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Effect of colostral bacterial contamination on the calves

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The first hours and days of a calf's life are the most crucial. During this period they adapt to the new living conditions. The newborned calf demand specific protective antibodies and it can receive them only with colostrum. Colostrum is the ultimate nutrition for a calf in the first period of life. It has all necessary nutrients and contains much more protein (5 times higher), minerals (2 times) and vitamins A and D (5 times) than milk. Colostrum contains a large number of immune bodies that protect the newborn's organism from pathogens of contagious diseases. We assessed the bacterial contamination of cow colostrum and its effect on the calves. We established that the level of bacterial contamination of colostrum, selected under proper conditions with the observance of the rules and its subsequent storage at a temperature of 18 ± 2°C in the frozen state was reduced by 300-1200 times. At the same time, the number of psychrophilic microorganisms increased by 8.5 times on the 30th day of incubation. We also proved that the level of psychrophilic microorganisms in freshly milked colostrum up to 5,000 CFU/cm^3 can be considered an important veterinary and hygienic standard of quality and safety, which characterized the suitability of colostrum for cooling and storage. The application of the electrogram of the calf's intestine revealed the effect of untimely intake of colostrum - when not receiving a portion for 1.5-2 hours and 2.5 hours.

Keywords: Colostrum; Quality; Contamination; Microorganisms; Calf's intestines

Introduction

At the present stage of development of animal husbandry the role of methods of health promotion of newborn animals grows. It is subject to young cattle. To use cow colostrum in the first day of lactation is an effective way to increase the viability of newborn calves. Feeding calves on colostrum is the first and important step in nursing them. It occurs when calves are less than a week old. Colostrum is rich on many nutrients that the growing body needs: it contains the required amount of proteins, fats, carbohydrates, trace elements and vitamins. Colostrum not only enriches the body with nutrients, but also provides energy, which is obtained from colostrum twice as much as from the by-product. Special enzymes that are responsible for the assimilation of food by the animal are also among its components. They improve digestion, protect the digestive system and increase gastric acidity (Gomez & Chamorro, 2017). The analysis in the field of dairy farming showed that the period of infancy is the crucial period in the life of young animals (Verma et al., 2018; Palczynski et al., 2020). Increased morbidity and death of calves in this period is mainly due to the lack of specific antibodies in their blood, which provide immunity against infectious agents. Colostrum is the source of such antibodies; it is the only product for feeding calves in the first days after birth. Colostrum nutrients can resolve the contradiction between the needs of the growing organism and the functional immaturity of the gastrointestinal tract. Along with this, protective factors ensure the resistance of the body to the effects of adverse environmental factors. According to (Kaskous & Fadlelmoula, 2015), the role of colostrum in maintaining immunity is no less important. During the first two days, antibodies in colostrum are easily absorbed by young animals, because the acidity of the stomach in calves is low, their enzymes are few, and therefore there is no one to dissolve them. Antibodies support the immune system, making the body less prone to viral, bacterial and other diseases. In the right amount, they prevent any infection during the first 10 days after birth.

Colostrum provides a bactericidal effect, as it contains lysozyme - a substance capable of dissolving the membranes of microorganisms, functionally active leukocytes and lymphocytes. Protective properties of colostrum are associated with high acidity, which reaches 40-50 °T on the first day, and in some cows - 58-60°T. Having high acidity, colostrum, creates an acidic environment in the calf's rennet and shows a detrimental effect on harmful microflora and prevents the development of putrefactive processes in it (Mcgrath et al., 2015). The quality of colostrum should be controlled by systematic studies of its chemical composition and verification of hygienic properties (Puppel et al., 2019). One of the important criteria for assessing the quality and safety of cow colostrum is bacterial contamination. There are two known facts about colostrum and bacteria. Firstly, a high content of bacteria in

colostrum is harmful to the health of the calf, and secondly, it is extremely difficult to reduce the risk of bactericidal infection of colostrum on farms (Paliy, 2016). Previous studies on young cattle were carried out with the colostrum with the preknown characteristics, which precluded the possibility of establishing the number of microorganisms in it. In addition, based on these studies, it was difficult to assess bacterial contamination of the colostrum after storage (Erdem & Okuyucu, 2020).
The papers (Palii et al., 2020a; Bozukluhan et al., 2017; Zwierzchowski et al., 2020) are devoted to the study of the issue of raising young cattle. They focus on methods of raising calves using feed additives, equipment for giving colostrum and keeping animals. But the issues related to the study of bacterial contamination of native colostrum and colostrum after storage in the freezer remained understudied. The issue of the effect of colostrum on the intestines of calves is also relevant. The reason for this is the objective difficulties associated with access to dairy complexes and the cost in terms of the timing of relevant research.
The data presented show that the issue of ways to increase the viability of animals during their infancy remains open. The optimal method of influence on the newborn animal to increase its protection against various pathogens has not been proposed. Thus, the preservation of young animals and increase their natural defenses of the body in the early postnatal period is a significant reserve for increasing the production of livestock products. Therefore, the development and search for the most rational and progressive methods of raising calves, which would ensure the formation of highly productive qualities of their body, especially in early postnatal ontogenesis, are of extreme importance.
Therefore, it is important to assess the level of bacterial contamination of cow colostrum and its effect on calves. From a practical point of view, it is interesting to study the intestines of a calf upon the consumption of colostrum during various terms.
Thus, the need for these studies consists in the determination of the number of microorganisms in native colostrum, as well as in the colostrum after storage in the freezer. This approach will expand the idea of the qualitative characteristics of colostrum and will lead to its rational use in the rearing of calves, therefore, will bring practical value.

Materials and Methods

The aim of the study is to assess bacterial contamination of cow colostrum and its effect on calves.
To achieve this goal the following tasks were solved:

- To find out the number of microorganisms in native colostrum and that after storage in the freezer;
- By means of an electrogram, to investigate the consequences of untimely consumption of colostrum on the intestines of a calf.

The study of the number of microorganisms in colostrum was determined according to the standardized methods: DSTU IDF 122S:2003 (2005) and DSTU IDF 100V:2003 (2005) in two stages. The method is based on the ability of mesophilic aerobic and facultative anaerobic microorganisms to propagate on selective solid media at a temperature of 30 ± 1°C for 72 hours and that of psychrotrophic microorganisms at a temperature of 6.5 ± 1°C for 10 days. Only analytically pure reagents, distilled water of equivalent purity were used in the work. After sampling, the initial suspension was prepared (primary dilution and sequential dilutions). Plating was performed on two Petri dishes. To test was carried out as follows: the inoculum in the amount of 0.1 cm^3 was transferred from each selected dilution in the middle of each Petri dish using a sterile pipette. The material was thoroughly mixed and distributed using a glass spatula.
The amount of product used for plating was determined by the degree of the most probable microbial contamination in accordance with current regulations on products or raw materials. In order to obtain reliable results, the dilution used provided the formation of 10 to 150 colonies per one cup. Petri dishes were marked before plating, indicating the number and dilution. After inoculation, 15 cm^3 of nutrient medium was added to each cup. The following nutrient media were used: GRM bacteriological agar and Endo agar produced by HiMedia Laboratories PVT Limited (India). The media were prepared according to the manufacturer's instructions. Sterilization was performed using a steam sterilizer VK-75 (Tyumen Plant of Medical Equipment and Instruments, Russia). Melting was performed on a heating bath by Kottermann (Germany) with a temperature range from 20 to 100°C. The seeded Petri dishes were left at 18 ± 2°C on a clean horizontal surface to form a gel. Aerobic incubation of crops was performed at a temperature of 30 ± 1°C for 72 hours in a Funke-Gerber (Austria) thermostat with the main technical characteristics of maintaining a temperature of 28 to 43°C, power 500 W.
To detect the amount of enterobacteria, the inoculum was applied to Endo solid medium in an amount of 0.1 cm^3. Aerobic incubation of cultures was performed at a temperature of 37 ± 1°C for 24 hours in a Funke-Gerber thermostat (Austria). The determination of amount of psychrotrophic microorganisms was carried out by a similar method, but the inoculum was applied to the surface of the nutrient medium in order to avoid thermal stress. Crops were subjected to aerobic incubation at a temperature of 6.5 ± 1°C for 10, 20 and 30 days in a refrigeration chamber Indesit IBS 15AA (Italy) with a statistical cooling system and mechanical control type. To check sterility, control Petri dishes were left without inoculum. At the end of the incubation period, the number of colonies of microorganisms in each of the parallel inoculations of the first dilution was counted. The arithmetic mean of the number of colonies in crops of one dilution or original sample was determined upon the results. The result was expressed in CFU (colony-forming units) per 1 cm^3.
In case of detection of less than 10 colonies on Petri dishes or no growth at all, the final number of microorganisms, according to DSTU 7357:2013 (2014) and DSTU ISO 6730:2006 (IDF 101:2005) (2008), was presented as $<10 \times d$ per 1 cm^3. The second stage of the study was to determine the number of microorganisms after storage at a temperature of -18 ± 2 °C for one month. The samples of native colostrum were frozen in plastic containers of volume of 50 cm^3 in a professional LIEBHERR GTE 3702 (Germany) freezer. The total volume was 300 l with a static cooling system and a temperature range from -10 to -24 °C. At the end of the experimental period of the storage at a temperature of 40 °C, the colostrum samples was subjected to gradual thawing using a heating bath SWL Byton (Poland) at a temperature of 28 to 60 °C. The next step was to inoculate the colostrum in the thawed state by the above mentioned methods.
An electron microscope of the SEM6200 series (China) was used to examine the intestines of calves. Main technical characteristics are as follows: resolution - 4.5 nm (30 KV); magnification - 15x ~ 250.000x. The microscope uses beams of electrons accelerated to high energies (30-100 KEV and more) in a deep vacuum instead of light rays; this provided a photograph of a magnified image of objects. Hematoxylin and eosin was used as a color in order to detect changes and visualize them during microphotography.

Results and Discussion

The results of studies aimed to determine the quantity of mesophilic aerobic and facultative anaerobic microorganisms (QMAFAnM) and Enterobacteriaceae (PER - protein efficiency ratio) in native colostrum and colostrum after storage are given in Table 1.

Table 1. The QMAFAnM and PER in native colostrum and the colostrum after storage at a temperature of -18 ± 2°C for a month, CFU/cm^3, (M ± m, n=20).

Test №	Native colostrum		Colostrum after storage	
	Enterobacteria[1]	QMAFAnM	Enterobacteria[1]	QMAFAnM
1	≤ 10 cm^3	1.8×10^3	≤ 10 cm^3	$1.4 \times 10^{3*}$
2	≤ 10 cm^3	1.6×10^3	≤ 10 cm^3	$1.1 \times 10^{3*}$
3	≤ 10 cm^3	7.0×10^3	≤ 10 cm^3	$5.8 \times 10^{3*}$
4	≤ 10 cm^3	6.3×10^3	≤ 10 cm^3	$9.4 \times 10^{3*}$
5	≤ 10 cm^3	5.5×10^3	≤ 10 cm^3	$1.1 \times 10^{3*}$
6	≤ 10 cm^3	1.5×10^3	≤ 10 cm^3	$1.0 \times 10^{3*}$
7	≤ 10 cm^3	4.0×10^3	≤ 10 cm^3	$3.5 \times 10^{3*}$
8	≤ 10 cm^3	3.2×10^3	≤ 10 cm^3	$2.1 \times 10^{3*}$
9	≤ 10 cm^3	5.2×10^3	≤ 10 cm^3	$4.2 \times 10^{3*}$
10	≤ 10 cm^3	4.1×10^3	≤ 10 cm^3	$3.3 \times 10^{3*}$
11	≤ 10 cm^3	6.0×10^3	≤ 10 cm^3	$5.2 \times 10^{3*}$
12	≤ 10 cm^3	3.8×10^3	≤ 10 cm^3	$2.7 \times 10^{3*}$
13	≤ 10 cm^3	3.6×10^3	≤ 10 cm^3	$3.1 \times 10^{3*}$
14	≤ 10 cm^3	5.8×10^3	≤ 10 cm^3	$5.3 \times 10^{3*}$
15	≤ 10 cm^3	2.2×10^3	≤ 10 cm^3	$1.7 \times 10^{3*}$
16	≤ 10 cm^3	6.3×10^3	≤ 10 cm^3	$5.8 \times 10^{3*}$
17	≤ 10 cm^3	5.1×10^3	≤ 10 cm^3	$4.0 \times 10^{3*}$
18	≤ 10 cm^3	4.8×10^3	≤ 10 cm^3	$3.6 \times 10^{3*}$
19	≤ 10 cm^3	6.4×10^3	≤ 10 cm^3	$5.1 \times 10^{3*}$
20	≤ 10 cm^3	5.9×10^3	≤ 10 cm^3	$4.8 \times 10^{3*}$
M ± m	–	4.5 ± 0.39	–	3.7 ± 0.36

* P≤0.05 as regards native colostrum; [1] ≤10 cm^3 - not detected.

The results of studies aimed to determine the quantity of psychrotrophic microorganisms (QPAFAnM) in native colostrum and the colostrum after storage are given in Table 2. The quantity of mesophilic aerobic and facultative anaerobic microorganisms (MAFAnM) in the studied samples of native colostrum ranged from 1.5×10^3 to 6.4×10^3 per 1 cm^3, $(4.5 \pm 0.39) \times 10^3$ on the average. In the colostrum after storage at a temperature of -18 ± 2°C for a month, this amount ranged from 1.1×10^3 to 9.4×10^3 per 1 cm^3, $(3.7 \pm 0.36) \times 10^3$ on the average.

There was a significant decrease in the level of contamination of native cow colostrum with mesophilic aerobic and facultative anaerobic microorganisms after storage at a temperature of -18 ± 2°C (P≤0.05). Enterobacteria were not detected, which indicates aseptic selection of the colostrum.

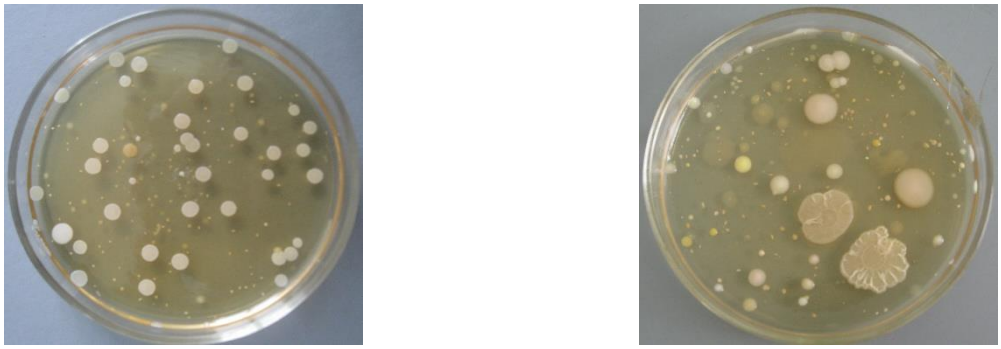
Table 2. The QPAFAnM in native colostrum and the colostrum after storage at a temperature of -18 ± 2°C for a month, CFU/cm^3, (M ± м, n=10).

Test №	Native colostrum			Colostrum after storage		
	Incubation time of inocula at a temperature of 6.5 ± 2 °C					
	10 days	20 days	30 days	10 days	20 days	30 days
1	1.1×10^3	1.4×10^3	1.5×10^3	$7.0 \times 10^{3*}$	$9.0 \times 10^{3*}$	$1.1 \times 10^{3*}$
2	1.5×10^3	1.7×10^3	1.7×10^3	$1.3 \times 10^{3*}$	$1.3 \times 10^{3*}$	$1.4 \times 10^{3*}$
3	1.4×10^3	1.7×10^3	1.8×10^3	$8.0 \times 10^{3*}$	$1.1 \times 10^{3*}$	$1.3 \times 10^{3*}$
4	1.2×10^3	1.8×10^3	2.0×10^3	$1.0 \times 10^{3*}$	$1.0 \times 10^{3*}$	$1.2 \times 10^{3*}$
5	1.0×10^3	1.4×10^3	1.4×10^3	$4.0 \times 10^{3*}$	$6.0 \times 10^{3*}$	$9.6 \times 10^{3*}$
6	1.4×10^3	1.6×10^3	1.7×10^3	$6.7 \times 10^{3*}$	$7.1 \times 10^{3*}$	$7.5 \times 10^{3*}$
7	1.0×10^3	1.1×10^3	1.5×10^3	$4.3 \times 10^{3*}$	$5.2 \times 10^{3*}$	$6.0 \times 10^{3*}$
8	1.5×10^3	1.7×10^3	1.8×10^3	$5.8 \times 10^{3*}$	$6.5 \times 10^{3*}$	$7.0 \times 10^{3*}$
9	1.3×10^3	1.4×10^3	1.5×10^3	$4.5 \times 10^{3*}$	$5.3 \times 10^{3*}$	$6.1 \times 10^{3*}$
10	1.2×10^3	1.3×10^3	1.5×10^3	$3.9 \times 10^{3*}$	$4.5 \times 10^{3*}$	$5.6 \times 10^{3*}$
M ± м	1.3 ± 0.06	1.5 ± 0.07	1.6 ± 0.06	4.6 ± 0.73	4.7 ± 0.87	4.7 ± 1.00

* P≤0.05

The quantity of psychrotrophic microorganisms (QPAFAnM) in native colostrum ranged from 1.0×10^3 to 1.5×10^3 per 1 cm^3, which averaged $(1.3 \pm 0.06) \times 10^3$ after 10 days of incubation. After 20 days of incubation it was from 1.1×10^3 to 1.8×10^3 per 1 cm^3 ($(1.5 \pm 0.07) \times 10^3$ on the average). And after 30 days of incubation it ranged from 1.4×10^3 to 2.0×10^3 per 1 cm^3 of the colostrum, respectively, $(1.6 \pm 0.06) \times 10^3$ on the average. The quantity of psychrotrophic microorganisms (QPAFAnM) in the colostrum after storage at a temperature of -18 ± 2°C ranged from 1.0×10^3 to 8.0×10^3, which averaged $(4.6 \pm 0.73) \times 10^3$ after 10 days of incubation. After 20 days of incubation it was from 1.0×10^3 to 9.0×10^3 per 1 cm^3, $(4.7 \pm 0.87) \times 10^3$ on the average; and after 30 days of incubation it estimated from 1.1×10^3 to 9.6×10^3 per 1 cm^3 of the colostrum, respectively, $(4.7 \pm 1.00) \times 10^3$ on the average. The level of contamination of native colostrum with psychrotrophic microorganisms significantly increased (P≤0.05) with increasing incubation time. With the ability of mesophilic aerobic and facultative anaerobic microorganisms to

propagate on selective solid media at a temperature of 30 ± 1°C for 72 hours and that of psychrotrophic microorganisms at a temperature of 6.5 ± 1 °C for 10 days, the following results were obtained (Figure 1).



In the thermostat In the refrigerator

Figure 1. Incubation time of inocula.

The results of the detection and assessment of the amount of microorganisms in the colostrum after storage at a temperature of -18 ± 2°C for a month are presented in Figure 2.

On the surface of the nutrient medium, microorganisms formed a holistic, dense growth and isolated colonies. Each colony is formed from the offspring of one microbial cell (clone), so their composition is quite homogeneous. Features of propagation of bacteria on nutrient media are a manifestation of their cultural properties.

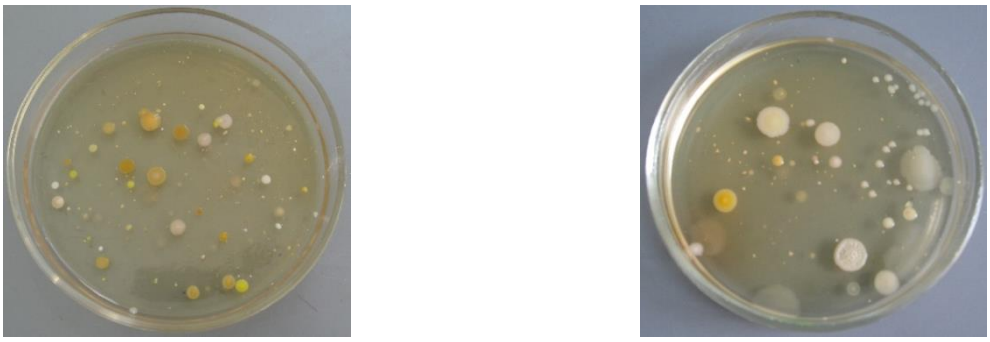
Morphological and tinctorial properties of pathogens are extremely important for diagnostic purposes in the characterization of certain species of microorganisms.

It has been established that the level of bacterial contamination of colostrum, selected under proper conditions and in compliance with the rules and after its subsequent storage at a temperature of -18 ± 2°C in the frozen state is reduced by 300-1200 times. In addition, the number of psychrophilic microorganisms increases by 8.5 times on the 30th day of incubation. The content of psychrophilic microorganisms in freshly milked colostrum up to 5 thousand CFU/cm^3 can be considered an important veterinary and hygienic standard of quality and safety, which characterizes the suitability of colostrum for cooling and storage.

The obtained results make it possible to predict possible changes in colostrum during storage in the frozen state.

Metabolic disorders in pregnant cows due to unbalanced and poor feeding are the etiological factors of non-infectious nature which cause acute gastrointestinal diseases in newborn calves. These factors also include procedural violations of growing newborn young. At the same time untimely feeding of calves on the first portion of colostrum acquires leading value.

The studies have shown that untimely feeding of colostrum allows microbes to be fixed on the microvilli of the small intestine of the calf. This prevents immunoglobulins from entering the bloodstream and actively performing a protective function (Figure 3).



In the thermostat In the refrigerator

Figure 2. Incubation time of inocula during a month.

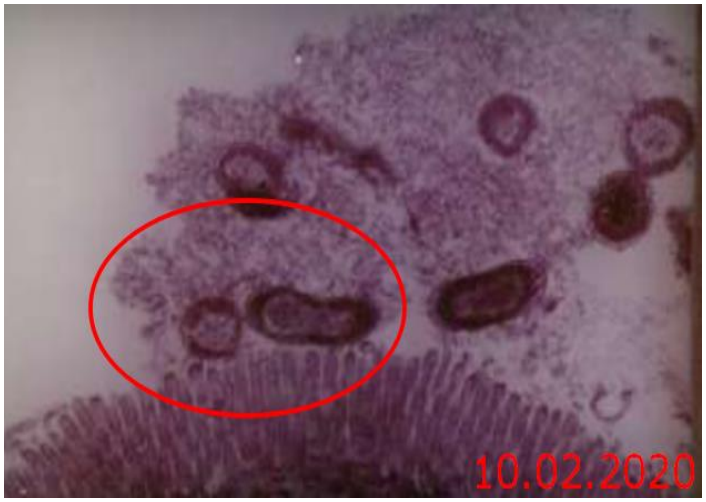


Figure 3. The calf did not receive a portion of colostrum for 1.5-2 hours.

The penetration of microbes into the enterocytes of the small intestine of the animal is accompanied by diarrhea and intoxication (Figure 4).

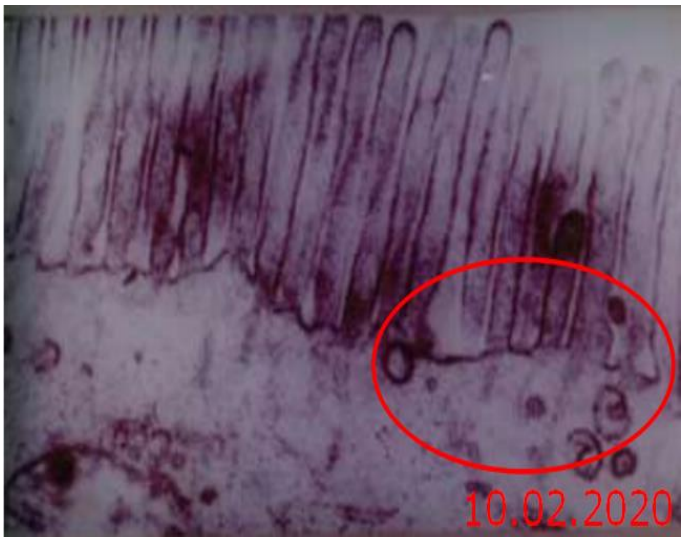


Figure 4. The calf did not receive a portion of colostrum for 2.5 hours.

The destruction of the villi of the duodenum during diarrhea caused by feeding on colostrum of poor quality to a two-day-old calf is shown in Figure 5.

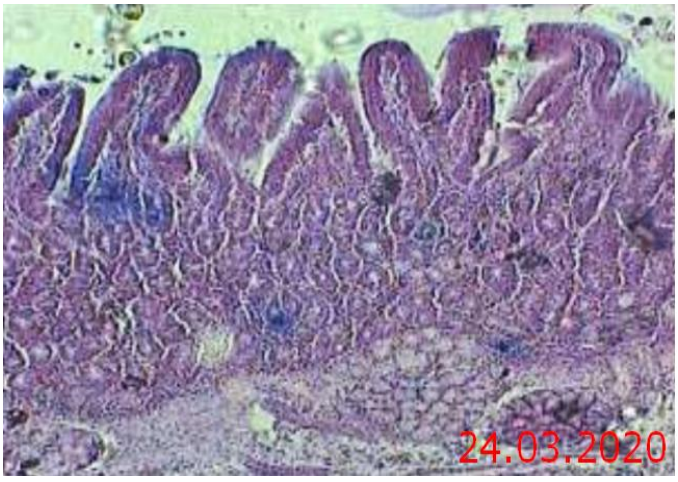


Figure 5. The destruction of the villi of the duodenum during diarrhea.

Feeding on colostrum with pH altered to the alkaline side to a three-day-old calf leads to the development of diarrhea. Thus, there is a destruction of villus tips, deformation and their rejection in a gleam of a duodenum (Figure 6).

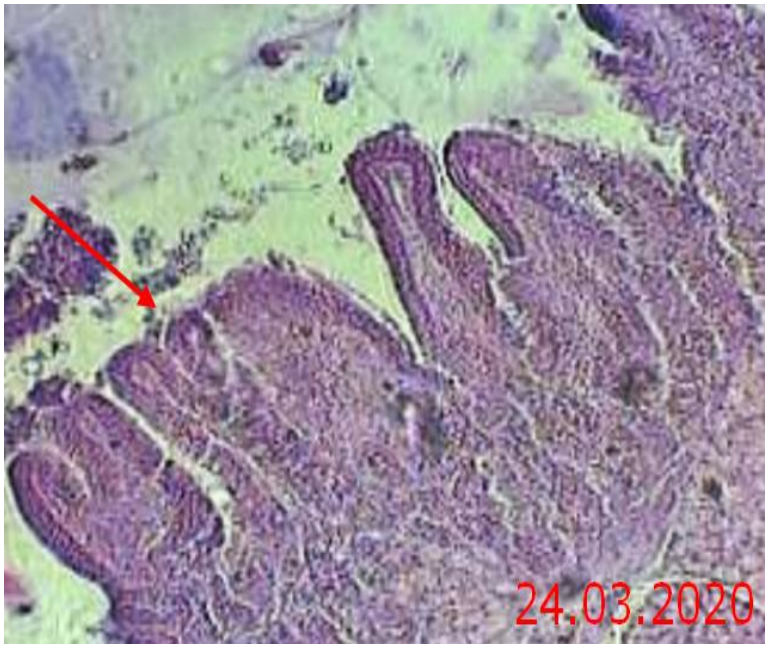


Figure 6. Destruction of the villus tips and their deformation in diarrhea

Therefore, the first giving of colostrum should be carried out no later than 45-60 minutes after birth. This is caused by the ability of the calf's intestinal wall to absorb the immunoglobulins available in the colostrum. The cow-calf bond persists for some time after the calf is born, but the amount of immunoglobulins in the colostrum decreases over time. In turn, the permeability of the intestinal wall of the calf for immunoglobulins is reduced. It should be noted that the cells of the mucous membrane of the small intestine (enterocytes) on the first day after birth of the calf, and especially in the first 8-10 hours, have the ability to absorb intact colostrum, without prior enzymatic cleavage of its components. When the digestive process is upset, the composition of the microflora changes in different parts of the calf's digestive tract, and gram-negative putrefactive microflora accumulates in the stomach. It quickly changes its properties, forming associations that have a pathogenic effect on animals. The accumulation of such microflora in the environment leads to the fact that it causes further infection of animals and more severe diseases of the calves. Some research (Bakayeva et al., 2019; Palii et al., 2019; Wąsowska & Puppel, 2018) addressed the issues that have become relevant as a result of identifying and studying the role of certain groups of microorganisms. There are important general issues regarding the guaranteed production of quality products. The most discussed issues, the solution of which will contribute to the effective maintenance of young cattle, are the identification and study of the role and cultural properties of microorganisms that cause damage of colostrum. The detection and study of the role of pathogenic microorganisms, the microorganisms that affect the sanitary and hygienic state of production are also urgent (Golovan' et al., 2007; Palii et al., 2020b). It is important to improve the existing sanitary and hygienic standards for colostrum, the introduction of rapid informative microbiological methods and innovative drinking systems.

The raising of young animals should be organized in such a way as to ensure normal growth and development at low labor costs and optimal feed consumption. This lays the foundation for the manifestation of genetically inherited productive capabilities of animals (Ishhenko & Paliy, 2019). The young body has high plasticity and, therefore, it is the most expedient to form its resistance and adaptive abilities at early stages of ontogenesis. But when the conditions of feeding, care and maintenance do not meet the requirements of the body, animals are forced to adapt to these conditions, primarily at the expense of its internal reserves. At the initial stage of the research, the goal was to determine the amount of microorganisms in native colostrum and that after storage in the freezer. The studies show that there are changes in bacterial contamination of colostrum during the month of storage (Tables 1 and 2). The obtained results reveal the mechanism of change of qualitative indicators of colostrum during its storage. This solves the problem of assessment of the nutritional value of colostrum as a valuable product for feeding calves. The advantages of the research are the assessment of bacterial contamination of colostrum by the amount of microorganisms (mesophilic aerobic and facultative anaerobic, psychrotrophic and enterobacteria).

At the next stage, the effects of the consequences of untimely consumption of colostrum on the intestines of calves were investigated using an electrogram. The high resolution of the electron microscope made it possible to observe objects and changes whose dimensions lie outside the resolution of other laboratory equipment. The images, obtained using the electron microscope, are shown in Figures 3-6. The obtained results of the electrogram expand the understanding of the processes that take place in the body of the calf and allow to detect the influence of the terms of colostrum feeding on the intestines. Saldana et al. (2019) focuses on the fact that, in a newborn calf, the full permeability of the gastrointestinal tract wall for colostrum nutrients lasts only for 24 hours after birth. At the maximum level, permeability is maintained for the first 6 hours after birth, then decreases for 12 hours, after which it falls sharply. Our research confirms this theory and allows us to critically approach the issue of timely consumption of colostrum by calves.

Our research differs favorably from others (Shkromada et al., 2019; Zarei et al., 2017; Quigley et al., 2019; Paliy et al., 2020) for its complexity, application of innovative approaches (electron microscopy) and large scale. In addition, due to the significant variability in the quality of colostrum, there are difficulties in fully addressing the issue of full satisfaction of the physiological needs of newborn animals. This remains a problematic part of the overall technological process of raising young cattle. Also, experiments performed in a production environment have a significant disadvantage, because they are conducted directly on animals. This causes special difficulties, as it is very difficult to find the animals identical in their physiology. This significantly affects the results of the experiment, distorts the real information about the influence of various factors on the body and the determination of their significance.

In recent years, there has been a tendency of the reduction of the productive life of cows. This situation in livestock requires radical changes and, above all, in matters of purposeful raising of young animals, taking into account not only feeding but also the technology of keeping calves from the first days of life. A set of measures to ensure healthy offspring, which requires the creation of perfect conditions for feeding and keeping cows, fundamental knowledge of morphological and functional features of newborn calves should be considered and developed. The previous investigations (Paliy, 2020; Puppel et al., 2019; Zwierzchowski et al., 2020) indicate the importance of using colostrum as a component with a wide range of biological activities for feeding calves. Researchers have identified a wide range of issues that require detailed study, in particular: in-depth analysis of quality and safety indicators, detailed study of the nutritional and biological value of products of animal origin.

Therefore, research aimed at determining the number of microorganisms in colostrum after storing it in the freezer for a longer period is considered promising. This will expand the field of both theoretical and practical knowledge in dairy farming, which will serve as a prerequisite for improving the methods of raising young cattle.

Conclusion

The level of bacterial contamination of colostrum, selected under proper conditions after subsequent storage at a temperature of -18 ± 2°C was reduced by 300-1200 times. The number of psychrophilic microorganisms increased by 8.5 times on the 30th day of incubation. The application of the electrogram of the calf's intestine revealed the effect of untimely intake of colostrum - when not receiving a portion for 1.5-2 hours and 2.5 hours.

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