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The course of the postpartum period in cows in the presence of concomitant pathology

Oleksandr Chekan*
PhD in Veterinary Sciences, Associate Professor
Sumy National Agrarian University
40021, 160 Herasym Kondratiev Str., Sumy, Ukraine
https://orcid.org/0000-0002-5676-1947
Vyacheslav Dopa
Postgraduate Student
Sumy National Agrarian University
40021, 160 Herasym Kondratiev Str., Sumy, Ukraine
https://orcid.org/0000-0003-2410-5846
Yurii Musiienko
PhD in Veterinary Sciences, Associate Professor
Sumy National Agrarian University
40021, 160 Herasym Kondratiev Str., Sumy, Ukraine
https://orcid.org/0000-0002-9735-4758
Larysa Plyuta
PhD in Veterinary Sciences, Associate Professor
Sumy National Agrarian University
40021, 160 Herasym Kondratiev Str., Sumy, Ukraine
https://orcid.org/0000-0001-8935-4873
Vitaliy Risovaniy
PhD in Veterinary Sciences, Associate Professor
Sumy National Agrarian University
40021, 160 Herasym Kondratiev Str., Sumy, Ukraine
https://orcid.org/0000-0003-0724-4991

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Abstract. The decrease in productivity in cows is directly related to the pathologies of the organs of the reproductive system that occur at the end of the transit period, therefore it is important to improve the methods of diagnosis and preventive therapy of cows in this period. The purpose of the work was to establish the forms of pathologies that occur in the transit period in cows, their interrelationship and the causes that cause them in terms of seasonal dynamics. When conducting research, morphological, clinical (examination, palpation), laboratory (bacteriological studies of the uterus), and

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*Corresponding author

statistical (statistical reliability) methods were used. The research was conducted in the limited liability company "Milk of the Fatherland" in 2 departments where unattached housing is used. The occurrence of subinvolution of the uterus against the background of litter retention and persistent corpus luteum was established by 9.5% more in the 1st department. A 43.5% correlation of the prevalence of delayed involution with endometritis was revealed. An increase, 12.8% in January and up to 14.1 in February, of cases of subinvolution of the uterus was established, while in May the similar indicator was 5.0%. The prevalence of persistent corpus luteum was established up to 16.8%, luteal cyst – up to 1.7%, ovarian follicular cyst – 2.1%. The presence of microflora in the uterine cavity (*E. coli, Ps. aeruginosa* and *S. aureus* – 49.8% *S. aureus* and *E. coli* – 33.5%, *Pr. vulgaris* and *E. coli* – 16.7%) provoked the occurrence inflammatory processes: chronic endometritis – 10.4%, vulvovaginitis – 18.1%, cervicitis – 21.4%. Research results can be used to develop new and improve existing methods of treatment of cows with pathology of genital organs in the transit period in farms of different forms of ownership

Keywords: transit period; inflammatory processes; subinvolution of the uterus; endometritis; cervicitis; salpingitis

INTRODUCTION

The processes of restoration of the uterus after parturition to the state characteristic of a non-pregnant cow are an important factor for further reproductive capacity. The delay in the involution of the organs of the reproductive system of cows is the main factor in the development of inflammatory and destructive processes, which subsequently lead to infertility and early culling of cows. At the same time, the cost of the obtained products increases due to overspending of feed and a decrease in herd productivity in general as a result of the use of repair cows (heifers), which, as a rule, have lower milk yields compared to cows aged 4-6 years.

Researchers O.V. Pascottini *et al.* (2022) claim the development of maladaptive mechanisms in cows in the postpartum period due to a negative energy balance, characterized by increased resistance of uterine tissues to insulin and excessive formation of adipose tissue. Another researcher, D.C. Wathes (2022), came to similar conclusions, but he also emphasizes the importance of genetic programming during pregnancy for structural and physiological modifications to the future female's fertility.

In addition, it is known that a large number of cows have a postpartum period of more than 30 days, which is due to the development of subinvolution of the uterus and requires stimulation of the organs of the reproductive system (Chen *et al.,* 2023). Most authors indicate vitamin E and selenium deficiency as a contributing factor to the development of uterine subinvolution (Dresen *et al.,* 2023). In addition, researchers Y.M. Somagond *et al.* (2023) obtained positive results when using multivitamin and multimineral products to prevent transit period pathologies in cows. As a result of research by B.R. Crites *et al.* (2022) is the establishment of a correlation between a low level of selenium in the blood serum of cows and a delay in the resorption of the corpus luteum in cows in the postpartum period, which causes not only the development of subinvolution of the organs of the reproductive system in cows, but also provokes the creation of prerequisites for the development of inflammatory processes in the uterus, and the mammary gland.

Important is the report of the authors P. Taechamaeteekul *et al.* (2022) that with subinvolution of the uterus caused by an insufficient amount of prostaglandin F2a, the amount of colostral antibodies in colostrum decreases. And as noted by R. Rekawiecki *et al.* (2020), during subinvolution, a decrease in the activity of the releasing hormone was observed, which indirectly affects the level of progesterone and the regression of the corpus luteum. The results of the study on the negative impact of oxidant stress are described in the work of M. Zachut & G.A. Contreras (2022). Other scientists indicate the development of postpartum pathology as a result of the action of mycotoxins, in particular zearalenone (Chekan *et al.,* 2022).

Along with this, researchers N.F. Krivoy & L.A. Franchuk (2018) suggest, along with clinical studies, for the diagnosis of postpartum endometritis, the use of laboratory tests with Benedict's reagent, which, according to the authors, increases the effectiveness of diagnosing subclinical endometritis. Other scientists L. Fedonyuk *et al.* (2021) point out the crucial importance of the disruption of metabolic processes in late dryness, which leads to the development of postpartum pathologies, in particular, endometritis and subinvolution, and suggest the use of supplements containing anionic salts of a new generation for the purpose of prevention

Effective work on the development of new and improvement of existing methods of diagnosis and treatment of cows with pathologies of the genital organs requires the establishment of correlational relationships between pathologies (cause-effect), as well as provoking and contributing factors (seasonality, disruption of homeostasis) determined the purpose of these studies. The aim of the work was to establish the causes and prevalence of gynecological and accompanying pathology in cows in the postpartum period, taking into account seasonal dynamics in a comparative aspect.

MATERIALS AND METHODS

The research was carried out on the basis of the Limited Liability Company of the Agricultural Company (LLC)

"Moloko Vitchyzny" in 2 departments with a non-affiliated system of maintenance in the period from 2020 to 2022. In both departments, a flow-shop keeping system has been implemented, the grouping of animals is carried out based on the productivity and physiological state of the animal. In the 2nd department, one-moment start-up is used, with the subsequent transfer of animals to a separate room and their separation into early and late dry periods. During the dry season, animals are kept on deep litter. There is a separate maternity room with two individual boxes. The milk productivity of animals per lactation is 6000-6500 kg., the 2nd department and 5000-5500 kg in the 1st department. In the 2nd department, synchronization and stimulation of the sexual cycles of cows is used, in the 1st – insemination of animals is used to determine the optimal time of sperm injection.

At the same time, the study of obstetric pathology (calving period) was conducted on the cattle of cows of the first department (n=62) and the second (n=78). Clinical signs of diseases were taken into account: delayed litter was considered when the placenta did not separate within 8 hours, endometritis was characterized by the release of purulent exudate from the genitals. Diagnosis of subinvolution of the uterus is carried out by visual control of the nature of lochia and a rectal examination on the 10-14th day after childbirth, using palpation (the size of the uterus is more than 40 cm in diameter), as well as observation of the clinical condition of the animals. To clarify the diagnosis and monitor the recovery of animals with postpartum subinvolution of the uterus, tests of Katerynov and Dyudenko with lochia were used. Pankov's obstetric and gynecological spoon (ALP) was also used for diagnosis.

The study of the anatomical and topographic state of the uterus (sonographic examination of the genitals, contractility of the uterus, its size, presence of contents, topography of the uterus) was carried out using a sonographer – Tringa Vet 50S with a linear sensor. In cows with subinvolution of the uterus, the content of cervical mucus was studied on the 5-7th day after childbirth. The content of the cervix was obtained, after the previous dry treatment of the external genitalia, by the rectocervical method using a plastic catheter (pretreated with rectified alcohol), a sanitary cover and a Jeanette syringe. Later, the lochia was placed in sterile plastic tubes for washing and sent to the Sumy Regional State Laboratory of Veterinary Medicine to find out microbiocinosis of the uterus due to subinvolution.

Vulvovaginitis was diagnosed using a vaginal examination (examination) and the presence of serous exudate. Cervicitis was established on the basis of a rectal examination (a pear-shaped increase in the cervix from 7 to 12 cm was detected). For the diagnosis of gynecological pathology, a rectal examination was performed according to the generally accepted method (palpation) and the use of ultrasound diagnostics (USD) using a sonograph – Tringa Vet 50S with a linear sensor. The size (subclinical endometritis, salpignitis, hypotrophy of the ovaries), presence of formations (persistent corpus luteum, luteal and follicular cysts), response to contraction massage (uterine atony, rebirth) were taken into account.

In order to establish the fecundity of cows in a seasonal aspect, a pregnancy study was carried out with the help of a sonographer – Tringa Vet 50S with a linear sensor and pregnancy was established. Thus, in the first department, 295 cows were examined in winter, 368 in spring, 356 in summer, and 296 in autumn. Similarly, cows in the second department were examined: 365 cows in winter, 215 in spring, 270 in summer, and 285 in autumn.

All experimental studies were conducted according to modern methodological approaches and in compliance with the relevant requirements and standards, in particular, they meet the requirements of DSTU ISO/IEC 17025:2005 (2006). Keeping of animals and all manipulations were carried out in accordance with the provisions of the Procedure for Conducting Experiments and Experiments on Animals by Scientific Institutions (Law of Ukraine No. 249, 2012), the European Convention on the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (1986).

RESULTS AND DISCUSSION

Among the cows of farms in the northern region, the prevalence of uterine subinvolution depended on the seasonality of calving, housing conditions (namely, a high concentration of animals in a limited area, group sectional housing, limited exercise and insolation), feeding technology (insufficient energy in the diet and balancing it at the expense of concentrated feed, presence of mycotoxins in feed). Thus, in a farm with an acceptable and average level of micromycete contamination of fodder, uterine subinvolution did not exceed 20-30%, acute postpartum metritis 25%, and subclinical metritis 35%. At the same time, obstetric and gynecological diseases were registered 2-3 times more often in animals from farms with a high level of feed contamination by mold fungi and their toxins (Chekan *et al.*, 2022). The structure of obstetric pathology in the 1st and 2nd departments of LLC AF "Moloko Vitchyzny" is shown in Table 1.

Table 1. *The structure of obstetric pathology causing complications in the postpartum period (n=140)*

Causes of gynecological pathology	Milk of the Fatherland JSC			
	1 department		2 departments	
	Number of heads	%	Number of heads	%
Litter retention	4	5.2	3	3.8

Table 1, Continued

Causes of gynecological pathology	Milk of the Fatherland JSC			
	1 department		2 departments	
	Number of heads	%	Number of heads	%
Subinvolution of the uterus	19	17.4	12	7.9
Endometritis	26	21.7	35	23
Vulvovaginitis	7	7.6	18	11.8
Cervicitis	6	4.9	10	6.6
In total	62	56.8	78	51.3

***Source**: developed by the authors*

The prevalence of obstetric pathology in the 1st department prevailed over the indicators of the 2nd department. Thus, the retention of manure increased by 1.5% compared to other farms. The subinvolution of the uterus, which developed both against the background of litter retention and independently in the first department, was 9.5% higher compared to the 2nd department. Subsequently, in the 1st department, 37.3% of sick cows and 43.5% of animals in the 2nd department had subinvolution of the uterus complicated by endometritis, the course of which in the 1st department decreased by 1.3%, compared to the other department.

The frequency of vulvovaginitis and cervicitis in the 2nd department exceeded the incidence in the 1st department by 4.2% and 1.7%, respectively. The prevalence of general obstetric pathology in the 1st department was 5.5% higher than the indicators of other farms. The next stage of research was the study of the prevalence of subinvolution of the uterus in the seasonal aspect (Table 2).

***Table 2.** Seasonal dynamics of the spread of uterine subinvolution (n=55)*

Period	January	February	March	April	May	June	July	August	September	October	November	December	everything
In total hotel heads	39	71	67	54	40	37	36	35	41	59	89	42	610
subinvolution	5	10	6	3	2	2	2	3	4	5	10	3	55
%	12.8	14.1	9.0	5.6	5.0	5.6	5.6	8.6	9.8	8.5	11.2	7.1	9.0

***Source**: developed by the authors*

The most cases of the disease were registered in February 14.1%, January 12.8% and November 11.2%, and in March it decreased to 9.0%. Uterine subinvolution was the least recorded in cows at the end of spring and summer, from April to July its percentage did not exceed 5.6%. An upward trend has been observed since August. Such a seasonal manifestation of subinvolution in the economy is associated with mass calving of cows and the influence of adverse environmental factors (accumulation of animals in one sector after birth, movement of cows to stalls and contamination of open birth canals, low level of carotene and microelements of copper (Cu) and zinc (Zn) in blood serum of animals, contamination of feed with molds).

After analyzing the reasons that lead to the development of subinvolution of the uterus in cows in these farms, the main and mediating factors were established: the crowding of animals in one sector after childbirth, moving cows to stalls and contamination of open birth canals, feeding poor-quality feed containing aflatoxins, low level carotene and microelements Cu and Zn in animal blood serum, the presence of heavy metal salts in colostrum (exceeding the maximum permissible levels of arsenic (As), mercury (Hg) and lead (Pb), overstretching of the uterus in multiple pregnancy, large fetus, violation of steroidogenesis in pregnant cows, the presence of accompanying pathologies and complications during pregnancy, improper delivery, in particular, premature extraction of the fetus, which leads to a violation and weakening of the rhythm of uterine contractions, pathological births and injuries of the birth canal, previous abortions and chronic inflammatory processes of the uterus, delayed litter.

As a result of the complication of pathologies during childbirth, there is the development of gynecological pathology, which in the vast majority blocks the fertility of cows and is a primary criterion for the development of methods of treatment and prevention of infertility in the postpartum and service periods. At the same time, the following gynecological pathologies of a functional and inflammatory nature were detected (Table 3).

***Table 3**. Analysis of gynecological pathology*

Causes of gynecological pathology	Milk of the Fatherland JSC				In general, for these departments	
	1st department		2nd department			
	Goal	%	Goal	%	Goal	%
Vulvovaginitis	77	18.1	17	8,9	94	15.2
Cervicitis	91	21.4	16	8.4	107	17.3
Chronic metritis	40	9.4	20	10.5	60	9.7
Subclinical metritis	30	7	31	16.2	61	9.9
Salpingitis	4	0.9	2	1	6	1.0
Persistent yellow body	42	9.9	32	16.8	74	12.0
Ovarian hypotrophy	55	12.9	28	14.7	83	13.5
Luteinous cyst	7	1.7	3	1.6	10	1.6
Follicular cyst	4	0.9	4	2.1	8	1.3
Clinical norm	34	8	18	9.4	52	8.4
Atony of the uterus	12	2.8	11	5.7	23	3.7
Degeneration	30	7	9	4.7	39	6.4
Total infertile animals	426	100	191	100	617	100.0

***Source**: developed by the authors*

The frequency of inflammatory processes of reproductive organs in cows in both farms ranged from 46.6 to 58.5% of the total number of gynecological pathologies. Inflammatory processes of genital organs in cows registered in the 1st department exceeded the indicators of animals of other farms by 12%. In this farm, acute inflammatory processes, such as cervicitis and vulvovaginitis, prevailed among the gynecological pathology of cows accompanied by inflammatory genesis. Their prevalence was 2.3 and 1.9 times higher compared to chronic metritis and 3.1 and 2.6 times higher compared to subclinical inflammatory processes of the uterus. The frequency of salpingitis in both farms was almost the same and did not exceed 1%.

In addition to inflammatory processes of reproductive organs in cows, a significant share of the total number of gynecological pathologies was ovarian dysfunction. The prevalence of ovarian dysfunction in both farms ranged from 28.5 to 35.2%. The main number among ovarian dysfunction was persistent luteal corpuscle and ovarian hypotrophy, which exceeded the frequency of luteal cysts by 5.8 and 7.6 times and the number of follicular cysts in the 1st department by 9 and 12%. A similar trend was observed in the 2nd department. Persistent corpus luteum and ovarian hypotrophy exceeded the frequency of luteal cysts by 10.5 and 9.2 times, respectively. The number of follicular cysts was lower by 14.7 and 12.6% compared to persistent corpus luteum and ovarian hypotrophy.

Among barren cows, the number of clinically healthy cows did not exceed 10% in both farms. Violation of the rigidity of the uterus was 2.8 and 5.7%, respectively, and was 2 times greater in the 2nd department, compared to other farms. Among ovarian rebirths, sclerotic processes prevailed and accounted for 7 and 4.7% of the total gynecological pathology. In the first two days after birth, 81.7% of the animals, which later developed acute subinvolution of the uterus, had abundant discharge of liquid bloody lochia, while the mucous plug in the cervical canal was absent in 87.6% of the animals. During the normal course after the hotel period, in 43.1% of animals, lochia is represented by a small amount of thick, cloudy, viscous mucus of a straw-yellow or light brown color, which is located in a small amount both in the vaginal cavity and in the cervical canal, forming mucous cork, which is a kind of protective barrier that prevents the penetration of microflora into its cavity.

During the study, intensive contamination of the uterine cavity with conditionally pathogenic microflora was established. And by the 7th day of the experiment, 100% of the test animals had different strains of microorganisms isolated from the cervical mucus samples. However, the introduction of the tested means already during this period contributed to positive changes in the microbial ecosystem of the reproductive organs. Among 15 samples of contents taken from the cervix of cows suffering from subinvolution, *Escherichia coli was isolated in 64% of the animals*. Contamination of the uterus *by Staphylococcus aureus* and *Pseudomonas aeruginosa* was diagnosed in 33.3% and 20% of cows. The smallest microbial contamination of the uterus was *Proteus vulgaris*, it was isolated in only 6.7% of animals.

In all animals, the microbial landscape of the uterus was represented by an association of

microorganisms. The association with *E. coli, Ps. aeruginosa* and *S. aureus* – 49.8% of the total number of cases. The association with *S. aureus* and *E. coli was determined as the next most common*, which was 33.5%. The association of the following microorganisms was the least common among the farm's cows – *Pr. vulgaris* and *E. coli* (16.7%). Thus, the leading role in the development of subinvolution is played by pathogenic microflora, which contaminates the uterine cavity up to 7 days after delivery and complicates the course of the pathological process. The general condition of cows with subinvolution of the uterus is depressed, appetite and productivity decrease. In some animals, there is a subfibrillar increase in body temperature and slowing down of scar contractions.

When conducting a rectal examination in the first two days after calving in the majority of animals that later developed acute subinvolution of the uterus, 47.1% of the animals did not have any discharge of lochia, and 52.9% of the cows showed abundant discharge of liquid blood lochia, while the mucous plug in the cervical canal was absent in 88.2% of the animals. The rigidity of the uterus is weakly expressed, the folds of its surface are insignificant, while when examining clinically healthy cows 2-3 days after calving, pronounced transverse and longitudinal folds were found on the surface of the uterus, during massage it became a bumpy, dense consistency.

In case of subinvolution in cows, on the 6-7th day after childbirth, the uterine horns hang over the edge of the pubic bones, which cannot be reached by hand, the uterus does not respond to contraction during palpation, there is fluctuation, the walls are loose, without pronounced folds, after the massage, lochia of a liquid consistency may be released. dirty-gray color and a slightly similar mass with impurities of the decay of caruncles or pieces of caruncles with areas of the choroid. In the normal course of the postpartum period, lochia has a thick homogeneous mass with an admixture of red-brown mucus.

When examining cows with subinvolution on the 10-11th day after calving, the uterus has dimensions' characteristic of a 3.5-4.0 month pregnancy, is located in the abdominal cavity, responds poorly to massage, after which lochia of a liquid or semi-liquid dark consistency is released from the genitals. brown with admixtures of a small amount of mucus, while with the normal course of involutional processes, the uterus has a size characteristic of a 2.5-3.0 month pregnancy with the release of homogeneous lochia of brown or straw-yellow color. The criteria for the completion of the involution of the uterus are: a decrease in its size, when it is freely grasped by the hand, is located in the pelvic cavity, its horns are relatively symmetrical, elastic and elastic in consistency and respond to massage (Table 4).

Table 4. *Indicators of genital involution in cows depending on the course of the postpartum period*

Indexes	Physiological course of the postpartum period, n=17	Subinvolution of the uterus, n=19
Periods of cessation of vibration of the middle uterine arteries, days	2.5±0.13	4.9±0.17**
Thickening of sacro-gluteal ligaments, days	2.7±0.23	5.2±0.31**
Periods of cessation of lochia discharge, days	14.7±1.2	24.9±0.8**
Completion of genital involution, days	24.6±2.4	32.6±1.6*

Notes: ** – p<0.05, ** – p<0.001*
Source*: developed by the authors*

The vaginal part of the cervix is reduced in size, designed in the form of a rosette, protrudes into the vaginal cavity by 2.0-2.5 cm, there is no swelling of the folds. The mucous membrane of the vagina is pale pink, smooth, shiny, moderately moistened, the discharge of lochia from the cervical canal stops. It was established that in cows with acute postpartum subinvolution of the uterus, the vibration of the middle uterine arteries is 2 times longer ($p<0.001$) than in animals with a normal course of the postpartum period, and sacro-gluteal ligaments tighten 1.93 times ($p<0.001$) later. joints The nature and amount of lochia released from the genital tract is significantly different. During subinvolution, the cessation of lochia secretion is delayed by 10.2 days ($p<0.001$) and the completion of involutional processes by 10.2 days ($p<0.05$).

The level of protein-carbohydrate compounds (hexose bound to protein, seromucoids, ceruloplasmin, and sialic acids) and sex steroids (progesterone and estradiol) in the blood of sick animals also has diagnostic value for subinvolution of the uterus. The results of the research indicate that there are significant differences between the course of the postpartum period in normal conditions and with acute subinvolution of the uterus in cows in terms of indicators of the state of the genital organs, the nature and amount of secreted lochia, depending on the timing of the research, the time of cessation of lochia secretion and the completion of the involution processes. The next stage of research was to find out the fertilizing ability of cows at different times of the year (Table 5).

Table 5. *Fertilization of cows during the year in experimental farms*

	Season											
	winter			spring			summer			autumn		
	wasps	add		wasps	add		wasps	add		wasps	add	
		n	%		n	%		n	%		n	%
1 department	295	91	30.8	368	134	36.4	356	93	26.1	296	107	36.2
2 departments	365	128	35.1	215	91	42.3	270	91	33.7	285	136	47.7

Notes: *– number of inseminated animals, pl. – the number of pregnant animals after insemination*
Source*: developed by the authors*

The lowest number of fertilizations was obtained in the 1st department in the summer season, which is caused by temperature stress. At the same time, this indicator was 15.3% higher in winter, 28.3% in spring, and 27.9% in autumn. The largest number of fertilizations was received in the autumn period in the 2nd department. It was 26.4% higher than the similar figure in winter, 11.3% in spring and 29.6% higher. At the same time, fertilization in all seasons of the year in the 2nd department was significantly higher than the similar indicators of the 1st department. The course of the postpartum period, and thus the fertility of cows, directly depends on the course of childbirth, in particular, the delay of litter and the introduction of microflora during delivery. At the same time, rare cases of simultaneous manifestation of inflammatory processes in different parts of the reproductive system (pathologies of the ovaries, oviducts, uterus and vagina) are important. All this leads to overgrazing and reduced productivity, which in turn leads to economic losses and higher prices of livestock products.

It was established that the subinvolution of the organs of the reproductive system in cows in the postpartum period occurred against the background of endometritis from 37.3% in the first department to 43.5% in the second department. Other researchers P. Nyabinwa *et al.* (2020) indicate that postpartum endometritis is recorded at the level of 23.5% of the total number of cows that have calved, which leads to a decrease in productivity. Some authors, N. Pascal *et al.* (2021), indicate that often endometritis occur in a complex with subinvolution of the uterus after delivery assistance and litter retention within 21-60 days after delivery. However, during the research, data was obtained that after giving birth assistance, the manifestation of cervicitis in cows was registered at the level of 4.9% in cows of the 1st department to 6.6% in cows of the 2nd department in a complex with subinvolution of the organs of the reproductive system of cows.

Characterizing the seasonal dynamics of uterine subinvolution, most researchers associate the increase in the number of diagnosed cases with mass calvings, while paying attention to the fact that in the winter-spring period, the insufficiency of vitamins and trace elements in the diets of cows is common, which coincides with the results of studies (Lin *et al.,* 2021). It was established that in the postpartum period and in cows against the background of the development of subinvolution, cervicitis was recorded in 17.3% and vulvovaginitis in 15.2%. Researchers D.A. Vallejo-Timarán *et al.* (2021) claim that about 23% of cows have clinical or subclinical cervicitis or vulvovaginitis, while the amount of interleukins IL 1 and IL 8 and cytokines in the vaginal mucus increases, indicating the development of inflammatory processes. According to T.O. Cunha *et al.* (2021) a high level of progesterone, reducing the local protective capacity of the mucous membrane of both the cervical canal and the vagina, provokes the development of microorganisms, and therefore the development of inflammatory processes.

P. Skliarov & O. Zubkov (2021) note the importance of using an algorithm for predicting the course of the postpartum period, which consists of a number of indicators of both homeostasis (the main markers of inflammation) and clinical condition, which fully coincides with the data obtained during the study. However, the authors point out the importance of the completeness of the fetoplacental complex. Along with this, it is important to complicate the course of the postpartum period as a result of overdistention and improper joint placement of the fetus, as noted by L.V. Koreyba (2014). At that time, the authors A.Y. Kraevskyi & A.G. Seredzhimova (2018) note that litter retention is more common in first-born cows, and injuries during childbirth are the cause of postpartum complications. The data are consistent with the research concept and will be part of further research.

Researchers O.B. Pascottini *et al.* (2023) indicate the presence of young neutrophils in large numbers in the cervical and uterine mucus and claim that the main representatives of the exudate microflora in endometritis are *E. coli, Streptococcus uberis and Trueperella*, which is confirmed by the data obtained during current research. Y. Yi *et al.* (2022), who claim that during inflammation of the endometrium, microvilli of the epithelium are destroyed, necrobiosis of cells and edema of the epithelium is observed, and the presence of a large number of microorganisms on the surface of the mucous membrane. This practically coincides with the results obtained during research.

Based on the above, we can say that postpartum complications are common pathologies in farms of various forms of ownership both in our country and abroad. However, given the large number of publications, the problem remains relevant and requires further research.

CONCLUSIONS

Subinvolution of the organs of the reproductive system is from 7.9% to 17.4% and is a consequence of litter retention, which is from 3.8% to 5.2% and the imbalance of individual hormones in the postpartum period and is a prerequisite for the development of such inflammatory processes as endometritis from 21.7% to 23.0%, vulvovaginitis from 7.6% to 11.8% and cervicitis from 4.9% to 6.6%. Delayed uterine involution has a seasonal pattern, so the highest percentage of 14.1% is diagnosed in February and 12.8% in January, and the lowest in May is 5.0%, which is associated with mass calvings and poor rations.

As a complication of subinvolution of the uterus, a violation of the secretion of both local hormones – persistent corpus luteum from 9.9% to 12.0%, and chronic inflammatory processes – metritis from 9.4 to 9.7% was noted. In the seasonal aspect, subinvolution of the organs of the reproductive system in cows most often occurs in January (12.8%) and February (14.1%), and the least this pathology was diagnosed in May (5.0%) and April, June and July (5.6%). Subinvolution of the organs of the reproductive system is a consequence of the development of gynecological pathology of an inflammatory nature (vulvovaginitis – 15.2%, cervicitis – 17.3%, salpingitis – 1.0%), a violation of the hormonal background (persistent corpus luteum – 12.0%, luteal cyst – 1.6%, follicular cyst - 1.3%), and non-inflammatory (uterine atony – 3.7%, rebirth – 6.4%).

With subinvolution of the organs of the reproductive system, the involution lasts 1.33 times longer (the period of cessation of uterine artery vibration is 1.96 times, thinning of the uterine ligaments is 1.93 times, the period of cessation of lochia discharge is 1.69 times). Fertilization in the seasonal aspect was the highest in spring (36.4%) in the first compartment and in autumn (47.7%) in the second, and the lowest in summer (26.1% in the first compartment and 33.7% in the second). In further research, it is planned to develop prognostic tests for the occurrence and complexity of transit flow in cows and to test effective treatment schemes for cows with this pathology.

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CONFLICT OF INTEREST

The authors indicate the absence of any conflicts of interest during research, data analysis and publication of the material.

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Перебіг післяродового періоду у корів за наявності супутньої патології

Олександр Миколайович Чекан
Кандидат ветеринарних наук, доцент
Сумський національний аграрний університет
40021, вул. Г. Кондратьєва, 160, м. Суми, Україна
https://orcid.org/0000-0002-5676-1947

Вячеслав Олександрович Допа
Аспірант
Сумський національний аграрний університет
40021, вул. Г. Кондратьєва, 160, м. Суми, Україна
https://orcid.org/0000-0003-2410-5846

Юрій Володимирович Мусієнко
Кандидат ветеринарних наук, доцент
Сумський національний аграрний університет
40021, вул. Г. Кондратьєва, 160, м. Суми, Україна
https://orcid.org/0000-0002-9735-4758

Лариса Василівна Плюта
Кандидат ветеринарних наук, доцент
Сумський національний аграрний університет
40021, вул. Г. Кондратьєва, 160, м. Суми, Україна
https://orcid.org/0000-0001-8935-4873

Віталій Іванович Рисований
Кандидат ветеринарних наук, доцент
Сумський національний аграрний університет
40021, вул. Г. Кондратьєва, 160, м. Суми, Україна
https://orcid.org/0000-0003-0724-4991

Анотація. Зниження продуктивності у корів безпосередньо пов'язано із патологіями органів статевої системи, що виникають наприкінці транзитного періоду, тому важливим є удосконалення методів діагностики та превентивної терапії корів у даному періоді. Метою роботи було встановити форми патологій, що виникають у транзитному періоді у корів, їх взаємозв'язку та причин, що їх викликають у розрізі сезонної динаміки. При проведенні досліджень застосовували морфологічні, клінічні методи (огляд, пальпація), лабораторні (бактеріологічні дослідження вмістимого матки), статистичні (статистична достовірність). Дослідження проводили в товаристві з обмеженою відповідальністю «Молоко Вітчизни» на 2-х відділеннях, де використовується безприв'язне утримання. Встановлено виникнення субінволюції матки на фоні затримки посліду та персистентного жовтого тіла на 9,5 % більше у 1-му відділенні. Виявлено кореляцію поширеності затримки інволюції із ендометритом у 43,5 %. Встановлено підвищення, 12,8 % у січні та до 14,1 у лютому випадків субінволюції матки, тоді як у травні аналогічний показник склав 5,0 %. Встановлено поширення персистентного жовтого тіла до 16,8 %, лютеїнової кісти – до 1,7 %, фолікулярної кісти яєчників – 2,1 %. Наявність у порожнині матки мікрофлори (*E. coli, Ps. aeruginosa* та *S. aureus* – 49,8 % *S. aureus* та *E. Coli* – 33,5 %, *Pr. vulgaris* та *E. coli* – 16,7 %) провокувало виникнення запальних процесів: хронічного ендометриту – 10,4 %, вульвовагініту – 18,1 %, цервіциту – 21,4 %. Результати досліджень можуть бути використані для розробки нових та удосконалення існуючих методів лікування корів із патологією статевих органів у транзитному періоді у господарствах різної форми власності.

Ключові слова: транзитний період; запальні процеси; субінволюція матки; ендометрит; цервіцит; сальпінгіт