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THE EFFECTIVENESS OF UTERINE DISEASE DIAGNOSIS METHODS IN COWS DEPENDING ON POSTPARTUM DAYS

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Abstract

The article presents the results of the effectiveness of methods for diagnosing the uterus in cows on different days after calving. In the postpartum period in cows under conditions of weakened immunity and dystocia, inflammatory processes in the uterus can develop, most commonly manifesting in clinical and subclinical forms of endometritis. Our research shows that the rectal diagnostic method is impact in the first 30 day in milk (DIM), particularly when clinical signs are evident. In 60 DIM, the vaginal method demonstrated about 58.8% effectiveness, by the using on "Metrastatum" device determine the degree of uterine involution and assess the obtained discharges. After 61 DIM the probability of detecting endometritis by laboratory methods increased from 6.3 to 25%. In this study, laboratory methods such as the Nagornyi-Kalinovsky test (NKT) and the Whiteside method (WM) were employed. Subclinical forms of inflammatory processes in the uterus in the absence of obvious visible signs imply the use of laboratory methods based on identifying inflammatory markers. The definition of effective and useful methods is an urgent task and requires additional research.

Key words: Cows; diagnostics; uterus; calving; inflammation; clinical methods, laboratory methods.

Introduction In large livestock farms, the issue of impaired fertility in cows remains relevant, with the most common cause being inflammatory processes in the uterus after calving [1].

As practice shows, usually inflammatory processes of the reproductive organs are common among highly productive cows, according to research endometritis was 28% higher in cows with high milk productivity compared with low-productive females [2]. Inflammatory processes of the reproductive system have a negative impact on the effectiveness of insemination, lack of milk and offspring, which leads to significant economic losses in farms [3].

In this cause, timely diagnosis and treatment of postpartum disorders is important. Research is conducted annually with the aim of identifying new diagnostic methods and enhancing those already in existence. Diseases of the uterus in cows are diagnosed using clinical, laboratory and biophysical research methods [4,5,6].

Clinical methods include external: examination, palpation, internal - vaginal, rectal method, based on the study of the nature of discharge, consistency, topography of the genital organs of animals [7,8]. Laboratory methods are based on bacteriological, cytological, physico-chemical, biological, physical and hormonal studies of animal body fluids. The biophysical method is based on the use of ultrasonic scanners [9].

Carrying out a rectal examination in the first 10 days after birth has some difficulties, since the size of the uterus and its qualitative characteristics vary between individual animals and depend on the days in milk [10].

For diagnose of the uterus diseases in the postpartum period, it is preferable to conduct a vaginal examination using a vaginal speculum rather than rectal palpation of the uterus, but veterinarians in the farms rarely use it, since they overestimate the time and effort required for such diagnosis, and it is also necessary to follow the rules of asepsis and antiseptics.

To diagnose the condition of the genital organs in cows, a “Metrastatum” device has been developed by the degree of its immersion, the involution of the uterus is determined, and the form of inflammation is determined by the nature of the mucus taken to the bowl [11]. By using this device, 72.6% of acute postpartum endometritis in cows was diagnosed, while 65% were diagnosed by rectal examination. However, the Metrastatum device is less specific for the diagnosis of subclinical pathologies of the uterus, when the uterus is located in the pelvic cavity and a small amount of mucus is secreted [12,13].

Laboratory methods for diagnosing diseases of the uterus are based on the study of mucus, urine, vaginal smears, and blood. Using a cytological study of changes in the uterine mucosa, it is possible to diagnose inflammatory postpartum diseases from the very first day after calving, despite the fact that clinical signs and hematological changes appear only from 5-17 days after birth. Signs of the disease are: increased leukocyte infiltration of neutrophils and lymphocytes, dystrophic changes in the epithelial cells of the uterus and vagina, the presence of mucus and macrophages in the smear [14].

Proposed laboratory methods Golovan I.A. [15] detect latent endometritis using cyclic aromatic compounds

(indole, skatole, phenol). Dudenko V.S. suggests examining 2 ml of mucus by exposure to a 20% solution of trichloroacetic acid, concentrated nitric acid and 33% sodium hydroxide solution [16]. According to the method of Kalinovsky G.N. a 1% solution of acetic acid is used to determine mucopolysaccharides in mucus [17]; Phlegmatov N.A. recommends a biological assay by studying the survival of diluted bovine semen in vaginal mucus [18]; method V.G. Gavrisha is based on determining the presence of histamine in urine - by mixing it with an aqueous solution of silver nitrate (lapis test) [19]; modified Foll test - for the detection of sulfur-containing amino acids in the contents of the uterus - using a 0.5% solution of lead acetate and a 20% solution of sodium hydroxide. These methods have both positive aspects and difficulties in use, it is not always possible to obtain a large amount of mucus, obtain urine, selection of reagents, recording of research results [20,21].

Ultrasound scanners are currently used to diagnose uterine pathology. They are used to determine pregnancy, diagnose pathologies of the reproductive system, and determine the condition of the internal structure of the uterus. This method is not always accessible to veterinarians; it is also difficult for them to diagnose subclinical cases of diseases of the cows genital organs [22].

According to the International Dairy Federation, the European Cattle Breeders Association, the subclinical form of endometritis is detected in 20.0-25.0% of dairy cows [23]. The European Union calculated that losses from subclinical endometritis amount to 233 euros per head per year [24].

If the take into account that diseases of the uterus in cows are widespread, it becomes clear that without effective diagnostic and treatment methods it is not possible to carry out successful reproduction of the herd. The difficulty of diagnosing chronic endometritis is due to the fact that the clinical signs of this disease are not expressed, and it is also difficult to differentiate from the physiological condition using clinical, rectal and vaginal methods. 30-60 days after calving, when the discharge stops, veterinarians differentiate only during the period of estrus by individual (if visible) droplets of purulent [25]. Thus, the existing diagnostic methods are laborious for wide application in veterinary practice, late detection of pathologies requires longer treatment, complications in the form of latent endometritis are observed, therefore, research on the development of early, simple, affordable methods for diagnosing calving and postpartum pathologies is relevant.

Material and Methods

The studies were conducted in the Department of Veterinary Medicine, Faculty of Veterinary Medicine and Animal Husbundry Technology at the S. Seifullin Kazakh Agrotechnical Research University, an also in several farms of the Akmola and North Kazakhstan regions of the Republic of Kazakhstan.

Cows of 1-5 lactation Holstein-Friesian (n=1153), black-and-white breeds (n=142) were used in the experiments.

For diagnostic of the uterus condition, clinical, instrumental and

laboratory methods were used. The clinical method included auxiliary instruments and devices, gynecological gloves, vaginal speculum; during instrumental examination, the "Metrostatum" device was used; for laboratory diagnostic methods: test tubes, stand, 1% acetic acid solution, 5% sodium hydroxide solution, measuring pipettes.

Diagnosis of acute endometritis was carried out clinically by visual examination of the vulva, tail root, by internal rectal examination, in which the topography, rigidity and consistency of the uterus were determined. During the vaginal examination, a Metrastatum device was used to determine the degree of involution of the genitals and determine the form of inflammation by the color of the discharge (from yellow-white, gray-brown to red-brown), consistency (from mucous, thick, viscous, the content of fibrin grains, necrotic mass or pieces of decayed tissues).

Chronic forms of endometritis were diagnosed by the state of the uterus, by the color of the discharge (cloudy, white); by the consistency of the discharge (creamy consistency); by the volume of discharge (0.5-1.2 ml); sedimentation, turbidity of the fluid (NMT), lemon-yellow staining of the contents of the test tube (WM).

According to the results of the analysis calving and after calving period, 5 experienced groups were formed: from 10-30 (n=31); 31-60 (n=17); 61-90 (n=16); 91-120 (n=16); 120 and more (n=11) days in milk (DIM).

Results

To study the prevalence of diseases of the reproductive organs in Holstein-Friesian (n=1153) and black-and-white (n=142) cows the monitoring, analysis of animals dispensary journal in agricultural formations of Akmola, North Kazakhstan regions were performed. The results of the studies are shown in Table 1.

Table 1. Prevalence of reproductive organ diseases in Holstein-Friesian and Black-and-white cows

Breeds	Normal calving		Retained placenta		Uterus inflammation	
	n	%	n	%	n	%
Holstein Friesian (n=1153)	820	71,1	135	11,7	198	17,2
Black-and-white breed (n=142)	88	61,9	21	14,7	33	23,2

In 71.1% of calved Holstein-Frisian cows, the birth period proceeded without complications; the remaining 28.9% had such pathologies as retained placenta, uterine diseases, uterine subinvolution, endometritis. Of the 142 calved cows of the black-and-white breed, 61.9% had calving without complications, 14.7% had aftercalving detentions, and 23.2% had uterine diseases. To determine of the uterus diseases, the course and form of the pathology are important. To determine the course and form of

endometritis in cows, the date and course of calving, the postpartum period, the nature of secretions, the state of the uterus and genital tract were learned.

The results of the diagnosis of uterine diseases depending on the days after calving are shown in Table 2.

Table 2. Effectiveness of diagnosing uterine diseases in cows using clinical and laboratory methods on different days after calving.

Days after calving	n	Transrectal examination		Vaginal examination		Laboratory tests			
						Nagornyi-Kalinovsky test		Whiteside Method	
		n	%	n	%	n	%	n	%
10-30	31	25	80,6	28	90,3	7	22,5	11	35,4
31-60	17	5	29,4	10	58,8	6	35,2	8	47,05
61-90	16	2	12,5	5	31,2	5	31,2	6	37,5
91-120	16	2	12,5	3	18,2	4	25	5	31,2
121 and more	11	1	9,09	2	18,1	2	18,1	4	36,3

The data in Table 2 show that in the diagnosis of endometritis, individual signs (enlargement of the uterus, the nature of secretions, their number) decrease or disappear with increasing days after calving. So in the interval of 10-30 DIM (n=31), endometritis was detected by rectal examination in 25 cows, in the interval of 31-60 DIM (n=17) in 5 cows, in the interval of 61-90 DIM (n=16) in 2 cows, in the interval of 91-120 DIM (n=16) in 2 cows, in the interval of 121 DIM and more (n=11) by one cow. Vaginal examination of cows in the interval of 10-30 DIM by the 31 examined cows, endometritis was detected in 90.3%, on 31-60 DIM in 58.8% of cows, on 61-90 DIM in 31.2%, on 91-120 DIM 18.2% and on 121 days or more about 18.1% of animals. When using laboratory methods in the same intervals after calving, by the Nagorny-Kalinovsky test about 18.1-35.2%, and by the Whiteside method about 31.2-47.05% cows with endometritis was revealed.

From 30 to 60 DIM, the effectiveness of the clinical rectal method decreases, a total of 29.4% of pathologies were detected, the method of vaginal diagnosis is more effective here, which determined 58.8% of pathologies. A vaginal examination allows you to detect discharge from the cervix, with the help of the Metrastatum device, the degree of involution of the uterus and the properties of the discharge are determined. From 61 to 90 DIM in infertile cows, endometritis was detected by clinical methods and laboratory methods in 31.2-37.5% of cows. The probability of determining endometritis by laboratory methods increased from 6.3 to 25%.

Discussion

According to numerous studies [9, 10], the criterion for the diagnosis of endometritis by rectal examination is an increase in the size of the uterus, features of

topography and consistency. Clinical diagnostic methods are most effective in acute endometritis and their effectiveness is 82-91%. Laboratory methods are most effective in the diagnosis of chronic endometritis [26].

Within the study, rectal and vaginal methods showed their effectiveness from 10 to 60 DIM, in the following from 61 to 90 DIM, vaginal examination was preferable to rectal, since it is possible to see mucus and evaluate its properties. From 91 to 120 DIM or more, depending on the course of uterine diseases, 18.7% of patients were identified by vaginal examination, and 18.1-37.5% by laboratory methods, which indicates the need for a comprehensive diagnosis of uterine diseases.

Conclusion

In conclusion, it can be noted that clinical methods show high diagnostic efficiency for 10-60 DIM and from 61 to 90 DIM, vaginal examination using the "Metrastatum" device is more preferable, it determined 29.4% more cows with uterine disease than rectal. In addition, methods of clinical diagnosis of the genitals in cows are effective in acute and subacute course of endometritis. Laboratory methods make it possible to determine 18.1-37.5% of pathology; however, these methods require continued study and the search for new effective, fast methods that will be relevant in agricultural farms.

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