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COMPARATIVE EVALUATION OF CONDITIONS OF KEEPING AND PRODUCTIVITY OF COWS IN TWO DIFFERENT METHODS

Yaremchuk O.S.
ORCID: 0000-0002-3283-6107
Doctor of Agricultural Sciences, Professor,
Varpikhovskyi R. L.
ORCID: 0000-0002-9315-7343
Candidate of agricultural sciences
Vinnytsia national agrarian university (Vinnytsia, Ukraine)

Comparing the two cows shows that in the second half of lactation increases the fat content in milk, the highest percentage is at 8-10 months of lactation, which indicates an excessive amount of energy rations and can lead to increased live weight of cows and their infertility, which is undesirable. Hopes are higher in groups of cows kept in loose housing in deep bedding - 8866 kg per lactation, which is 292 kg more milk compared to loose housing in boxes.

In order to increase the conditions of milk production there is a comprehensive approach to solving the following problems: the intensity of the herd of dairy cows 3-4 years, to reduce the level of infertility of first-borns to use directed breeding heifers and transfer them to insemination at 19 months, tested for their own milk productivity of first-born cows that are suitable for industrial technology.

It is established that the composition of milk is significantly influenced by the level and completeness of feeding cows. Feeding green mass of legumes or cereal-legume mixtures increases the fat content of milk by 0.15-0.3% compared to the green mass of cereals, which is confirmed not only by lactation but also by the season.

Studies have shown that increasing the fat content of Ukrainian black-and-white dairy cows can be achieved not only by breeding for fat milk, but also by regulating calves, preference should be given to: spring calving, higher fattening cows and balanced feeding.

***Key words**: heifers, first-born cows, content, microclimate, cowshed, method, group, hopes, milk.*

Introduction. It is known that Ukraine is an agrarian state with significant natural potential. Solving the set tasks of effective development of the agricultural sector of the state today will not only contribute to the solution of national problems, but will also have international significance. The livestock industry is a defining component of solving the problems of the agricultural sector [2, 10].

Providing livestock with a high level of feeding and maintenance, their productivity can increase 2-3 times [14]. Obtaining milk using industrial technologies involves five components: compliance with technological design standards, balancing nutritional rations, breeding work, compliance with sanitary and hygienic requirements and veterinary preventive measures.

The farms widely specialize and concentrate production, increase the level of mechanization of labor-intensive processes, improve the organization and remuneration of labor. The ultimate goal of these measures is to increase productivity, reduce costs, increase profitability.

The growth of production, reduction of labor costs and cost reduction is most successfully solved in terms of specialization and concentration. At specialized dairy complexes, all efforts and material resources are focused on the production of the

main type of product and the care of one animal is reduced, which helps reduce costs and increase profitability. However, most farms produce not only milk but also a significant amount of beef. Due to the fact that the farms keep overhauled young animals, the proportion of cows in the herd does not exceed 40%

In many complexes put into operation on farms, the share of cows in the herd does not exceed 48%. Under such conditions of production on dairy farms keep not only repair, but also a part of overrepair young growth. The impact of insufficient level of specialization of production on the main indicators of management was analyzed by scientists based on the work of large dairy farms, each of which houses at least 800 cows. Analysis of the work of dairy complexes shows that the proportion of cows in the herd should be at least 64%. Thus heifers on a dairy complex should arrive for 2-3 months before calving, and young growth to transfer on cultivation at the age not older than 6 months.

In the future, the main should be considered specialized dairy complexes with a proportion of cows in the herd of at least 88% when keeping young animals not older than one month. Along with the complexes for the production of young animals, there should be a network of specialized complexes for raising heifers and young animals for meat. Now there are specialized farms for the production of milk and beef, raising heifers in many parts of the country.

Dairy farming in recent years has developed on the priorities of concentration and specialization, widespread investment in livestock complexes, the formation of inter-farm enterprises. These projects were implemented in capital premises, bulky equipment on the principles of industrial technology. Most industrial complexes did not reach the design level, complicated the environmental situation, and the growth of energy and capital intensity of the premises did not improve livestock. High concentrations of livestock, unsatisfactory microclimate and many other problems have led to the deterioration of the physiological condition of livestock, increased culling, reduced reproductive function and milk productivity.

The industry's economy is subsidized, but these subsidies do not help to remedy the situation, as many agricultural enterprises have been operating at a loss. The amount of damage was twice the revenue from the sale of raw milk to factories. This situation is the result of the shadowing of the economy, which is manifested through low marketability of production. In remote enterprises, it is not possible to send milk for processing, so it is done on the spot.

Dairy farming, which occupies one of the leading positions in the agro-industrial complex, has different vectors of dynamics. In the public sector there is a tendency to reduce the number of cows and milk production, and in the private peasant sector - to increase. But the processes that occur spontaneously are not unequivocally positive for the development of the industry market for milk and dairy products.

Review of literature sources. The formation of the Ukrainian black-spotted dairy breed was greatly influenced by animals of imported selection, namely Dutch and German, as well as Holstein breeds. This effect affected primarily milk productivity [6, 12].

According to many scientists, Ukrainian black-and-white dairy cattle, which are bred in different parts of our country, have high milk productivity [7, 8, 9].

Improvement of this breed should take place in Ukraine in the following directions: increase in fat milk yield (breed standard is now 3.6%), strengthening the constitution and resistance to various diseases and stresses, improving meat qualities [10].

Modern animals of the Ukrainian black-and-white dairy breed in the Vinnytsia region correspond most closely to the type of Dutch cattle, because at the beginning of the XIX century a significant number of black-and-white cattle were imported from Holland.

However, black-spotted cattle still do not fully meet the requirements of intensive milk production technology. It has the advantages and disadvantages of Dutch breeds, which have been used for many years as an improver for domestic black-and-white cattle [4].

Increasing production and improving quality is closely related to improving existing and creating new more productive, as well as adapted to the conditions of machine milking breeds, lines, families and herds of cows based on improving hereditary qualities, creating optimal feeding and housing conditions.

Decades are needed to solve the problems of increasing productivity by intrabreeding methods.Therefore, it is more radical to involve the gene pool of specialized dairy breeds of foreign selection. In addition, measures should be taken to increase productivity and its breeding value by improving the feeding, keeping and fertility of cows [12, 13].

Improving the breeding and productive qualities of cows of black-spotted dairy breed is carried out on the principle of large-scale selection, which is based on the method of purebred breeding [1].

To improve the array of black-spotted breed there is a need to streamline its genetic structure and intensive selection aimed at consolidating heredity and the desired type [15, 16].

Along with improving the breeding and productive qualities of black-spotted breed cows by the method of intra-breed selection, in Ukraine it is widely crossed with breeders of related black-spotted breeds imported from European countries. Over the last 20 years, 11,975 young cattle have been imported to Ukraine, including 543 bulls and 11,432 heifers from different countries.

An important way to increase the efficiency of dairy farming is to improve the quality of milk. After all, the price of its implementation increases significantly. The efficiency of the dairy industry also largely depends on the quality. Improving the quality of milk requires providing the forms with the necessary equipment for its cooling and filtering means, qualified personnel. It is necessary to maintain proper sanitation in the premises, to ensure impeccable cleanliness of milking parlors [13].

In animal husbandry, the technological process involves the conversion of animal nutrients into livestock products and raw materials. Industrial is the technology of milk production, in which the main processes of animal care are performed by mechanical means or automation. To use industrial technology, specialized facilities for keeping animals, auxiliary buildings for storing and preparing feed, collecting and storing manure and sewage, an isolator for sick animals, office space, and other ancillary facilities are being built. All these objects,

provided by a scientifically sound project, are a complex in which to perform labor-intensive processes create flow (conveyor) lines, equipped with a system of machines and appropriate equipment (equipment) [14].

Thus, modern technology of milk production is based mainly on biological, engineering and economic knowledge. If these sciences determine and determine what needs to be done to produce milk, the technology that accumulates the necessary provisions of these sciences, as well as practical experience, answers the question of how to act to obtain milk in the production process with the greatest efficiency. The technology of milk production on the farm is determined by the number and quality of animals, the parameters of all operations, as well as the sequence and duration of their use by staff [2].

Dairy productivity in the best breeding herds is 6000-8000 kg of milk with a fat content of 3.6-3.8%. There are many animals in the breed with a milk yield of 10,000 kg of milk. Live weight of adult cows - 600-650 kg, bulls - 850-1100 kg. Heifers with good feeding reach a live weight of 12 months. 290-300 kg, in 18 - 400-420, bulls - respectively 380-400 and 500-520 kg, have satisfactory meat qualities. The Central-Eastern type is 65-70% of the breed [8].

The key to the efficient operation of a dairy farm is the rational organization of machine milking of cows. The secretion of milk in the mammary gland of animals occurs evenly over 9-12 hours. after milking, and therefore a calm environment in the herd, the organization of rest of cows according to a certain regime, contribute to the optimal secretion of milk. The capacity of a cow's udder determines her individual ability to accumulate a certain amount of milk before milking without suppressing the secretion process. It should be borne in mind that the capacity of the breast does not remain constant during lactation: in the first months of lactation it increases slightly, then, until the fifth or seventh - remains almost the same, and then decreases with decreasing daily milk yield [4, 11].

The purpose and objectives of the study. To improve the technology of quality milk production from the dairy herd of Ukrainian black-spotted and Ukrainian red-spotted dairy breeds, it is necessary to analyze the existing technology, which in turn will improve it by integrating optimal design and technological solutions.

The purpose of the work is to evaluate the technology of milk production under the existing conditions and to determine the directions of technology improvement by integrating effective technological solutions of milk production from a dairy herd of cows.

To solve this goal, we highlight the task: to assess the structural features of the herd of cows in the livestock enterprise; to characterize aspects of milk production technology; to develop the scheme of technology of improvement under the conditions of observance of sanitary and hygienic norms; substantiate the efficiency of milk production and the level of microclimate and heat balance of the building in winter; to form conclusions and proposals to production.

The urgency of the topic is that the optimization of milk production technology will improve the sanitary and hygienic conditions of livestock and increase the productivity of quality milk.

Research methodology. The work was performed according to the plan of

research work of the Department of Veterinary Hygiene, Sanitation and Expertise of Vinnytsia National Agrarian University within the scientific topic: "Optimization of sanitary and hygienic conditions for obtaining calves by industrial technology" (State registration number 0120U104437).

Cattle are kept in loose groups in compliance with technological norms in lightweight cowsheds with a frame base of metal and reinforced concrete structures.

Watering of animals with the help of automatic systems for group watering with fixed water supply.

Milking cows with a milking platform in the milking parlor - twice.

Manure removal with a scraper unit, and in the delivery room of a bulldozer, as cows are kept in deep bedding.

The economic feasibility of milk production should be considered in a comparative study of two groups, one of which is the control of existing technology (keeping cows loose in sections with boxes), and the second experimental advanced technology (keeping cows loose in deep litter). Animals in the experimental groups were selected on the principle of analogous groups. Each has 20 dairy cows with an average live weight of 560 kg. Ukrainian black-and-white dairy breed.

Feeding is the same for experimental groups of livestock, distribution of feed three times a day. Research of feeding according to "Feeding norms" [3, 4, 11].

Air microclimate indicators were evaluated according to generally accepted methods [1, 16], and a multifunctional ultrasonic digital compact device (5 in 1) was used, which simultaneously controlled temperature, humidity, air velocity, illuminance and noise level.

The results of the research were processed biometrically using the methods of variation statistics [3, 5], using computer technology and MS Excel software.

Research results. Care and maintenance of animals on the farm involves a system of organizational and economic measures aimed at ensuring the best living conditions for animals and obtaining from them the planned productivity at the lowest cost of labor and resources.

In livestock buildings where lactating cows are kept, it is advisable to observe veterinary and sanitary measures, to work on disease prevention, to observe veterinary sanitation of livestock production, to obtain products that comply with the procedure of veterinary and sanitary examination.

Given the fact that in dry air unfavorable conditions for the development of microorganisms are less, it is desirable to prevent an increase in humidity in the air than to reduce their ability to reproduce.

The Departmental Standards of Technological Design state: in order to prevent and eliminate animal diseases, protect people from infectious and invasive diseases common to humans and animals, livestock enterprises must provide a set of special measures, including disinfection, deworming, disinfection, disinsection and deratization .

The most effective and common measure to destroy infectious agents in the environment is disinfection, which is carried out after thorough mechanical cleaning of livestock premises.

Disinfect animals, equipment, inventory, animal care items, indoor air, company

premises, loading and unloading areas, veterinary and sanitary facilities, vehicles, milking parlors, overalls, manure, slurry and wastewater.

Research of microclimate on temperature, relative humidity, content of ammonia, carbon dioxide in the room air to calculate the total score and determine the appropriate level of milk production technology (Tables 1, 2).

Table 1 - Microclimate of premises for keeping dairy cows - January 2021

Microclimate parameters	Norm	A cowshed is a loose-fitting box		The cowshed is loose on deep bedding	
		indicator	rating	indicator	rating
Air temperature, ºC	8-10	8,4±0,32	4	14,6±0,29	5
Relative humidity, %	65-75	76±2,35	4	72±3,22	5
Air velocity, m/s	до 0,3	0,34±0,07	4	0,22±0,12	4
CO2 content,%	до 0,25	0,18±0,01	5	0,17±0,02	5
Ammonia content, mg/m³	до 20	20±1,10	3	18±0,91	3
Total score	-	-	4,0	-	4,4

Based on the data obtained in Table 1, all indicators are within the norm, none of them exceeds the allowable limit, except for the relative humidity in the capital building by 1%.

According to the score, the microclimate in cowsheds corresponds to 4.0 and 4.4 points according to research in January and corresponds to the allowable design and technological regime in which the level of productivity is 7-10% relative to the optimal design and technological regime or 5 points.

Based on the data obtained in Table 2, all indicators are within the norm, except for the relative humidity, which is above the norm by 1% in the cowshed with loose-box content.

According to the score, the microclimate in livestock facilities in March corresponds to the allowable design and technological regime - 4.2 and 4.4 points.

Resumption of operation of the cowshed for milk production must be carried out in accordance with the regulations, the reconstruction of the building should be carried out at a residual value of about 40%. Therefore, it is advisable to provide for the reconstruction of livestock products, which requires a minimum of technological costs.

Table 2 - Microclimate of premises for keeping dairy cows - March 2021

Microclimate parameters	Norm	A cowshed is a loose-fitting box		The cowshed is loose on deep bedding	
		indicator	rating	indicator	rating
Air temperature, ºC	8-16	14,3±0,33	5	15,3±0,26	5
Relative humidity, %	65-75	76±3,11	4	75±3,17	5
Air velocity, m/s	до 0,50	0,21±0,12	4	0,25±0,18	5
CO2 content,%	до 0,20	0,20±0,01	5	0,22±0,01	4
Ammonia content, mg/m³	до 20	19±1,26	3	19±1,42	3
Total score	-	-	4,2	-	4,4

We have developed a group cage for 25 cows of the following sizes: width 6.75 m, length 15.75 m. The group cage is designed for 25 cows. There are two zones in the cage: a zone for feeding cows at the feeding table and a zone for resting in deep litter. One cow has 4.25 square meters. m, which corresponds to the minimum floor area for cows. There are three autodrinkers in the group cage.

Cows will enter the building after calving for 20 days. The technological scheme envisages keeping cows in deep litter (Fig. 1).

Cows move freely in the rest area and, if desired, approach the feeding table, where there is always a rough, juicy and concentrated feed. Near the building there are paved areas with an area of 375 square meters. m or for each cow of 15 square meters. m. The total area for cows (pasture + premises) is 481.25 square meters. m, one cow has 19.25 square meters. m. The presence of 8 group cages of 25 heads allows you to alternately complete the technological groups.

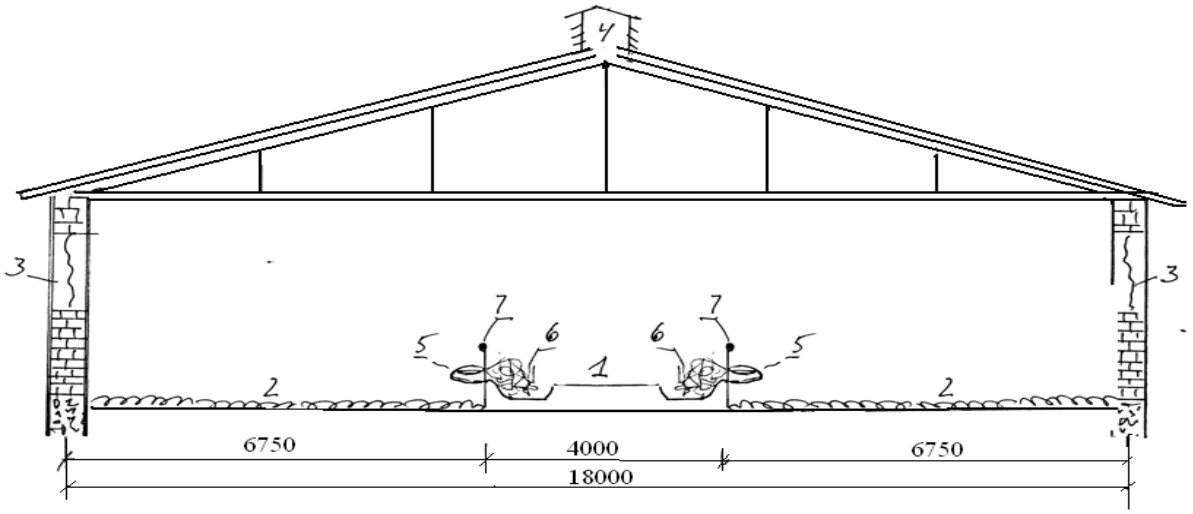

Fig. 1. Section of a cowshed for 200 cows

***1** - feeding table; **2** - a place for rest of cows; **3** - ventilation curtains; **4** - ventilation and light lantern; **5** - autodrinkers; **6** - daily supply of feed; 7 - feeding lattice.*

With 8 group cages for the period of keeping cows, specialists have the opportunity to assess behavior and regroup in order to isolate aggressive animals, or select similar ones, which allows after some competing behaviors to choose their place for rest and feeding. Thus, when developing the parameters of group cages, we took into account the peculiarities not only of ensuring the normative parameters of keeping, milking, but also control over the behavior of cows.

Characterizing the reconstruction of the existing building on the farm for milk production, which can sell more than 900 tons of milk per year, it should be noted that this building uses the following advanced technological solutions: loose housing of cows in deep bedding with equipment feeding area, recreation area , playgrounds; there are feeding tables in the room, which improve the hygienic and sanitary conditions for feeding cattle; placement of feeding tables allows to normalize the feeding of animals taking into account the level of productivity of cows; sufficient recreation areas, a feeding front and free movement in the group cage and on the playgrounds create comfortable housing conditions that allow to achieve minimal feed and labor costs; the cost of time-consuming processes is minimized.

A new technology for keeping cows in a building of 18 × 72 m is proposed, based on loose housing of cows in group cages of 25 heads on deep litter with equipment for feeding area, recreation area, playgrounds; feeding tables are provided for feeding, which increases the possibility for normalized feeding of cows; reducing labor costs for milk production to a minimum.

Today in Ukraine there are various requirements and standards for whole milk, namely: DSTU 3662: 2018 Raw cow's milk. Specifications; DSTU 2661: 2010 Drinking cow's milk. General technical conditions; DSTU 8553: 2015 Raw milk and raw cream. Rules of acceptance, sampling and preparation of samples for control, however, due to the large shortage of raw materials, milk processing enterprises receive milk of much lower quality than required, which negatively affects the production of dairy products.

For stable supply of dairy processing enterprises with high-quality raw materials, specialized highly profitable dairy farms are being created, where the production technology would correspond to the modern level and ensure the production of high-quality and cheap milk.

Fat content of cows is influenced by genetic factors, environmental factors and the physiological condition of cows. The main genetic and selection indicators of fat content in milk are as follows: heredity of fat 0.48-0.60; protein correlation coefficient: fat 0.29-0.42; the correlation coefficient between milk yield and fat content from 0.028 to 0.175; variability of fat content in milk 5.5-11.4%.

The theory is that the more milk we get, the more fat we get, but with increasing milk yield, the fat content decreases, which is confirmed in practice (Table 3).

Table 3 - Indicators of milk yield and fat content of experimental groups of cows in different cowsheds, n = 20 (M±m)

Indicator	Months of lactation (305 days), months								Average value
	1	2	3	4-5	6-7	8	9	10	
Loose cowshed									
Daily milk yield, kg	27,6± 2,42	30,1± 1,73	29,9± 1,53	29,1± 1,48	27,9± 1,52	27,2± 1,78	26,6± 1,56	25,7± 1,48	28,11
Fat content,%	3,7± 0,11	3,8± 0,08	3,8± 0,09	3,9± 0,04	3,9± 0,06	3,9± 0,04	3,9± 0,08	4,1± 0,02	3,88
Loose cows in deep bedding									
Daily milk yield, kg	27,9± 1,56	31,5± 1,82	31,3± 2,32	30,1± 1,94	28,9± 1,87	28,1± 1,62	27,3± 1,26	26,5± 1,42	29,07
Fat content,%	3,7± 0,08	3,8± 0,05	3,8± 0,04	3,8± 0,06	3,9± 0,07	3,9± 0,04	3,9± 0,05	4,0± 0,08	3,85

From the data of table 3 we see that in the second half of lactation, with increasing fattening cows, simultaneously increases the fat content in milk, the highest percentage is at 8-10 months. With increased fat content at the end of lactation means an excessive amount of energy in the diet, which can lead to an increase in live weight of cows.

In summer, the air temperature rises by 21 ° C (optimum), which leads to

inhibition of milk fat synthesis in cows. Each increase in temperature by 5 ° C above the optimum leads to a decrease in fat content in milk of cows by 0.2-0.3%, and in some cases - by 0.5%.

The composition of milk is greatly influenced by the level and completeness of feeding cows. Feeding green mass of legumes or cereal-legume mixtures increases the fat content of milk by 0.15-0.3% compared to the green mass of cereals, which is confirmed not only by lactation but also by the season.

Studies have shown that increasing the fat content of Ukrainian black-and-white dairy cows can be achieved not only by breeding for fat milk, but also by regulating calves, preference should be given to: spring calving, higher fattening cows and balanced feeding.

High profitability of milk production on the farm was due to the high productivity of the dairy herd. Milk is sold at the Lityn Dairy Plant. Specialists are working to ensure that the cost of production was low, and the selling price allowed to have a highly profitable production.

Table 4 - Economic evaluation of milk production technology from dairy cows in different cowsheds at loose housing, n = 20

Indicator	Keeping in boxes	Keeping in deep bedding	± keeping in deep bedding before keeping in boxes
Duration of lactation, days	305	305	-
Average live weight of cows, kg	556	564	8
Average hopes for lactation, kg	8574	8866	292
Fat content in milk,%	3,88	3,85	-0,03
Gross amount of milk, c	1714,80	1773,20	58,4
Marketability of milk,%	96	96	-
Commodity milk, c	1646,21	1702,27	56,06
Cost of milk sold, thousand UAH	1626,6	1612,2	-14,4
The average price per 1 kg of milk, UAH	12	12	-
Sales revenue, thousand UAH	1975,45	2042,72	67,27
Profit, thousand UAH.	348,85	430,52	81,67
Profitability level,%	21,45	26,70	5,25

When selling milk, the enterprise is profitable - 21.4-26.7%, the profit under the conditions of keeping dairy cows in a building of light type on deep litter - 430.52 thousand UAH, while in a building with loose housing of animals in sections with boxes - 348.85 thousand UAH, which is 81.67 thousand UAH less, which is accompanied by violations of the microclimate and heat balance of the building.

Discussion. Selection and breeding work is underway to increase the fat content of cows. Animals are highly productive because they all belong to the first class - 400, elite - 607 and elite record - 220 heads.

The herd of cows on the farm is young, the proportion of cows 1-3 calves 83.7%, the remaining 4-5 lactations.

The following additives stimulate the processes of milk fat synthesis in the body of animals: feed fat, brewer's yeast, sodium bicarbonate and others. The fat content of milk with the introduction of additives in the diet of cows increases by an average of 0.2-0.4%. It should be noted that violations of feeding regime and maintenance technology, namely: tight stalls, poor ventilation, increased temperature in the room are the reasons for the refusal of cows to feed the result is a decrease in milk yield, fat, protein and milk density.

In hunting cows, the fat content in milk is reduced by 1.0-1.5%. The fat content in milk usually increases in autumn and winter, and decreases in spring and summer. The minimum fat content was in the second month of lactation. Subsequently, there was a gradual increase in fat content, reaching a maximum in the last two months of lactation.

Studies have shown that increasing the fat content of Ukrainian black-and-white dairy cows can be achieved not only by breeding for fat milk, but also by regulating calves, preference should be given to: spring calving, higher fattening cows and balanced feeding.

Conclusions. According to the score, the microclimate of cowsheds in January corresponds to 4.0 and 4.4 points or the allowable design and technological regime under which the level of productivity is reduced by 7% relative to the optimal design and technological regime. The assessment of the microclimate in March also corresponds to the allowable design and technological regime - 4.2 and 4.4 points, which is slightly better than in winter.

When selling milk, the enterprise is profitable, the profit from the cows of the experimental group from the lighter type cows when kept in deep litter - 430.52 thousand UAH, while in the building with loose housing of animals in sections with boxes - 348, 85 thousand UAH, which is 81.67 thousand UAH less, which is accompanied by violations of some parameters of the microclimate and a decrease in the level of thermal balance of the building.

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