In recent years, in Ukraine and in many countries of the world, probiotics, which are the catalysts of metabolic processes in the body, have been procured for the prevention and treatment of digestive disorders. Probiotics normalize the processes of digestion due to the correction of qualitative and quantitative composition of the microflora of the gastrointestinal tract, contributing to increasing the natural resistance of the animals organism.

The period of weaning in pig breeding is one of the most important, since that time the piglets are switching to another type of feeding, they begin to come in contact with other pigs in a new environment that is accompanied by stress, a decrease in the natural resistance and immunological reactivity of the organism. The damage of the normal microflora structure of the gastrointestinal tract. As a result of which gastrointestinal disorders arise, daily average gains decrease and mortality increases.

The main purpose of the use of probiotics is the formation of a metabolic active population of probiotic bacteria in the digestive tract, which contributes to a qualitative change in the composition of the intestinal flora and the displacement of pathogenic microorganisms, and also an increase in the bacterial synthesis of enzymes and throughput of the intestinal mucosa.

When using probiotic drugs in livestock production, the quality of feed use is increased, animal growth and productivity are accelerated, as well as the cost of production and the number of cases of morbidity and mortality among young animals are reduced.

The purpose of our work was to study the effect of Protecto active probiotic on the macro and microelements in piglets blood serum during the period of weaning from the sow.

For the experiment there were taken piglets of 45 days of age, taking into account the breed, live weight and total physiological state. The conditions for keeping and feeding animals were the same. For pigs in the experimental group, in addition to the main diet, the Protecto active probiotic was administered at a dose of 2 g per 10 kg of body weight, which was given together with the food 1 time per day for 30 days.

To determine the effect of Protecto active on the biotic elements of animals blood serum of all groups, blood was collected from the orbital sinus, in the morning, before feeding. Blood tests were conducted before feeding probiotics, as well as at 30, 45, and 60 from the beginning of experiment.

Mineral elements in the body of animals play an important role, so studying the effects of feed additives on their content and assimilation is an important stage in the research. After all, it is micro and macro elements that are an important factor in increasing the natural resistance of the organism of young animals.

As a result of the use of Protecto active probiotic there have been established, some positive effects on the macro and microelements of piglets blood serum during the period of weaning from the sow. An increase in total calcium content by 8.81 %, inorganic phosphorus by 5.85 %, magnesium by 12.80 %, ferrum by 6.95 %, copper by 2.90 %, zinc by 3.64 % was noted among experimental animals compared with a control group. Feeding the pigs with the Protecto active did not have a negative impact on the biotic parameters of the blood, all changes occurred within the physiological norm, among animals of the experimental group, there was an improvement in the physiological state, increased gain and livestock survival. It should be noted that all changes in the indexes of the content of macro- and microelements of the serum did not have a reliable nature and occurred within the limits of the physiological norm.

Key words: probiotic drugs, young pigs, average daily gain, metabolism, biochemical parameters, blood composition, prophylaxis, gastrointestinal tract.

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PRODUCTIVITY OF COWS OF DIFFERENT TOLERANCE TO STRESS UNDER ROBOTIZED MILKING CONDITIONS

Метою даної публікації було вивчення впливу стресотійкості корів української чорно-рябої породи на продуктивність, ранговість та елементи поведінки за умов роботизованого, добровільного доїння.

Дослідження проводили в умовах роботизованої молочної ферми ТДВ «Терезине» на коровах-первістках української чорно-рябої молочної породи (n=50) в період роздою (2–3-й місяць лактації). При цьому за типом стресостійкості корів розподілили на три групи: високостресостійкі – ті, в яких не відбувалося, або відмічалося незначне умовно-рефлекторне гальмування молоковиведення; середньої стресостійкості – у яких відбулося до 66,7 % умовно- і до 33,3 % доїнь безумовно-рефлекторне гальмування динаміки молоковиведення і низькостресостійкі – у яких більше 66,7 % відбулося умовно- і понад 33,3 % безумовно-рефлекторне гальмування.

Установлено, що високостресостійкі тварини характеризуються високою адаптаційною пластичністю до дії стрес-факторів і здатністю зберігати стабільну молочну продуктивність. Продуктивність корів із середньою стрес-

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остійкістю знизилася на 2,17 кг (або 8,49 %), на фоні стабільності надоїв високостресостійких корів, а низькостресостійких – на 5,68 кг (або 22,54 %). Високостресостійкі корови займають домінуючі позиції в ранговій ієрархії стада, частіше відвідують доїльну установку та кормову станцію, споживають більше концентрованого корму, швидше адаптуються до умов доїння, порівняно з коровами середньої і низької стресостійкості.

Ключові слова: стрес, адаптація, роботизоване доїння, ієрархія, молочна продуктивність, кормова станція.

Statement of the problem. The problem of stress is one of the main factors of intensive milk production technologies [1, 2, 3, 4, 5]. This indicates the topicality of studying the causes of the emergence and development of cows' stress and developing of methods in order to prevent the phenomenon in modern production conditions [6, 7, 8, 9, 10]. For industrial livestock, an important condition for the selection and matching of animals is not only their productive potential, adaptive features, and high resistance to diseases, but also the ability to tolerate stress [11, 12, 13, 14, 15, 16]. Animals with a high ability of stress resistance adapt rapidly to such conditions, whereas ones with low-stress resistance to a greater extent reaction. This may negatively affects the functional activity of all organs and systems, whose work in turn in one way or another affects the lactation function of dairy cattle [17, 18, 19, 20, 21].

Stressis a great damage to the animal body and inhibits the efficiency of livestock production up to 30 % [22, 23, 24, 25]. According to research [26, 27, 28, 29, 30], the prevention of stress is based on three basic principles: the engineering-technical one by creation of the necessary conditions for the exploitation of animals with a minimum of external influences; the principle of chemical regulation of stress reactions with the use of biologically active substances that would mitigate the stress or improve the adaptive capacity of the organism; and the selection of animals with resistance for certain stressors.

The purpose of this research was to study the effect of stress-resistance of cows of the Ukrainian Black-Spotted breed on productivity, rank, and elements of behavior under the conditions of robotized voluntary milking.

Material and methods of research. The research was carried out under the conditions of a robotized dairy farm "Terezine" LAC with the fresh cows of the Ukrainian Black-Spotted breed (n=50) within the period of increasing the milk yield (2-3rd month of lactation). Stress resistance of cows under voluntary, motivational milking at the machine was studied according to the method of Kokorina et al. [31].

The first milking is carried out for comparison, and the next three ones, conducted by the experimenter at the same times of day as the background one. The amount of milk received was counted in every minute of the start of milking. The dynamics of milk production was determined with three milk yields and based on these data, a graph of the dynamics of milk production was constructed. It was considered and expressed as a percentage: the total number of milk yields with the same inhibition of milk production, the number of milking with elements of conditional reflex inhibition (decrease of the milk yield during the first minute), the amount of milking with the elements of unconditionally reflex inhibition, the amount of milking with different distortions of the curve of the dynamics of milk production (for a total conditional and unconditional inhibitions).

Indicators of the duration and multiplicity of milking, eating of feed at the feeding station and during milking, productivity and intensity of production, the number of passages through the selection gate was determined according to the DelPro™ herd management program. Cases for bringing cows for milking and pushing aside from feed stations were based on daily observation.

Research results. As a result, the difference in relation stress resistance types in herd was discovered (table 1).

Table 1 – **Types of stress resistance of tested cows, their productivity and intensity of milk production**

Types of cows' stress resistance	Quantity of cows		Average daily milk yield before the experiment, kg	Average daily milk yield during the experiment period, kg	Average single milk yield, kg	Duration of the single milking, min.	Average milk production, kg/min
	number	%					
Total including:	50	100	–	–	–	–	–
High	25	50.0	28,73±0,62	29,08±0,78	9,87±0,56	6,69±0,47	1,71±0,11
Moderate	16	32.0	25,54±0,29	23,37±0,56	7,92±0,32	6,33±0,53	1,39±0,10
Low	9	18.0	25,19±0,22	19,51±0,67	6,75±0,45	6,03±0,34	1,26±0,11

In particular, the number of cows with high stress resistance were 50 %, and with the average and low – 32 and 18 %, respectively. The analysis of lactation at experimental cows showed that the influ-

ence of the stress factor during milking did not affect the group of cows with high resistance to stress, and their productivity increased by 0.35 kg. Milking of cows with moderate to low resistance to stress levels decreased by 2.17 and 5.68 kg or by 8.49 % and 22.54 %, respectively, compared with the normal conditions of milking. Accordingly, the rates of the average single milk yield, the duration of one-time milking, and the intensity of milk production of the cows with medium and low stress resistance yielded to indices of cows with high resistance to stress.

Productivity reduction is associated with a change in the dynamics of milk production of cows with different stress resistance, which in turn, is associated with inhibition of the reflex of milk yield, which is reflected in the curves of the dynamics of milk production (Fig. 1). The maximum amount of milk of 2.7 kg was obtained in a group of cows with high resistance to stress per 1 minute of milking with its gradual decrease. In cows with moderate stress resistance, the maximum milk yield was obtained during the 2-nd minute of milking – 2.0 kg. Low stress-resistant cows have reached the maximum milk yield during the 3-rd minute of milking – 1.7 kg.

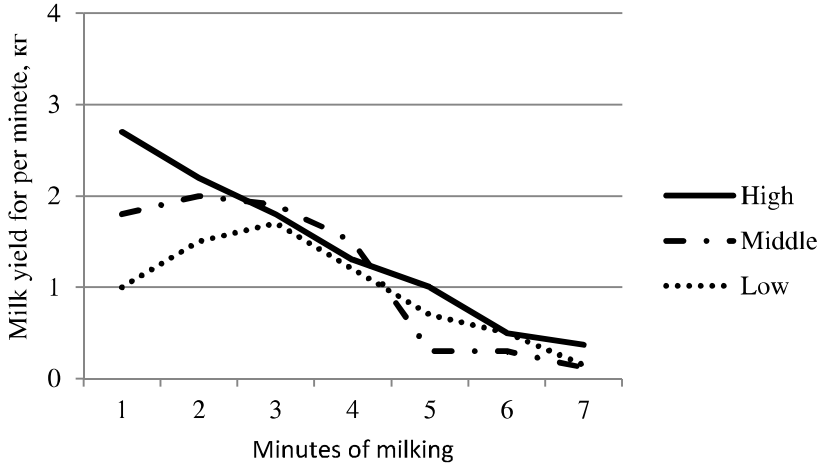

Fig. 1. **Dynamics of milk production at cows of different types of stress resistance.**

It has been found that the stress resistance of cows is correlated with their fodder and milking activity (Table 2). Thus, the cows with high resistance to stress more often visited the milking plant and feed stations in comparison with the cows with moderate and low resistance to stress.

Analyzing the duration of eating feed at the, it can be seen that neither manipulation of the robot-milker nor the presence of unauthorized persons during milking were not act as stressors for cows with high resistance to stress, the attention of which was primarily directed at the feeder and the process of fodder eating.

Table 2 – **Indicators of the hierarchy of cows of different stress resistance levels in the herd**

Indexes	Type of resistance to stress		
	High	Moderate	Low
Number of passes through the selection gate, times:	7,42±0,12	7,18±0,37	6,33±0,19
• for milking	3,64±0,07	3,19±0,05	2,87±0,07
• to the feed station	4,36±0,03	4,07±0,06	3,71±0,04
Number of visits to the feed station, times	3,50±0,08	3,22±0,11	2,86±0,06
Duration of fodder eating at the feed station, min / day	8,15±0,14	8,12±0,38	7,76±0,26
Duration of fodder eating during milking, min/day	9,71±0,33	9,43±0,29	8,97±0,58

In cows with moderate / low stress resistance to stress, this figure was somewhat lower. The cows with high resistance to stress occupied the dominant positions in the rank hierarchy of the herd thereafter the duration of fodder eating at the feed station was higher. Regarding the cows of moderate stress resistance, they were practically at the same level with the cows of high stress resistance, but the cows with low stress resistance were distinguished with their excitement, often panic movement, compliance to more vivid animals and consequently, fewer visits to the feed station, the duration of eating, and insufficient consumption of concentrated feed.

The amount of consumed concentrated forage at the depends on the quantity of milking, and hence on the productivity. The higher the productivity, the more often and hence much more fodder the animal will receive at the. In this study, the type of stress tolerance completely confirmed this conclusion (Table 3). At the the cows with a high type of stress resistance consumed 0.13 and 0.21 kg of concentrated forage more than the cows with moderate and low stress resistance. A similar trend was observed during milking. The optimum interval between two milking of cows should not exceed 12 hours. In cases when the duration of milking approaches the critical mark, which is determined by the computer data, the operator brings the specific cows for milking.

Table 3 – **Consumption of concentrated forage by cows of various stress resistance which is not included in the TMR**

Indicators	Type of stress resistance		
	High	Moderate	Low
Amount of consumed concentrated forage per day (excluding fodder mix), kg: - at the feed station	1,64±0,08	1,51±0,03	1,43±0,03
- during milking	1,84±0,05	1,69±0,04	1,53±0,05

It was found that the greatest number of cases of bringing animals to milking was among the cows with low stress resistance – 4, which constituted 44.5% of the number of animals in the group (table 4). The cows with high and moderate stress resistance demonstrated 2 such cases per each group, or 8.0 and 12.5% respectively.

Table 4 – **Pre-milking stimulation of the milk production reflex of the fresh cows at the robotized installation**

Indexes	Type of stress resistance		
	High	Moderate	Low
	n=25	n=16	n=9
Cases of bringing for milking, times	2	2	4
Average duration of stay at the pre-milking area, min.	22,46±0,73	30,35±1,47	38,12±1,74
Duration of preparation of dug for milking (washing, milking drying), sec	48,46±2,32	44,81±3,16	45,17±2,59
Duration of connection of milking glasses, sec	47,35±2,19	45,87±2,38	45,31±1,56

Ranking struggle between animals also occurs when staying at the pre-milking area. Animal leaders are usually the first that enter the robot, or wait for their turn at the entrance, pushing aside the weaker ones. This often leads to the fact that weaker cows are located at the pre-milking area for longer periods, which leads to incomplete milk dry during milking. Therefore, the DelPro ™ program has established that the maximum stay of cows in the pre-milking area should not exceed 1 hour, and their number is not more than 15 cows. Cows with high resistance to stress were at the pre-milking area on average 7.89 and 15.66 min less than cows with moderate and low resistance to stress, respectively.

Regarding the duration of preparation of for milking and the connection of milking machines, a special difference at cows of different types of stress resistance was not detected, since they were selected with the same dug shape, the vertical placement of and without atrophy.

Conclusions. Animals with high resistance to stress are characterized by high adaptive plasticity to stressors and the ability to maintain stable milk productivity. Cows with high stress resistance occupy the leading positions in the hierarchy of the herd, have more frequent visits to milking and feeding stations, and also consume more concentrated feed, adapt more quickly to milking conditions than cows with less stress-resistance.

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Продуктивность коров различной стрессоустойчивости в условиях роботизированного доения

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Целью данной публикации было изучение влияния стрессоустойчивости коров украинской черно-пестрой породы на продуктивность, ранговость и элементы поведения в условиях роботизированного, добровольного доения.

Исследования проводились в условиях роботизированной молочной фермы ОАО «Терезино» на коровах-первенцах украинской черно-рябой молочной породы (n = 50) в период раздоя (2–3-й месяц лактации). При этом по

типу стрессоустойчивости коров распределили на три группы: высокой стрессоустойчивости – те, у которых не происходило, или отмечалось незначительное условно-рефлекторное торможение молокоотделения; средней стрессоустойчивости – в которых произошло до 66,7 % условно- и до 33,3 % доений безусловно-рефлекторное торможение динамики молокоотделения, и низкой стрессоустойчивости – у которых больше 66,7 % произошло условно- и более 33,3 % безусловно-рефлекторное торможение.

Установлено, что высокострессоустойчивые животные характеризуются высокой адаптационной пластичностью к действию стресс-факторов и способностью сохранять стабильную продуктивность. Продуктивность коров со средней стрессоустойчивостью снизилась на 2,17 кг (или 8,49 %), на фоне стабильности надоев высокострессоустойчивых коров, а низкострессоустойчивых – на 5,68 кг (или 22,54 %). Высокострессоустойчивые коровы занимают доминирующие позиции в ранговой иерархии стада, чаще посещают доильные установки и кормовую станцию, потребляют больше концентрированного корма, быстрее адаптируются к условиям доения по сравнению с коровами средней и низкой стрессоустойчивости.

Ключевые слова: стресс, адаптация, роботизированное доение, иерархия, молочная продуктивность, кормовая станция.

Productivity of cows of different tolerance to stress under robotized milking conditions

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This article demonstrates the results of studies dealing with the influence of fresh cow tolerance to stress on the productivity, ethological, and hierarchical characteristics under conditions of voluntary robotized milking.

The research was carried out in Terezine robotic dairy farm on the first calve cows of the Ukrainian black-and-white breed (n = 50) during 2nd-3rd month of lactation. At the same time, according to the type of stress resistance, the cows were divided into three groups: high stress resistant – those that did not have or had insignificant conditioned reflectory inhibition of milk production; the medium stress resistant – in which up to 66.7 % of the conditional inhibition of milk production and up to 33.3 % of unconditional inhibition of milk production was observed and low stress resistant – in which more than 66.7 % had conditioned and more than 33.3% unconditioned reflectory inhibition.

It has been researched that lactating cows with high tolerance to stress are characterized by high adaptive plasticity to the stressors and the ability to maintain stable milk productivity. The productivity of cows with moderate resistance to stress has decreased by 2.17 kg (or 8.49 %), against the background of the milk-yield stability of cows with high tolerance to stress and cows with low tolerance to stress by 5.68 kg (or 22.54 %). The cows with high resistance to stress occupy the dominant positions in the rank hierarchy of the herd. More often they visit the milking machine and feed station, consume more concentrated feed, and adapt more quickly to the conditions of milking than cows with moderate and low resistance to stress.

Key words: stress, adaptation, robotized milking, hierarchy, milk productivity, feed station.

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BEE STIMULATION TO FORM PROTEIN FOOD RESERVES

Досліджено різні способи стимуляції бджіл до закладання білкового корму при використанні штучних стільників. Доведено, що використання штучного стільника для отримання перги, за умови додаткової обробки його елементів воском і медовою ситою, не стимулює бджіл до закладки та переробки в осередках білкового корму. Визначено, що при безпосередній участі робочих бджіл у формуванні запасів перги, мало місце найбільше споживання білкового корму. Це вказує, що робочі бджоли використовують для власних потреб свіжопринесену обніжку в період її активної заготовки. Встановлено, що ефективним способом стимуляції бджіл до переробки обніжки в пергу є разове ущільнення її в штучних стільниках з подальшою обробкою верхнього шару корму медом. Такий спосіб стимулює бджіл до формування запасів перги і знижує їх активність використання білкового корму з осередків штучних стільників. Імовірно, що обробка ущільненої обніжки медом пригнічує у бджіл потребу використовувати білковий корм, переорієнтовуючи їх із заповнених осередків на інші стільники гнізда родини, де є ділянки, на яких сконцентровані запаси перги.

Ключові слова: етологія бджіл, бджолина обніжка, перга, штучний стільник, секції стільника, робочі бджоли, осередки, бджолині сім'ї, стимуляція.

Formulation of the problem. By industrially maintaining bee-keeping, bee-keepers get not only honey from the bee colonies, but other goods as well. It widens the range of apicultural products in the market and promotes enterprises' rise in profitability. At the same time, despite the increasing needs for separate kinds of apicultural goods, bee-breadin particular, their overall production level is very

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