirements, in conditions similar to adult cattle, which will make it possible to minimize stressful situations in different age periods (Lobeck-Luchterhand K. M. et al., 2014; Han L. et al., 2021).

One of the key criteria characterizing the productive qualities of livestock is their body weight and growth intensity, the changes of which depend on a number of paratypic, the main of which are feeding conditions, and genotype factors (Vyshnevskiy L. V. et al., 2019). In addition to body weight, separate measurements of their bodies are used to assess the growth and development of heifers, which complement it and are closely related to the milk yield of cows (Heinrichs, A. G., 1998). The high level of growth of young animals can be achieved by introducing a significant amount of concentrated fodder into the diet. But the concentrated type of fodder for replacement heifers is undesirable, because with its use, replacement heifers gain weight, do not come to want badly, and walk too much (Pidpala T. V. et al., 2018). Silage is the main component of ruminant diets, containing from 30% to 50% of their nutrition, so increasing its production for livestock farming is an extremely important problem. In the modern conditions of the organization of technology for the production of livestock goods, which involves the use of the same type of feed in farms all year round, the use of silage in the summer months is a necessary prerequisite for intensive management of the industry throughout the year. Therefore, the problem of ensuring sustainable production and improving the quality of silage, reducing the loss of nutrients in the process of harvesting and storing it is of important scientific and practical importance. And, as a result, the intensification of the production of such a fodder determines the stability of providing ruminants with fodder by almost half.

Global warming in recent years has made it impossible to obtain stable high yields of the traditional silage crop – corn. The analysis of official data of the Kharkiv Regional Center of Hydrometeorology for the periods 1986–1995 and 2004–2015 established an increase in the average annual temperature from 8.14 °C to 9.10 °C, with a decrease in the amount of precipitation from 559.9 mm to 528.8 mm or by only 5.5%. Therefore, during the period of active vegetation of fodder crops (April–September), an increase in temperature from 15.77 °C to 17.88 °C is observed. The amount of precipitation in the summer months decreases from 354.8 mm to 287.8 mm or by 18.9% (Pomiton I. A. and Drozdov S. Ye., 2018). Thus, there is a need to apply for a set of measures to adapt the fodder industry to modern climatic conditions, one of which is to increase the area of more drought-resistant crops.

One of these crops is sugar sorghum, which, due to its properties, in particular, drought resistance, is able to provide stable harvests even in dry years (Alix et al., 2019; Getachew G. et al., 2016). However, a significant drawback of using its single-species crops as a raw material for silage production is the chemical composition, in particular the lower content of crude protein and higher crude fiber compared to corn (Corriher V. A. et al., 2010; Ran T. et al., 2021).

Researchers have proven the prospects of growing corn and sugar sorghum crops together, which makes it possible to increase the content of crude protein in such silage and increase its nutritional value, due to a decrease in the content of crude fiber, compared to sorghum silage (Podkówka Z. and Podkówka L., 2011).

Research by foreign scientists has proven the possibility and expediency of using both sorghum and a mixture of corn and sorghum silage in feeding cattle for the produc-



tion of beef (Fazaeli H. et al., 2006) and milk (Oliver A. L. et al., 2004; Amer S. et al., 2012; Xiaokang Lv et al., 2023).

Taking into account the above, there is a need to revise traditional views on the organization of the technology of feeding cattle with this type of fodder, and first of all, replacement heifers, for which the levels and age periods of its introduction into the diet, methods of feeding, etc., are not fully justified, which determines the relevance of the conducted research.

The purpose of the research is to consider the age-related changes in the parameters of linear growth of replacement heifers of the Ukrainian black-and-white dairy breed under different approaches to the organization of their feeding technology.

Materials and methods. The research was carried out in the conditions of the state enterprise Experimental Farm of the Livestock Farming Institute of NAAS "Hontarivka", Chuhuyiv Region, Kharkiv Oblast.

Determining the chemical composition of fodders that were included in the diets of experimental animals was carried out at the Testing Center of the Livestock Farming Institute of NAAS accredited by the National Agency according to methods generally accepted in zootechnics (Vlizlo V. V. et al., 2012). The energy content of fodders was calculated according to current methods (Tsiupko V. V. y dr., 1989).

To conduct a scientific and economic experiment, three groups of replacement heifers of the Ukrainian black-and-white dairy breed, 6 months old, with a body weight of 170 kg, 9 heads each, were formed. For the formation of the experimental groups, different approaches to the organization of their feeding technology were used, namely, the heifers of the first (control) group received a diet that included corn silage. In the diet of the second and third (experimental) groups, respectively, 50% and 100% of this silage was replaced with silage made from the green mass of compatible crops of corn and sorghum. Animals are under stall housing, fed twice a day, with free access to water. Peers were selected according to age, sex, breed and individual body weight.

Body weight dynamics and linear growth of heifers of the Ukrainian black-and-white dairy breed were determined by systematic monthly weighing and measurements. The absolute increase in body weight (D) for individual age periods of the study was determined by the formula:

$$D = W_t - W_0$$

where W_t and W_0 are final and initial body weight, kg.

Absolute average daily gain was determined by the formula:

$$\frac{W_t - W_0}{t_2 - t_1}$$

where W_t and W_0 are body weight at the end and beginning of the period, kg;

t_2 and t_1 are age at the end and beginning of periods, days.

The relative intensity of growth (K) was determined by the formula of S. Brody:

$$K = \frac{(W_t - W_0) \times 100}{(W_t + W_0) : 2}$$

Changes in body weight of heifers were determined on 30, 60, 90, 120 and 150 days of the experiment for each animal and on average for the group (Ibatullin I. I. y dr., 2017). The exterior of replacement heifers was evaluated by the following body measurements: withers height, heart girth, chest depth and width, diagonal body length, rump width, cannon girth) and body indices (hip length, topline, chest, rump, stance, bones).

Diets were adjusted after each animal weighing. Diets were balanced according to detailed feeding norms (Bogdanov G. O. et al., 2012; Kandyba V. M. et al., 2012).



Statistical processing of the results of the experiment was carried out using the method of variational statistics. The difference between groups was considered probable at $p \leq 0.05$.

Research results. Before starting the research, the chemical composition, nutritional value, content and ratio of organic acids in silages were determined. It was established that the use of green mass of corn and sorghum as raw materials for harvesting silage led to a decrease in the content of raw protein in the finished fodder, compared to corn silage, by 2.78%, fat - by 0.14%, and an increase in the content of raw fiber – by 3.31% (in terms of absolutely dry matter).

Differences in the chemical composition caused a decrease in the nutritional value of silage made of the green mass of compatible crops of corn and sorghum from 10.76 MJ to 10.15 MJ in 1 kg of dry matter.

As for the organization of the technology of feeding experimental animals, the data on the amount of fodder fed to replacement heifers during the experiment period (per animal) are given in Table 1.

Table 1

Amount of fodder fed during the period of the experiment, kg (per animal)

Fodder	Groups		
	Group I (control)	Group II (experimental)	Group III (experimental)
Hay: alfalfa	120	120	120
annual herbs	300	300	300
Hay of annual herbs	285	285	285
Silage: corn	639	321	-
corn + sorghum	-	291	582
Concentrated fodder	225	225	225

Analysis of the data in Table 1 indicates the absence of significant differences in the amount of fodder consumed between animals of different groups. Thus, the specific share of silage, on average during the period of the experiment, was 25.0% of the total nutritional value of the diet of these animals.

The use of corn and sorghum silage in animal diet did not have a significant effect on reducing the energy content diet in the dry matter of animal diets of different groups on average during the experiment period, and was, respectively, 9.49 MJ, 9.34 and 9.20 MJ.

According to the content of the main nutrients contained in the diets of the control and experimental groups during the research period, it was proven that it fully satisfied their daily needs, since the intake of feed nutrients met the recommended standards.

The obtained results of the experiment testify to the ability of replacement heifers of the Ukrainian black-and-white dairy breed under appropriate conditions for high growth intensity. However, it should be outlined that different approaches to the organization of feeding technology provided minor differences in the values of the body weight of replacement heifers and its absolute growth (Table 2).

The analysis of the dynamics of the body weight of replacement heifers indicates the absence of a significant and probable difference in this indicator between the experimental animals. The absolute gain of the heifers of the control and experimental groups during the period of the experiment was: Group I 128.0 ± 5.11 kg, Group II – 127.8 ± 3.28 kg, and Group III – 131.4 ± 5.09 kg.



Table 2

Body weight dynamics of replacement heifers (M±m), kg

Groups	Age, months					
	6	7	8	9	10	11
Group I (control)	170.4± 3.04	192.7± 4.50	219.2± 6.57	244.7± 6.29	272.7± 6.83	298.4± 7.54
Group II (experimental)	168.4± 2.87	189.1± 2.49	214.7± 2.68	240.0± 3.12	269.1± 3.63	296.2± 3.71
Group III (experimental)	167.6± 2.23	188.2± 3.24	214.0± 4.30	240.6± 5.09	270.3± 5.68	299.0± 6.02
Breed standard	170	189	209	229	248	266

Evaluating the results of rearing replacement heifers, we compared their absolute body weight indicators and compliance with the minimum requirements of the growth standards set forth in the "Instructions for grading dairy and milk-meat cattle" while they are 6-, 7-, 8-, 9-, 10- and 11-month-old. It was established that the average body weight of experimental animals from the age of eight months exceeded the requirements of the breed standard. Thus, the body weight of 8-month-old heifers was higher than the standard by 5.0-10.2 kg or 2.4-4.9%. With age, the advantage in body weight, in comparison with the breed standard, grew and amounted to 11.0 - 15.7 kg or 4.8 - 6.9% at the age of 9 months. The biggest deviations were at the end of the experiment. Thus, the body weight of 11-month-old heifers exceeded the breed standard by 30.2 - 33.0 kg or 11.4 - 12.4%. This testifies to the optimal existing system of rearing replacement heifers in the farm.

The values of changes in the average daily weight gain of heifers during the experiment are shown in Fig. 1.

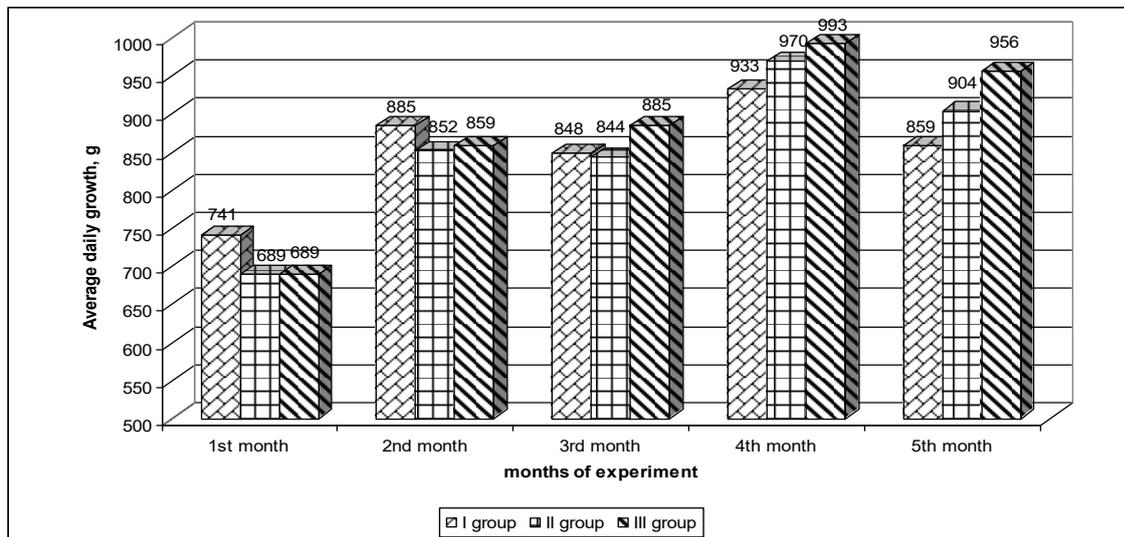


Fig. 1. Average daily weight gain of replacement heifers

The obtained results indicate that changes in the organization of feeding technology had a multi-vector effect on the amount of average daily gains of the animals of the experimental groups. These were diets of animals of Groups II and III that caused a decrease in growth intensity in both the first and second months of the experiment, respectively, by 7.0% in both cases of comparison and by 2.9 and 3.8%. In the next month



of the experiment, the animals of the third group had a slightly higher increase in body weight compared to the heifers of the other groups. However, there was no significant difference in the values of average daily gains in body weight of the replacement heifers of the control and experimental groups.

As for the fourth and fifth months of research, changes in the organization of feeding technology due to the use of silage in the diet of heifers of the experimental groups contributed to an increase in their average daily gains, compared to animals of the control group, by 4.0 and 6.4%, respectively, and by 5.2 and 11.2% ($p \leq 0.05$). Thus, the obtained results proved the expediency of using corn and sorghum silage in the technology of rearing replacement heifers.

Taking into account the results of our previous studies, in which a decrease in the degree of protein breakdown in the rumen was established from 67.8% to 57.6% in corn and sorghum silage, compared to traditional corn, as a result of which a greater amount of it entered the small intestine, where it actually and its absorption took place, this can explain the increase in average daily gains in replacement heifers of the second and third groups (Drozdova O. V. et al., 2018).

However, given the same values of the absolute growth of replacement heifers in groups, it is not possible to judge the identity of the growth process when using different approaches to the organization of their feeding technology, since the absolute growth does not reflect the relationship between the value of body weight growth and growth rate. Therefore, to compare the degree of intensity of growth of heifers, an indicator of relative intensity of their growth was calculated.

Data on the relative intensity of growth of heifers, which reflects the degree of intensity of the growth of their body and gives an idea of the relation between the growth rate and body weight of animals, are shown in Table 3.

Table 3

Relative intensity of growth of replacement heifers (M±m), %

Age, months	Group I (control)	Group II (experimental)	Group III (experimental)
6 - 7	12.1±1.01	11.6±0.84	11.6±0.91
7 - 8	12.8±0.96	12.7±0.82	12.8±0.84
8 - 9	11.1±0.72	11.1±0.37	11.7±0.48
9 - 10	10.8±0.32	11.4±0.50	11.7±0.32 ⁰
10 - 11	9.0±0.24	9.6±0.38	10.1±0.30 ¹
6 - 9	35.6±1.55	35.1±1.34	35.7±1.58
9 - 11	19.8±0.53	21.0±0.73	21.7±0.54 ¹

Note. ⁰ - $p \leq 0.1$ – a tendency towards the probability of difference in Group I; ¹ - $p \leq 0.05$ - the probability of difference in Group I.

The analysis of the data in Table 3 established that the first three-month period of the experiment was characterized by the highest growth energy of heifers. Nevertheless, no significant difference was observed between animals of different groups. With age, the intensity of growth decreased, which is associated with the relative fading of synthesis processes in the body. Thus, in the period of 9-11 months. heifers of the experimental groups were characterized by higher indicators of the relative rate of growth of body weight, which exceeded the animals of the control group, respectively, by 6.1 and 9.6% ($p \leq 0.05$).



To establish the growth and development characteristics of replacement heifers, along with indicators of changes in their body weight, the dynamics of indicators of their linear growth were also determined using different approaches to the organization of feeding technology, which are represented in Table 4.

Table 4

Linear body measurements of replacement heifers, M±m

Groups	Body measurements, cm						
	withers height	diagonal body length	chest depth	chest width	heart girth	rump width	cannon girth
Age of 6 months							
Control	99.9±1.02	108.3±1.21	46.6±0.71	25.9±0.42	123.2±0.74	27.2±0.36	12.7±0.17
I experimental	100.2±1.10	107.9±0.95	46.2±0.62	25.7±0.33	123.0±0.78	27.1±0.42	12.6±0.18
II experimental	100.0±0.82	107.8±0.86	46.1±0.56	25.6±0.29	122.7±0.53	27.0±0.33	12.6±0.18
Age of 9 months							
Control	108.3±0.83	119.1±0.96	54.1±0.93	32.1±0.51	142.3±0.82	33.1±0.45	14.7±0.24
I experimental	107.9±0.65	118.9±0.73	53.4±0.50	31.9±0.31	141.9±0.54	33.1±0.35	14.6±0.24
II experimental	107.3±0.83	118.7±0.80	53.3±0.78	31.7±0.44	141.8±0.52	32.8±0.43	14.6±0.18
Age of 11 months							
Control	114.9±0.82	126.7±0.87	58.6±0.84	35.0±0.50	149.8±0.70	37.8±0.52	15.9±0.26
I experimental	114.8±0.43	126.8±0.55	58.3±0.53	35.3±0.24	149.9±0.31	37.8±0.32	15.8±0.22
II experimental	114.6±0.56	127.0±0.53	58.4±0.67	35.6±0.34	150.2±0.70	38.0±0.44	15.8±0.28

Based on the results of the research, it was established that the use of different approaches to the organization of feeding technology for replacement heifers had an impact not only on the intensity of growth and changes in body weight during the experiment, but also on the formation of their exterior and constitutional features (Table 4). In particular, it led to some slowdown in the growth of all measurements of the heifers of the experimental groups in the first months of the experiment. However, it should be outlined that this difference was not significant. In the following months of the experiment, the heifers of the experimental groups had slightly better results compared to the animals of the control group, which indicates that the body compensates for the temporary slowdown in growth and development. This compensation is due to the adaptation of animals to their consumption of corn and sorghum silage. As a result, at the end of the research, no significant difference was established in the features of the body structure according to the data of linear measurements between the animals of the control and experimental groups.

Based on the assessment of the calculated indices of the body structure of replacement heifers of different groups, some differences were observed in some of them, and similarities in others (Table 5). It should be outlined that at the end of the experiment, the difference between groups of animals in most indices was insignificant, with the exception of topline indices and chest index, which showed a tendency to probability ($p \leq 0.1$) in favor of replacement heifers of the third group. A stable increase with age



was also noted in the indices of topline (by 1.8 - 3.5%), rump (by 4.2 - 4.5%), chest (by 4.2 - 5.5%) and bones (by 1.1 - 1.2%). With ageing, the indices of hip length (by 4.3 – 4.9%) and stance (by 1.1 – 2.4%) steadily decreased in experimental heifers.

Table 5

Indices of body structure of replacement heifers, M±m

Groups	Indices, %					
	hip length	topline	chest	rump	stance	bones
Age of 6 months						
Control	53.4±0.41	108.5±0.50	55.6±0.39	113.8±0.69	95.1±0.63	12.7±0.13
I experimental	53.9±0.35	107.7±0.54	55.5±0.30	114.0±0.34	94.7±0.59	12.5±0.11
II experimental	53.9±0.36	107.8±0.48	55.4±0.42	113.8±0.59	94.7±0.62	12.6±0.10
Age of 9 months						
Control	50.1±0.57	109.9±0.29	59.4±0.39	119.5±0.32	97.0±0.52	13.5±0.14
I experimental	50.5±0.20	110.2±0.36	59.7±0.21	119.4±0.38	96.3±0.42	13.5±0.16
II experimental	50.3±0.35	110.6±0.34	59.4±0.22	119.5±0.45	96.6±0.34	13.6±0.10
Age of 11 months						
Control	49.1±0.38	110.3±0.21	59.8±0.43	118.3±0.37	92.7±0.56	13.8±0.13
I experimental	49.2±0.32	110.5±0.29	60.6±0.56	118.2±0.38	93.6±0.59	13.7±0.16
II experimental	49.0±0.38	110.9±0.23 ⁰	60.9±0.42 ⁰	118.3±0.28	93.6±0.41	13.8±0.19

Note. ⁰ – $p \leq 0.1$ – a tendency towards the probability of difference in Group I.

Discussion. According to our data, it was established that the use of green mass of corn and sorghum as raw materials for harvesting silage led to a decrease in the content of raw protein in the finished fodder, in terms of absolutely dry matter, compared to corn silage by 2.78%, fat – by 0.14%, and an increase in crude fiber content by 3.31%, which is confirmed by data obtained by foreign researchers. In particular (Podkówka Z. and Podkówka L., 2011; Carvalho W. G. et al., 2016) prepared corn and sorghum silage, which contained 1.4% less crude protein, 1.44% less fat and more crude fiber by 7.07%.

As for the positive effect of feeding corn and sorghum silage on changes in the body weight indicators of replacement heifers, the data obtained by us are consistent with the results of studies (Fazaeli H. et al., 2006), which in their research due to the partial replacement of corn silage with sorghum in the diets of heifers on fattening, received an increase in their body weight by 5.6%. Research (Xiaokang Lv et al., 2023) found out that replacing 50% of corn silage with sorghum in the diets of dairy cows contributed to an increase in average daily milk yield by 6.3%, fat content in milk by 0.35 abs., protein – by 0.21% abs. Nevertheless, (Oliver A.L. et al., 2004) in their research did not establish an increase in average daily milk yield when feeding sorghum silage as part of dairy cows' diets.

Therefore, taking into account the fact that even under unfavorable weather conditions, the use of combined crops of corn and sorghum made it possible to increase, compared to corn, the yield of green mass by 65%, harvesting of dry matter by 42%,



ECD by 37%, crude protein by 35%, in order to sustainably provide fodder to the livestock industry facing climate change, as well as increase fodder production from a unit of land area while reducing their cost, the feasibility of using silage made of the green mass of compatible crops of corn and sorghum in the technology of rearing replacement heifers has been proven.

Conclusions.

1. The expediency of using silage made of the green mass of compatible crops of corn and sorghum in the technology of rearing replacement heifers has been proven.

2. The influence of different approaches to the organization of feeding technology on the patterns of changes in the dynamics of average daily body weight gains of replacement heifers of the Ukrainian black-and-white dairy breed was established, which were accompanied by an increase of 5.2% and 11.2% ($p \leq 0.05$) in the intensity of growth at the end of the study compared to the control group.

3 Partial (by 50%) and complete replacement in the diets of replacement heifers led to a slight slowdown in the growth of all measurements of the heifers of the experimental groups in the first months of the experiment. However, in the following months of the experiment, the body compensated for their growth and development.

4. It was found out that experimental animals exceeded the requirements of the breed standard in terms of body weight at the age of 8 months – by 5.0 - 10.2 kg or 2.4 - 4.9%, at the age of 9 months – by 11.0 - 15.7 kg or 4.8 – 6.9%, at the age of 11 months – by 30.2 – 33.0 kg or 11.4 – 12.4%.

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