ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Correction the reproductive function of cows with fatty liver dystrophy.

Nikolay Vasilyevich Belugin*, Natalya Aleksandrovna Pisarenco, Valentina Michajlovna Shpygova, Vladislav Anatoljyevich Porublyov and Vladimir Anatolyevich Meshcheryakov.

Stavropol State Agrarian University, Faculty of Veterinary Medicine, Zootekhnicheskiy lane 12, Stavropol 355017, Russia

ABSTRACT

The aim of the study was to assess the therapeutic efficacy of the drug based on healthy liver hydrolysate and its effect on the restoration of reproductive function in cows with revealed clinical signs of fatty liver dystrophy. For this purpose two groups of animals on 15 heads each were formed; the first group included first-timers in days after calving at which borders of a liver found by percussion method, the second group included animals in a month after. They were administered 40 ml of healthy liver hydrolysate daily (20 ml intramuscularly and 20 ml subcutaneously), a course of treatment for 5 days. After the 1st stage, the remaining 25 cows of both groups were combined into one test group of the 2nd stage, followed by periodic follow-up to the next calving and insemination; 25 animals that were not subjected to hepatoprotective therapy were monitored. Cows that were even one treatment was better adapted to the post-Natal period and subsequent insemination. They have a faster involution of the uterus and the resumption of the sexual cycle ($P<0.001$), higher fertility, a greater number of healthy calves.

Keywords: symptomatic infertility, endometritis, cows, novocaine, oxytocin, autohaemotherapy

Corresponding author

ISSN: 0975-8585

INTRODUCTION

In the first place among liver pathologies in newborn cows and heifers on dairy complexes is fat [11, 12, 13, 14, 15] and toxic dystrophy. At the same time, economic damage is formed not only from obvious losses, but also because it seems impossible to determine the intensity of the distribution of these pathologies in a herd of highly productive animals [11, 13, 15], which entails latent losses [12, 14].

The intensity of the dystrophic processes depends on the individual characteristics of the organism [15] and the season of the year: in the winter, manifestations of these pathologies occur much more often than in the summer. In addition, the degree of their expression in heifers and cows is not the same. In the liver, the first-born under unfavorable conditions, the destruction of hepatocytes occurs more intensively. To the specific features of the microscopic structure of the liver, the first-person refers to the pronounced variability of the form and size of hepatocytes [5].

De-amination of amino acids in the liver is accompanied by the formation of ammonia, neutralization of it occurs by the synthesis of urea with a large expenditure of energy. Therefore, in violation of metabolic processes, urea synthesis decreases and ammonia begins its action as a strong cellular poison, which causes the occurrence of toxic dystrophy of the liver. Fatty degeneration of the liver is caused by a change in trophism [15] and the morphology of hepatocytes due to impaired energy metabolism in the body and the infiltration of liver tissues with lipids [13]. Failure to comply with the technological conditions of feeding and keeping, non-compliance with sanitary hygiene requirements and the use of poor-quality fodders cause a general metabolic disorder in animals, while the resistance of the organism decreases, the functions and the entire physiological activity of the organism change. Deviations in metabolism in highly productive cows, which are more sensitive to adverse effects, arise primarily in the liver. Ultimately, yield and fertility are reduced [11, 12, 14].

It should be noted that liver tissue has the highest capacity for regeneration. With the maintenance and creation of conditions for metabolic processes, the liver is able to perform an independent regeneration, with the restoration of blood vessels and bile ducts. Therefore, the urgent task is to improve the methods of pharmacocorrection and pharmacoprophylaxis of violations of liver function and the occurrence of fatty and toxic dystrophy.

The purpose of our studies was to study the therapeutic and prophylactic efficacy of the drug based on the hydrolyzate of a healthy liver with fatty liver dystrophy on the reproductive function of cows. The task of our research was to study the therapeutic and preventive efficacy in cattle hepatoses, a drug created on the basis of hydrolyzate of healthy liver in order to restore reproductive function.

MATERIALS AND METHODS

The work was carried out in the conditions of the dairy complex of OJSC Urozhainoye, Novoaleksandrovsky district of the Stavropol Territory on the headwheels of the Yaroslavl Holstein breed at the age of 2.5 years, above the average fatness and body weight of 450 kg, with the planned milk yield for lactation of over 8000 kg. In the course of the research, the analysis of the documentation on the horticulture and the disposal of animals was carried out between January and June 2013, inclusive, biochemical studies of urine were conducted, clinical methods for diagnosing liver status in animals before and after treatment were used.

Table 1: Retirement of the first calving for half a year

Month	Total calving, head	Disposal due to fatty liver disease	
		Head	% from calving
January	18	8	44
February	19	4	21
March	15	1	6
April	18	3	16
May	22	5	22
June	43	11	25
Total	135	32	average 22,5

During the observation period, the primary process was dropped, mainly within two to three weeks after the calving. The highest percentage of drop-out of the first-calves after calving was observed in January (Table 1). In forced slaughter in all animals, external examination showed depletion, dehydration (falling of the eyeballs), ruffling, dryness and fragility of the hairline. At the opening of the abdominal cavity and examination of the internal organs, changes in the liver were observed in all animals, it was enlarged in size, clay-yellow in color, with a cut of the edge it did not converge, a fat coating remained on the knife, the tissue of the liver easily tears.

For the treatment and prevention of hepatosis in animals after calving, a preparation made from the liver of healthy animals by hydrolysis was used. A standard procedure for the complete hydrolysis of peptides or protein is to heat this peptide or protein with an excess of 6 N. HCl at 100-120 ° C for 10-24 hours in a flask of heat-resistant glass from which air is previously evacuated. The suspension obtained as a result of repeated pipetting is washed by centrifugation on the principle of precipitation of higher structural compounds. In this case, short and primary peptide bonds are absent in the hydrolyzate (and not in the lysate). Then a solution of mineral salts is injected into the composition of this agent to an isotonic concentration. The hydrolyzate obtained in this way containing amino acids in the form of hydrochlorides and mineral salts of isotonic concentration is adjusted to a pH value of 5.7-7.0.

Therapeutic and preventive efficacy is achieved directly by administering the hepatoprotective agent by injection subcutaneously, intramuscularly or intravenously once a day. With the therapeutic purpose of the new-born cows with live weight of 350-550 kg, for which hepatic changes occur with concomitant changes in peristalsis of the prednis, general exhaustion and metabolic disorders, the dose of the drug is 20.0-40.0 ml, 0.5 doses are injected subcutaneously and 0.5 doses intramuscularly simultaneously for 5-6 days in a row. With maternal paresis and animals in critical condition, with obvious signs of accumulation, and to avoid a fatal outcome, the drug is administered daily intravenously at a dose of 100-200 ml, in a 1: 1 dilution with 40% glucose, until the threat of forced slaughter is eliminated, and further according to the scheme for novice cows. With a view to prevention, we recommend that dry-bodied cows weigh 350-550 kg in a dose of 10-20 ml with an interval of 7-10 days, a total of 5-7 injections.

Taking into account the medical measures on the principle of analogues, two groups of animals were formed with 15 heads each: the first group included heifers one day after the calving, with an enlarged liver with percussion; the second group included animals one month after calving with clinical signs of deep liver dystrophy, including cachexia, a refusal to feed, a loss of milk production. The course of treatment is 5 days, the dose of the drug is 40 ml (20 ml intramuscularly and 20 ml subcutaneously).

All animals underwent percussion of the liver before and after treatment, to determine its boundaries, as well as auscultation of the scar to determine its contractile activity. Technique of percussion of liver boundaries: the 12th intercostal margin of the liver blunting is at the level of the middle of the scapula, and in the 10th intercostal space the dull sound of the liver passes sharply into the tympanic sound of the lung. At auscultation of the scar in the middle of the famine fossa, diseased animals are noted atony, for a short time a weak sound of "rustle" is heard.

RESULTS AND DISCUSSION

The criterion for a positive result was an improvement in the general condition of the animal, reduction of the liver boundaries to the limits of normal (Table 2).

Table 2: Results of liver percussion in the first calving before and after treatment (M ± m, n = 15)

Group	The area of hepatic blunting	
	before treatment	after treatment
1	18,90 ± 0,33^	^^{2}11,00 ± 0,22
2	19,60 ± 0,51^	^^{1}12,70 ± 0,18

(^-P<0,001;$^{1, 2}$- groups number)

In the first group, the borders of blunting of the liver with percussion decreased by the fifth day of treatment by 41.8%, in the second group the dimensions of hepatic dulling decreased by 35.2%. A positive

result of treatment is confirmed by a significant improvement in the general condition of the animals. The appearance of appetite and active chewing gum indicate the resumption of cicatricial motility.

We conducted a comparative analysis of the studies obtained (Table 3), taking into account the culling of animals due to loss of productivity, retirement as a result of forced slaughter, average daily yield before and after treatment, and the number of animals that went hunting.

Table 3: Results of treatment of fatty liver dystrophyat the first calving (M ± m, n = 15)

Group	Culling		Retirement		Yield of milk, l/day		impregnated	
	Head	%	Head	%	before treatment	after treatment	Head	%
1	1	6	0	0	24,0±0,50	29,0±0,52***	13	86
2	4	26	1	6	17,0±0,51	24,0±0,51***	7	46

Note: *** P <0.001 according to the t-test when compared with milk before treatment.

The advantage of the proposed method is that it allows, with the help of percussion of the liver, to more quickly control the clinical state of its dimensions, since the results of subclinical (laboratory) analysis, and especially histological examination, as practical practice shows, enter the farm at least 7-14 days.

The essence of specific symptomatic metaboliotherapy lies in the fact that the composition contains amino acids of the hepatic tissue of clinically healthy animals, obtained by hydrolysis, and therefore its injection into the body by injection allows selective use of the constituents of the preparation with liver of sick animals, since there is a genetically conditioned dependence in the body in the use of composite structural ingredients derived from similar tissues. Hydrolytic cleavage of the protein structures of the liver extract leads to the breakdown of long polypeptide chains of the protein to amino acids. In this regard, amino acids lose protein specificity, colloidal properties and no longer have individual toxicity, neither teratogenic, nor antigenic, nor allergic and anaphylactic properties, characteristic for the incompatibility of protein tissues. However, amino acids retain their bipolar affiliation to liver tissue.

Intravenous administration of the drug for the treatment and prevention of hepatosis and fatty degeneration in cows is used in connection with the fact that in case of liver disease, the intake of the therapeutic and prophylactic drug together with the feed and its assimilation will be ineffective due to the digestive characteristics of ruminant animals, moreover, the patient an animal, as a rule, lacks appetite. As for the digestive characteristics of ruminants (cows, sheep, goats, camels, etc.), the solution of a therapeutic and prophylactic agent containing amino acids that has entered the digestive system can be used by microorganisms and the animal's organism as nutrients, in addition to this It is impossible to accurately control the dose of the medicinal product in the body together with the feed. Intravenous injection of a solution of liver hydrolyzate promotes faster and better diffusion (penetration) into the liver than when it is taken with food, as a result of which regenerative processes and the binding of toxic substances are more actively carried out. After the 1 st stage, the remaining 25 cows of both groups were treated as one experimental group of the 2nd stage, followed by periodic observation until the next calving and insemination. Control was performed by 25 animals not exposed to hepatoprotective therapy.

Table 4: Results of use the liver hydrolyzate on cows reproductive indicators (M±m, n =25)

Criteria	Test	Control
Involution of the uterus, days	26,80 ± 0,37***	34,68 ± 0,16
The beginning of the sexual cycle, days	49,60 ± 0,24***	56,40 ± 0,29
Number of inseminations on the head	1,44	2,8
Fertile insemination, days	73,60 ± 0,37***	79,80 ± 0.47
Insemination index	1,5	2,7
Fertilized, goal.	16	5
Infertility, days	51,64 ± 0,27***	63,60 ± 0,46
Pathology, numberof	1 abortion	2 of the still born
Obtained healthy calves, n.	15	3

Note: *** P <0.001 for the t-test when compared with the control.

From the digital material of Table 4, it can be seen that cows who underwent even one treatment procedure are better adapted to the previous calving and the new period. They quickly underwent the involution of the reproductive organs and the onset of the sexual cycle. In this case, the experimental animals were three times higher than fertilization and fewer days of infertility.

The results could be much higher if the cows who had received the treatment course after calving had previously received preventive therapy before calving [9, 10] at a dose of 10-20 ml with an interval of 7-10 days (5-7 injections in total), instead of 5 days in a dose of 40 ml, at least.

With this liver pathology, the acute form runs from 4 to 7 days, subacute-lasts from seven days to three weeks, and without active pathogenetic therapy can lead to the death of the animal or the forced slaughter and withdrawal of highly productive cows from the herd [9, 14]]. The chronic course of liver lipidosis does not lead to ruminant animals lethal, but they can be the object of culling for productivity and reproductive ability without therapeutic measures [10, 13]. Recently, in novice cows, even with a subclinical form of obesity, the lengthening of the service period has been established [11, 12, 13, 15]. Since the lipidic liver causes a delay (ie, the resumption of cyclic ovarian activity) of normal estrus after calving, this increases the number of inseminations before fertilization. The main metabolic cause, in this case, is the lack of formation in the liver of glucose and a violation of the metabolism of sex steroids - a process that occurs in the liver. In this context, one can find an explanation for why reproductive function, as a rule, is more often violated with high productivity of cows. In these cases, there is expressed carbohydrate (glucose) insufficiency and excessive mobilization of lipids, which can disrupt liver function, primarily glucose-synthesizing and steroid-metabolizing. With a low concentration of glucose in the blood, its availability is reduced for peripheral tissues and the hypothalamic-pituitary-gonadal connections necessary for reproductive function are impaired. On the other hand, the cells of the lipidic liver because of reduced functional activity cannot provide the necessary metabolism and/or catabolism of sex steroids, which leads to a violation of reproductive function [15].

CONCLUSION

One of the important priorities in the distribution and operation of cows in the early phase of lactation is to consider the maintenance of normal liver function [11, 12, 15] for the effective maintenance of not only metabolism and productivity, but also the reproductive function of animals [15]. At the same time, we believe that the use of liver hydrolyzate for prophylactic purposes before calving will reduce gynecological diseases and disrupt reproductive cycles. This hepatoprotective drug can be successfully used not only for the treatment of fatty liver but also for other types of hepatitis disorders. In addition, the drug used has never shown side effects during its use and in the conditions of other farms.

REFERENCES

[1] Bobe G., Young J.W. and Beitz D.C. Pathology, etiology, prevention, and treatment off atty liver in dairy cows. Journal of Dairy Science, 2004. Vol. 87, N 10, P. 3105-3124.
[2] Goff J.P. and Horst R.L. Physiological changes at parturition and their relationship to metabolic disorders. Journal of Dairy Science, 1997. Vol. 80, N 7, P. 1260-1268.
[3] Kapp P., PethesGy., Zsiros M. and Schuster Z. Contribution of the development of the fatty liver syndrome in high producing dairy-cows. Magy Álatovr Lapja, 1979. Vol. 34, P. 458-461.
[4] Mulligan F.J. and Doherty M.L. Production diseases of the transition cow. Veterinary Journal, 2008. Vol. 176, N 1, P. 3-9.
[5] Reid I.M. and Robertc C.J. Subclinical fatty liver in dairy cows. Irish Vet. J., 1983, N 37, P. 104-110.
[6] Stockdale C.R. Body condition at calving and the performance of dairy cows in early lactation under Australian conditions: a review. Australian Journal of Experimental Agriculture, 2001. Vol. 41, N 6, P. 823-839.
[7] West H.J. Liver function in dairy cow sinlate pregnancy and early laclation. The Bovine Practitioner, 1990, N 25, P. 127-130.