



## ETIOLOGICAL FACTORS CAUSING THE RETENTION OF THE PLACENTA IN COWS

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### ABSTRACT

For the period of 2015 to 2021, 194 cases of a pathogenic process due to the retention of membranes in cows were detected in the herds of cows of Krasnodar and Kuban educational farms under supervision. The predominant etiological factor in the occurrence of the retention of the membranes in cows is the development in the pregnant uterus of a chronic inflammatory process, which causes a dense fusion of chorionic villi with caruncles. At the same time, hemodynamic disorders and hypotonia of the uterus, noticeably prevail over the rest. The reason for the retention of the membranes should be considered the blood circulation in the maternal part of the placenta, due to the high concentration of unbound heparin and the low concentration of ascorbic acid. Hyperkinesia allocated by several authors. Animals does not play such a big role. In addition, the relationship can be traced between the age of cows and the frequency of development of birth pathology due to the retention of the membranes.

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### Introduction

According to A.P. Studentsov (1972), A.G. Nezhdanov (1978), V. Ya. Nikitin and many other domestic and foreign experts, the study of the prevalence and etiological factors causing the retention of membranes in cows is very important. In animals of different species, the generic act ends with the separation of the membranes at a certain time [1-5]. It is generally accepted that it is possible to speak about the retention of the placenta if it is not excreted from the cow - 6 hours (according to some experts - 10 - 12 hours) after the birth of fetuses [6-10].

Unfortunately, the timing of separation of the membranes for many reasons can be increased [11-15].

For the first time in the conditions of the Krasnodar Territory, the prevalence and etiological factors that determine the retention of the placenta in cows have been studied.

To study the prevalence and etiological factors responsible for the retention of membranes in cows.

### Materials and Methods

For the period from 2015 to 2021, 194 cases of a pathogenic process due to the retention of membranes in cows were detected in the herds of cows of Krasnodar and Kuban educational farms under supervision. The number of dairy cows in the herd in different years ranged from 795 to 845 heads, averaging 830 heads. Of these, in 2015, the delay of the membranes was recorded in 22 cows (2.65%), in 2016 - in 19 (2.29%), in 2017 - in 32 (3.86%), in 2018 - 35 (4.2%), in 2019 - 29 cows (3.5%), in 2020 - 26 (3.02%) and in 2021 - 31 cows (3.73%).

The determination of the body condition of the animals was carried out according to the generally accepted method - the BCS body condition determination system.

The probing of the cow mesh was carried out in three series of experiments according to the methods of Meliksetyan and Korobov using the magnetic probes of the above authors.

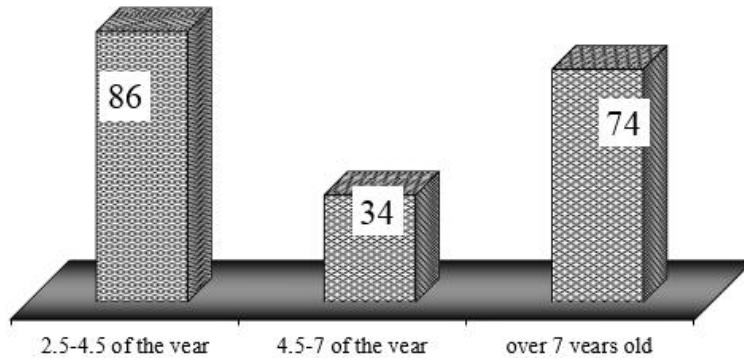
Anamnesis was collected by interviewing veterinarians and service personnel.

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The research results were subjected to mathematical processing using standard statistical analysis programs for the IBM PC. The reliability of the results was determined by the parametric Student's test.

**Results and Discussion**

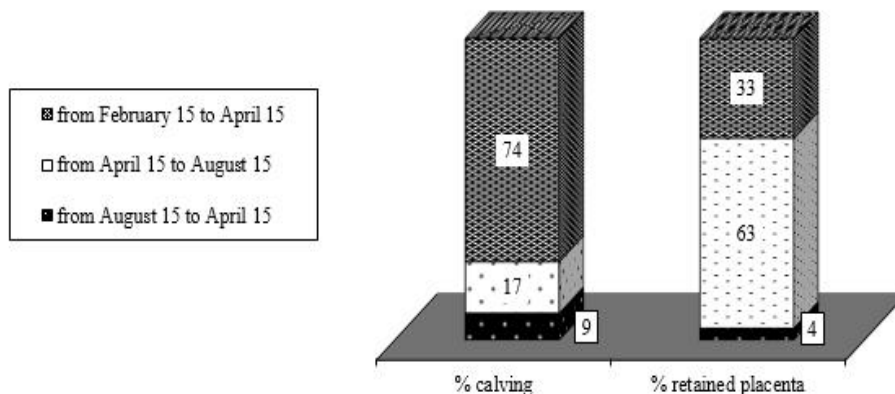
Childbirth pathology caused by the retention of membranes was observed in 2.29-4.2% of the cows of the herd under study in the years under analysis. During the observation period (7 years), the incidence rate was 3.32%. These indicators differ significantly from previously published data [4, 7, 10], which studied this problem, where the retention of the membranes is observed in 6.9-59.1 % of cows. According to the data obtained by us, it can be noted that the main peak of the birth pathology associated with the retention of membranes in cows is run in spring and early summer. If the high incidence rates from February to early April can be explained by mass calving, then the continuing high incidence rate occurs in the months when the number of calving decreases.



**Figure 1.** Seasonality of calving and retention of membranes

**Figure 1** shows that the number of cases of retention of membranes is not proportional to the number of calving. Although approximately 74% of calving occurs in the period from February 15 to April 15, this period accounts for only 64 cases of retention of membranes (33% of all registered). About 17% of cows calve from 15 April to 15 August. During this period, the retention of the membranes is noted much more often - in 122 cows (63%). On average, about 9% of cows calve from 15 August to 15 February. They account for about 4% of cases of retention of membranes.

In addition, an interesting, in our opinion, the relationship can be traced between the age of cows and the frequency of development of birth pathology in them, due to the retention of the membranes (**Figure 2**). The average age indicators of cows admitted for treatment for this pathology of childbirth were 6.2 years, and the age indicators varied from 1 year and 9 months to 17 years. The highest level of the pathology of the generic process due to the retention of membranes occurs at the first and second calving, that is, on animals aged 2.5 - 4.5 years. This group of cows accounts for 86 cases of retention of membranes (44.33%). In the age group from 4.5 to 7 years (from the third to the fifth calving), 34 (17.53%) were registered, and in animals older than 7 years - 74 cases of retention of membranes (38.14%).



**Figure 2.** The number of cows with retention of membranes in different age groups  
\* - vertical number of cows (heads)

Analyzing the regularity of the development of childbirth pathology associated with the retention of the membranes, depending on the age of the cows, it should be noted that most often this pathology is recorded in young cows, pregnancy, and lactation of which coincide with the process of their growth. The second largest group is made up of cows over 7 years old. These data

are comparable with the results of observations [8], which found that in the age group of cows from 3 to 5 years, the retention of membranes was 6.4%, 6-9 years - 7.6%, and in cows, over 9 years old this indicator increased to 12.4%.

The results of processing the obtained data indicate that from the second half of April to August, the rate of retention of membranes in cows, concerning the average annual, increases markedly and reaches 12.35% of all calving cows. Meanwhile, many studies carried out in the conditions of farms and complexes indicate that in the warm season, the pathology of childbirth associated with the retention of the membranes is significantly reduced [15]. In this regard, we attempted to analyze the conditions of keeping, feeding, and insemination of cows before the development of this pathology in animals in training and experimental farms.

When providing veterinary care to cows with retention of membranes, it was found that in most animals, manual separation of the child's part of the placenta from the caruncle tissue is associated with the need to apply significant efforts for this. After their separation, profuse capillary bleeding was noted, indicating trauma to the vessels of the glandular part of the caruncles. Only in 11 cows (5.67%), in which there was partial retention of the membranes, their manual separation could be carried out without the application of significant efforts and trauma to the maternal part of the placenta. Based on this, we assumed that the retention of membranes in the majority of supervised cows (94.33%) is like an adhesive placentitis.

In our opinion, the predominant etiological factor in the occurrence of retention of membranes in cows is the development of a chronic inflammatory process in the pregnant uterus, which causes dense fusion of chorionic villi with caruncles. In our opinion, this is largely facilitated by a decrease in the resistance of the animal's organism caused by poor and inadequate feeding in the last months of pregnancy, and concomitant diseases of the digestive system. We have noticed that this pathology is recorded in cows with a body condition below average, much more often than in animals with an average and above-average body condition. So, of the cows we examined during the observation period with the retention of the membranes, 181 of them had a body condition below average and only 13 animals were average and above average body condition. The period from spring to mid-summer is the most unfavorable in this respect. After spring lack of fodder, when forage stocks, and these are, in the main majority of farms, roughage (corn stalks with leaves obtained during harvesting, barley, soybean, pea, and sometimes wheat straw, hats left after threshing sunflower, alfalfa or forest hay, etc.) are coming to an end, the animals are driven out in the summer - camp keeping. There they often eat last year's dry grass and leaves, as well as young shoots of cereal grasses that have not reached the heading stage, and are defective in terms of fodder. The animals are starving. The lack of minerals in the body is evidenced by the frequent spring cases of cows eating earth, clay, licking the walls of the barns, which was confirmed by acts of laboratory research of feed.

Separately, it should be said about the role of deworming in the prevention of depletion of productive animals. Helminthiasis create favorable conditions for the occurrence of pathologies of the prenatal and birth period. A high concentration of livestock in traditional summer campsites (inconvenience, swampy valleys, roadsides, forest edges, etc.) leads to high intensity of infestation by various types of helminths. This, along with a meager forage base, leads to significant emaciation and a decrease not only in the productivity of cows but also in the resistance of their organism. Indicative is the fact that over 7 years only 37 cases (19%) of the occurrence of retention of membranes in deworming cows at the end of the grazing period were registered. In deworming cows, there was no case of prenatal laying. At the same time, the retention of membranes, bearing the character of sticky placentitis, was found in all cows, in which laying began at least a week before calving.

One cannot ignore such an important etiological factor in the development of sticky placentitis as the presence of a chronic inflammatory process in the mesh of cows and heifers, caused by a long stay of metallic foreign objects in its cavity. The high degree of contamination of grazing areas with ferromagnetic objects leads to the fact that quite often animals in which the retention of the membranes is recorded, already at the time of providing them with therapeutic assistance or 3-5 days after calving, showed signs of traumatic inflammation of the mesh. When the cows of this group were probed with the magnetic probes of Meliksetyan and Korobov, it was found that in 173 (89.2%) animals there were sharp foreign objects in the net that could penetrate the net wall or damage it. It is logical to assume that traumatic reticulitis, which developed in cows in late pregnancy, initially proceeded in a latent, subclinical form, and only at the time of labor, as a result of a deeper penetration of the traumatic object into the wall of the mesh, its aggravation occurred. Thus, as a result of three series of experiments and taking into account the repeatability of the results, we identified a pattern between the presence of traumatic foreign objects in the mesh of cows, causing traumatic reticulitis, and the subsequent occurrence of chronic placentitis in them, leading to the retention of the membranes.

In addition to the above, one should not lose sight of the microbial factor in the development of complications of the birth period. So, from the data of the anamnesis, it is known that many of the sick animals were artificially inseminated several times before fruitful insemination, and no clinically expressed signs of inflammatory diseases of the reproductive organs were found in them. In some cases, after several unsuccessful attempts at artificial insemination, cows and heifers have developed clinically expressed endometritis or cervicitis. The insufficiently high level of culture of artificial insemination can be judged by the fact that out of 194 cows in which the retention of membranes was recorded, as established from the anamnesis data, only 63 (32.5%) became pregnant as a result of artificial insemination. In the remaining 67.5% of cows, the last pregnancy before the disease occurred as a result of insemination by a bull (which is kept in the UHF for educational purposes).

It should be noted that over the entire observation period, only 3 cows (out of 191) after the course of treatment we carried out, this pathology was noted the next year. The more interesting each of these cases. In each of them, the body condition of the cow was above average. The conditions of feeding and keeping are good, the zoohygienic parameters are within the normal range. Measures for the prevention of helminthiasis and traumatic reticulitis were strictly followed. All three cows were of

high productivity (7000 or more liters of milk per lactation) and approximately the same age - 7-8 years. All of them had 2-3 unsuccessful attempts at artificial insemination before fruitful insemination. This suggests that in this case, the iatrogenic factor was the main and, possibly, the only one.

Based on the results of our observations, it can be assumed that the risk of retention of membranes is in close connection with the state of the food supply in educational and experimental farms (which is confirmed by the data of laboratory studies of feed), as well as with the presence of helminthic infestation in animals (fascioliasis, dicroceliosis, moniesiasis, dictyocaulosis, etc.) and metal foreign objects in the mesh, leading to the development of traumatic reticulitis.

Summing up the above, we can conclude that due to a significant difference in the conditions of livestock maintenance, the problem of the incidence of cows with retention of membranes in the UHH has well-expressed features. The most noticeable difference is in the prevalence of this pathology of the patrimonial period among animals living in an industrial complex, a farm, and a peasant economy. The incidence rate in them correlates at the level of 6.9-59.1%, respectively [1] and 2.29 - 4.2% [12]. The seasonal dynamics of the incidence rate of cows are well traced. Thus, it was noted that the peak incidence occurs in the period from early April to late June. At the same time, it was found that the number of cases of retention of membranes is not proportional to the number of calving. From the second half of April to August, the rate of retention of membranes in cows concerning the average annual increases markedly and averages 12.35% of all cows calving during this period.

## Conclusion

Analyzing the etiological factors that determine the retention of the membranes in cows of educational and experimental farms, it can be concluded that the development of this pathology of the birth period in cows is closely related to the state of the fodder base in farms and the presence of helminth infestation in animals. A pattern was revealed between the presence of traumatic foreign objects in the cows' net, causing traumatic reticulitis, and the subsequent occurrence of chronic placentitis in them, leading to the retention of the membranes.

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## References

1. Beloborodenko MA, Beloborodenko TA, Beloborodenko AM, Beloborodenko DF, Demkina AV, Gubsky VI, et al. Prevention of reproductive disorders in cows. *Vet Kuban.* 2016;2:10-2.
2. Selyaninov DB, Vachevsky SS, Osipchuk GV, Rodin IA, Povetkin SN. Influence of some types of pathogenetic therapy on blood composition. *Vet Kuban.* 2012;4:20-2.
3. Fenchenko NG, Khairullina NI, Kilmetova IR, Sabitov MT, Rodin IA, Gorlov IF, et al. Probiotic supplement for feeding aberdeen-angus bulls: influence on the growth rate and quality of meat. *Int J Pharm Res.* 2020;12(3):950-6.
4. Rodin IA, Pere-bor AV. A method of complex prevention and treatment of endometritis, mastitis in cows and dyspepsia in their offspring. Patent of the Russian Federation for invention No. 2134116, 08/10/1999. Application No. 98105795/13 dated 25.03.1998.
5. Zykova SS, Shurov SN, Rodin IA, Koshchayev AG, Danchuk MS, Chernobrovkina AP, et al. Hepatoprotective and Antioxidant Activity of 8, 8-Dimethyl-5-P-Tolyl-3, 4, 7, 8-Tetrahydro-2 H-Pyrido [4, 3, 2-de] Cinnolin-3-One. *Pharm Chem J.* 2020;54(8):777-80.
6. Belyaev NG, Rzhepakovsky IV, Timchenko LD, Areshidze DA, Simonov AN, Nagdalian AA, et al. Effect of training on femur mineral density of rats. *Biochem Cell Arch.* 2019;19(2):3549-52.
7. Nagdalian AA, Oboturova NP, Krivenko DV, Povetkin SN, Blinov AV, Verevkina MN, et al. Why does the protein turn black while extracting it from insects biomass? *J Hyg Eng Des.* 2019;29:145-50.
8. Nuzhnaya KV, Mishvelov AE, Osadchiy SS, Tsoma MV, AM RS KK, Rodin IA, et al. Computer simulation and navigation in surgical operations. *Pharmacophore.* 2019;10(4):43-8.
9. Zuev NP, Khmyrov AV, Dobrunov RA, Zueva EN, Rodin IA, Evdokimov VV, et al. Etiology, prevention and treatment of farm animals and poultry in mass diseases of young animals with gastroenteric and respiratory syndromes. Monograph. FGOU VPO Belgorod State Agrarian University named after V.Ya. Gorin. Belgorod, 2015.
10. Zykova SS, Igidov NM, Zakhmatov AV, Kiselev MA, Galembikova AR, Khusnutdinov RR, et al. Synthesis and Biological Activity of 2-amino-1-aryl-5-(3, 3-dimethyl-2-oxobutylidene)-4-oxo-N-(thiazol-5-yl)-4, 5-dihydro-1h-pyrrole-3-carboxamides. *Pharm Chem J.* 2018;52(3):198-204.
11. Ilyasov KK, Demchenkov EL, Chernyshkov AS, Rodin IA, Pushkin SV, Povetkin SN, et al. Features of the phytopharmacological preparations in the metaphylaxis of urolithiasis. *Pharmacophore.* 2020;11(5):66-71.

12. Kazeev GV, Balkova II, Mironov VN, Rodin VI, Barannikov VM, Kudrina LN. Laser therapy and laser puncture for obstetric - gynecological diseases of cows. *Vet Med.* 2002;2:34.
13. Koshchaev AG, Blazhenko AN, Rodin IA, Mukhanov ML, Kiselev IG. Experimental substantiation of PRP usage as a tubular bones fracture therapy. *Adv Agr Biol Sci.* 2017;3(5):11-8.
14. Povetkin SN, Shantyz AKh, Yakimov YV, Rodin IA, Ziruk IV, Osipchuk GV, et al. Additional laboratory analysis of the veterinary and sanitary direction: identification of toxins and microorganisms using digital technologies. *Scientific Notes of the Kazan State Academy of Veterinary Medicine. N.E. Bowman.* 2014;220(4):188-91.
15. Semenenko MP, Kuzminova EV, Tyapkina EV, Rodin IA. Modern view on the use of natural bentonites in the prevention of gastroenteric pathology of piglets. *Res J Pharm Biol Chem Sci.* 2018;9(6):1513-7.