

# Use of Ovostim-CT in the prevention of hepatosis and retention of placenta in cows after calving

*P.V. Burkov*\*

FSBEI HE South Ural State Agrarian University, 13 Gagarina Str., Troitsk, 457100, Russian Federation

**Abstract.** High milk productivity of cows after calving is the cause of liver damage in the form of hepatosis and premature retirement of animals. In such cases, a pathological examination simultaneously reveals violations in the form of protein and fatty degenerations with the subsequent destruction of cells, as well as disturbed circulation in the liver. Also, hepatoses can cause such postpartum complications in cows as retention of placenta. For the prevention of hepatosis, the drug "Ovostim-ct" is proposed, which contains cytotoxic sera against the tissues of the liver, ovary, spleen and muscle. In order to prevent liver damage and postpartum retention of placenta, the drug is used 1-1.5 months before calving at a dose of 1 ml per 100 kg of live weight subcutaneously or intramuscularly. The use of the hepatoprotector allowed to reduce the number of cases of hepatosis and retention of placenta in cows after calving. Also, "Ovostim-ct" had a favorable effect on the biochemical parameters of the blood serum of cows: there was an increase in the concentration of total protein by 6.7%, albumin - by 15.6% and glucose - by 45.8% in the blood.

## 1 Introduction

Due to the high potential of milk productivity, intense metabolism in the transit period and immediately after calving, the liver in cows after calving is subject to significant stresses, which in most cases lead to forced culling and premature slaughter. In this regard, agricultural enterprises suffer significant losses, since the cow can not even justify the costs of its cultivation.

With the modern technology of milk production, associated with a sufficiently high level of animal feeding, it is almost impossible to create ideal conditions for maintaining health and productive longevity. Milk management is constantly looking for a compromise between maintaining high milk productivity and maintaining the cow health. Animal feed, even when properly prepared, contains a significant amount of harmful substances, such as mycotoxins, heavy metals, alkaloids and other toxicants. In the diet of cows, there is an imbalance of protein and individual amino acids, lipids, macro- and microelements. To a greater extent, the liver in cows is damaged by infectious diseases [1-8].

---

\* Corresponding author: [burcovpavel@mail.ru](mailto:burcovpavel@mail.ru)

Liver diseases in animals are more often presented in the form of fat and protein hepatoses, which are present in the organ at the same time. In addition to milk productivity, hepatoses have a huge impact on the state of the genitals in cows after calving and on the subsequent reproductive function of animals [9-11].

For the prevention of liver diseases in cows, the pharmacological and feed industry offers a significant variety of preparations and feed additives. Nevertheless, most often they are means of replacement therapy and are not able to have a general stimulating effect on the organ, to affect its reserve capabilities for recovery after damage.

Preparations containing cytotoxic sera can affect all the cells of the organs to which they are obtained, affecting various aspects of disease pathogenesis, activate the intensity of metabolism in the affected organ and bring it to a stable state.

These preparations include "Ovostim-ct" [12, 13]. It is a hepatoprotector that allows to prevent liver diseases while stimulating the immune and reproductive systems. The hepatoprotector contains antihepatotoxic, antisplenotoxic, antimyotoxic and antiovarial sera that have been hydrolyzed with acids and enzymes to eliminate pathological allergic reactions in animals after application. The preparation has no toxic properties and is safe for animals.

The purpose of the work is to determine the effectiveness of the use of the hepatoprotector "Ovostim-ct" in the prevention of hepatitis in animals and its subsequent effect on the postpartum period.

## **2 Materials and methods**

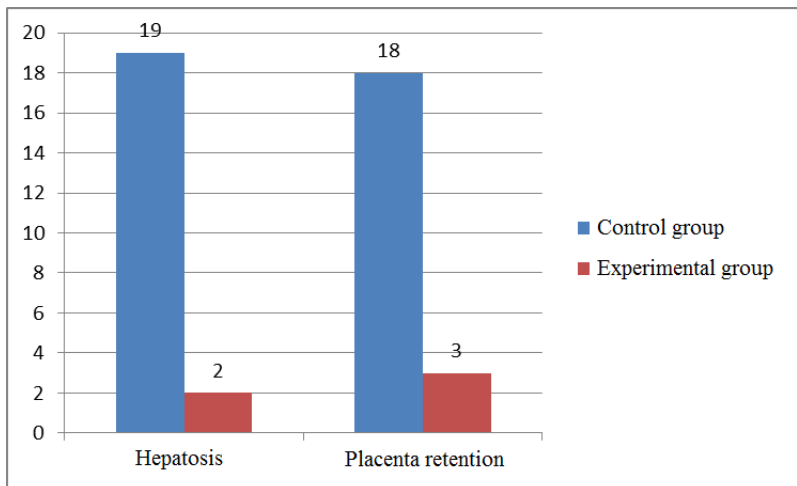
The experiments were carried out in compliance with the requirements set out in the EU Directives (86/609/EEC) and the Helsinki Declaration. Experimental studies were carried out on the basis of the IAPC "Chernovskoy". At the enterprise, two groups of cows were formed on the principle of analogue-pairs, 20 heads each, with a pregnancy period of 7.5-8 months. To determine the effectiveness of the use of the hepatoprotector "Ovostim-ct" in the prevention of hepatitis and its subsequent effect on the postpartum period, the cows of the experimental group were injected with the preparation at a dose of 1 ml per 100 kg of live weight once, subcutaneously or intramuscularly. After calving, the animals were monitored, clinical condition, timing of placenta separation were recorded. In the case of forced slaughter of an animal, a histological examination was performed to assess the condition of the liver. For this purpose, a piece of the affected organ was fixed in a 10% neutral formalin solution, paraffin blocks were made, from which histological sections were made. The sections were stained with hematoxylin and eosin. Hematoxylin stains basophilic cell elements bright blue, and eosin - eosinophilic organelles bright pink. Two weeks after calving, blood samples were taken from the control and experimental groups for biochemical testing. The content of total protein, albumins, and glucose was determined in the blood serum. The total protein was determined by colorimetric method using a set of reagents "Clinitest-OB". The method is based on the ability of proteins with copper ions in an alkaline medium to form complex compounds of purple color. The color intensity is proportional to the protein concentration in the test sample. Blood albumins were determined by reaction with bromocresol green using a set of reagents "Clini Test - Albumin". The method is based on the interaction of albumins with bromocresol green in a slightly acidic medium in the presence of a detergent, which is accompanied by the formation of a colored blue compound, the color intensity of which is proportional to the concentration of albumins. The glucose oxidase method for determining blood glucose is based on the reaction of glucose oxidation in the presence of the enzyme glucose oxidase to form hydrogen peroxide, which in turn, in the presence of peroxidase, oxidizes orthotoluidine to form colored products; the concentration of glucose is evaluated by the

number of colored products. Glucose in the presence of the enzyme glucose oxidase is oxidized by air oxygen to form hydrogen peroxide during the reaction. Hydrogen peroxide in the presence of the enzyme peroxidase oxidizes orthotoluidine to form a colored compound, the color intensity of which is proportional to the glucose content.

Statistical data processing was carried out using the table processor "Microsoft Excel – 2003" and the package of the application program "Biometrics".

### 3 Results and discussion

Figure 1 shows data on the preventive effectiveness of the preparation "Ovostim-ct" in relation to hepatitis and the retention of placenta after calving.



**Fig. 1.** Number of cases of hepatitis and retention of placenta in cows after calving.

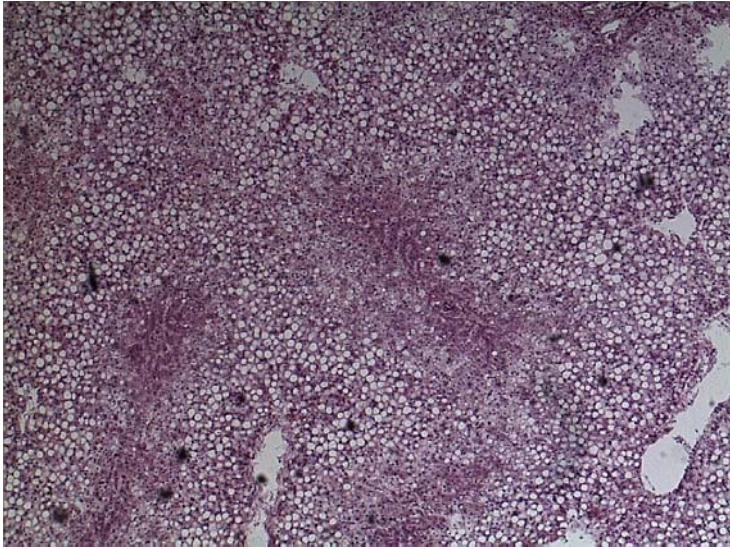
According to the data in Figure 1, it follows that the use of the preparation "Ovostim-ct" in animals before calving reduced the number of cases of hepatitis in animals. Thus, in the control group 19 cows got sick, in the experimental group - 2. It should also be noted that the biopreparation allowed to reduce the number of cases of placenta retention in animals to 3 in the experimental group of cows against 18 in the control group. At the same time, it should be noted that all cases of placenta retention were accompanied by postpartum endometritis.

Clinical signs of hepatitis in animals were characterized by the following changes: depression, weakness, progressive emaciation, forestomach atony. One cow was subjected to forced slaughter.

After forced slaughter and autopsy, the liver of the animal is slightly enlarged in volume, the edges are flat. The parenchyma is flabby, heterogeneously colored: from cherry-red to ochre-yellow, slightly bulging on the incision. The gallbladder is enlarged, the walls are thinned, filled with bile of a thick consistency. When the organ was cut, a characteristic greasy coating was observed on the knife.

Also, during the autopsy, dystrophic changes in the heart, kidneys, and signs of pulmonary edema were observed.

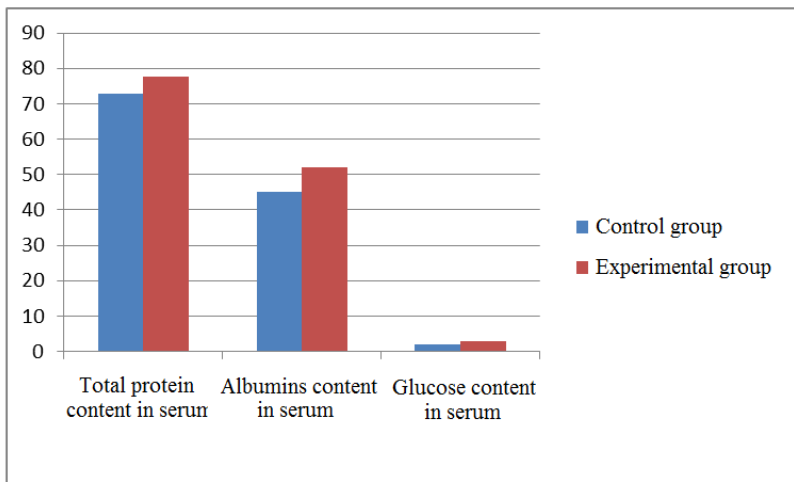
The results of the histological examination of the liver are shown in Figure 2.



**Fig. 2.** Liver. The initial phenomena of autolysis of hepatocytes. Venous and capillary hyperemia and centrilobular macrovesicular steatosis. Staining with hematoxylin and eosin  $\times 50$

According to the data in Figure 2, it is established that the organ is destroyed by hepatocytes with simultaneous accumulation of blood in the veins and capillaries. The hepatic cords are compressed in places of hyperemia. Also there is a phenomenon of steatosis in the organ by the type of cell infiltration. Such hepatocytes are enlarged in size, rounded in shape, the nucleus is shifted to the periphery of the cell.

Figure 3 shows the results of a biochemical study of the blood serum of cows after calving.



**Fig. 3.** Biochemical parameters of blood serum of cows after calving.

When studying the blood serum, it was found that the use of the preparation "Ovostim-ct" as a means of prevention had a positive effect on the biochemical composition of the blood of cows. Thus, in comparison with the control group, the total protein content in the blood serum increased by 6.7% ( $p < 0.05$ ), the number of albumins increased by 15.6% ( $p < 0.05$ ), and the glucose concentration increased by 45.8% ( $p < 0.05$ ).

## 4 Conclusions

Liver damage in cows after calving is accompanied by severe structural changes in the organ in the form of fat, protein dystrophy, microcirculatory disorders and, ultimately, the destruction of hepatocytes. The use of the preparation "Ovostim-ct", which has hepatoprotective properties, allowed to reduce the number of cases of hepatitis in cows after calving, to reduce the number of placenta retention. The preparation "Ovostim-ct" had a favorable effect on the biochemical parameters of the blood serum of cows: there was an increase in the concentration of total protein, albumin and glucose in the blood.

## References

1. Y. Shen, L. Chen, W. Yang, Z.Wang, *Sci Rep.* **8(1)**, 13574 (2018) doi: 10.1038/s41598-018-31845-0. PMID: 30206404; PMCID: PMC6133919
2. C. Gerspach, S. Imhasly, M. Gubler, H. Naegeli, M. Ruetten, E. Laczko, *Res Vet Sci.* **110**, 47-59 (2017) doi: 10.1016/j.rvsc.2016.10.001. Epub 2016 Oct 5. PMID: 28159237
3. M. Tharwat, D. Endoh, S. Oikawa. *Res Vet Sci.*, **93(3)**, 1281-6 (2012) doi: 10.1016/j.rvsc.2012.03.011. Epub 2012 Apr 17. PMID: 22513126
4. C. Gerspach, S. Imhasly, R. Klingler, M. Hilbe, S. Hartnack, M. Ruetten, *BMC Vet Res*, **13(1)**, 98 (2017) doi: 10.1186/s12917-017-1004-9. PMID: 28403840; PMCID: PMC5389092
5. E. Bogin, Y. Avidar, M. Merom, S. Soback, G. Brenner, *J Comp Pathol*, **98(3)**, 337-47 (1988) doi: 10.1016/0021-9975(88)90042-4. PMID: 3392248
6. J.J. Veenhuizen, J.K. Drackley, M.J. Richard, T.P. Sanderson, L.D. Miller, J.W. Young *J Dairy Sci.*, **74(12)**, 4238-53 (1991) doi: 10.3168/jds.S0022-0302(91)78619-0. PMID: 1787194
7. Y. Gröhn, L.A. Lindberg, *J Comp Pathol* **95(3)**, 443-52 (1985) doi: 10.1016/0021-9975(85)90049-0. PMID: 4031138
8. B.J. Gerloff, *Vet Clin North Am Food Anim Pract*, **16(2)**, 283-92 (2000) doi: 10.1016/s0749-0720(15)30106-7. PMID: 11022341
9. I.M. Reid, R.A. Collins, *Invest Cell Pathol.* **3(3)**, 237-49 (1980) PMID: 7429883
10. G. Bobe, J.W. Young, D.C. Beitz, *J Dairy Sci.* **87(10)**, 3105-24 (2004) doi: 10.3168/jds.S0022-0302(04)73446-3. PMID: 15377589
11. K. Tanemura, T. Ohtaki, M. Ono, S. Tsumagari, *J Vet Med Sci.* **78(5)**, 755-60 (2016) doi: 10.1292/jvms.14-0637. Epub 2016 Jan 16. PMID: 26781845; PMCID: PMC4905827
12. D.V. Olkhovsky, P.V. Burkov, A.A. Romanov, Pat. 2712524 Rus. Federation, MPK A61K 35/16, A61K 35/50, A61P 15/00. patent holder of the South Ural State Agrarian University. - No. 2018140102; application No. 13.11.2018; Publ. 29.01.2020, Bul. No. 4.
13. D.V. Olkhovsky, P.V. Burkov, A.A. Romanov, Pat. 2651775 Rus. Federation, MPK A61K 35/16, A61P 15/00, patent holder of the South Ural State Agrarian University, No. 2016124595; application No. 20.06.2016; publ. 23.04.2018, Bul. No. 12.