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Research paper



Efficacy of Dosages of the Embryonic Stimulant Preparation for Preventing of Postpartum Complications in Cows

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Abstract

The research was aimed at determining the optimal dosage of "STEMB" (Embryonic Stimulant) for preventing delivery and postnatal complications, for which purpose 4 groups of 20 cows in each were formed. During the experiment, the animals in the studied groups were in similar feeding and keeping conditions, dry matter in the diet amounted to 44.95%. The animals in the experimental groups received "STEMB" subcutaneously three times in the 30 days period before delivery with the interval of 7 days in the following dosages: the first experimental group received 0.05 ml per 1 kg of live weight; the second experimental group received 0.075 ml per 1 kg of live weight; the third experimental group received 0.10 ml per 1 kg of live weight; the cows in the reference group did not receive the preparation. It has been determined that the dosage of "STEMB" equal to 0.075 ml per 1 kg of live weight prevents postpartum complications, shortens the labor and the postpartum period. The obtained data may be used for developing the reference criteria of using "STEMB" for correcting the reproductive function and preventing complications during delivery and postnatal complications.

Keywords: *Embryonic Stimulant, delivery, involution, lochia, endometritis.*

1. Introduction (literature review)

In modern economic conditions, the problem of preventing infertility is still very relevant to the veterinary science. Scientific studies in the recent years show that pathologies of pregnancy, delivery and the postpartum period in the animals are caused by functional metabolic disorders [1], [2].

Disruptions of metabolism in the organisms of animals are caused by errors in feeding and prolonged lactation. This contributes to the shift of the acid-alkali balance, which results in deteriorated organism protection [3], [4].

According to M.A. Bryan [5], M. Drillich [6], in order to correct treatment of reproductive disorders in cows, some researchers recommend using hormonal, antimicrobial, enzyme preparations, which, according to other authors, namely, J.S. Brickell [7], C. Fourichon [8], does not always result in normalization of reproductive organs' functioning to the level of healthy animals. In the recent years, in order to improve the immune properties of the organism with the purpose of preventing and treating sexual pathologies, preparations of plant and animal origin have been widely used in medical practice. However, the use of these preparations is often imperfect and undefined, haphazard and inefficient. In this respect, the search for new medications with the pathogenetic effect on the organism is one of the main tasks of improving the preventive measures of the postdelivery pathology. To date, the dosage of using an "STEMB" (Embryonic Stimulant) preparation of animal origin for preventing postpartum complications has not been determined in the world's and domestic practice.

2. Relevance

It is known that during the second half of pregnancy, the organism of highly productive cows experiences intensive loads due to increased growth vigor of the fetus; the lack of energy in the organism of a cow is compensated for at the expense of its own reserves, which may result in various metabolic disorders; in high-yielding cows, it is also determined by prolonged duration of lactation for over 350 days. In this respect, determination of the optimal dosage of "STEMB" for preventing postpartum complications in high-yielding cows is relevant.

3. Materials and methods

The research was performed on cows of the Holstein breed in the conditions of JSC NIVA in the Samara region, Russian Federation. To determine the optimal dosage of "STEMB" for preventing complications during delivery and postpartum complications in cows with the duration of pregnancy between 7.5 and 8.0 months, four groups of 20 cows in each (reference, experimental 1, experimental 2, experimental 3) were formed in compliance with the principle of analog pairs. The duration of pregnancy was determined according to the primary documentation - log of insemina-

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tion and calving, through rectal examination, and with the use of ultrasound machine KAIXIN-5200 VET. The animals in the studied groups were in identical feeding and keeping conditions.

For preventing complications during delivery and postpartum complications, the animals in experimental groups received tissue "STEMB" injected three times subcutaneously into the neck 25-30 days before calving in 7 days intervals at the following dosages: first experimental group – 0.05 ml per 1 kg of live weight; second experimental group – 0.075 ml per 1 kg of live weight; and third experimental group – 0.10 ml per 1 kg of live weight. Before the use, the preparation was stirred and warmed to room temperature.

"STEMB" is made of embryonic tissues of chicken. It is an efficientbiostimulant. It has immunomodulatory, adaptogenic, bacteriostatic and pathogenetic action, and can stimulate vital functions of the organism due to the changes in the energy exchange processes, which also influences the enzyme system. "STEMB" enhances secretory and regenerative ability of mucous cells of the reproductive system, liver, and the digestive tract. "STEMB" was used according to the temporary instruction with State Registration No. 065/00569TU929/-007-05377152-2003 (authors: Timchenko L.D., Rzhepakovsky I.V., et al. 2003) [9].

During the research aimed at determining the optimal dosages of "STEMB" for preventing postpartum complications in cows, and at improving the efficacy of their comprehensive use for preventing postpartum pathologies, clinical, obstetric-gynecologic, reproductive parameters of the studied groups of cows were considered. Reproductive qualities of cows were studied by the duration of labor (the nature of delivery was determined for 5 cows from each group), the postpartum period, manifestations of postpartum complications with definition of their form, uterus involution, the time of the first appearance of ovary cycle after delivery, impregnation capacity during the first and subsequent heats, insemination index, duration of the period of successful insemination after calving, and regression of corpus luteum.

All obtained digital materials about experimental data were checked with variational statistics for veraciousness of the difference among the compared indicators with the use of Student's test adopted in biology and animal science, with the use of Microsoft Excel software suite.

The degree of veraciousness of the processed data was denoted by appropriate symbols $P < 0.05^{*}$; $P < 0.01^{**}$; $P < 0.001^{***}$.

4. Results

Subcutaneous injection of "STEMB" to the animals in the experimental groups in the dosages of 0.05; 0.075; 0.10 ml per 1 kg of body weight three times within 25-30 days before calving in 7 days intervals had a different effect on delivery and involutional processes in genital organs.

Table 1: The flow of delivery and the postpartum period in the studied groups of cows

Indicators	Groups of animals			
	reference	experimental 1	experimental 2	experimental 3
Duration of the preparatory stage of delivery, h	7.83±2.05	7.40±0.66	6.71±0.46	6.73±0.55
Duration of spasms, min	12.72±0.52	13.54±0.25	15.33±0.28	15.42±0.17
Duration of the stage of fetus delivery, min	44.18±4.16	42.74±2.08	32.17±2.06	32.15±1.18
Duration of spasms and labor, min	52.63±1.28	57.18±1.08	63.77±1.31*	63.79±1.24
Duration of the postpartum period, h	8.45±1.70	6.70±1.28	5.32±0.64	5.49±0.81
Termination of lochia discharge, days	17.37±0.66	12.63±0.42**	11.12±0.97**	10.72±0.46**
Involution of the uterus, days	31.74±2.07	24.17±0.86**	23.08±0.71**	22.05±0.26***
Regression of corpus luteum, days	16.85±0.77	12.16±0.59**	10.76±0.56**	10.82±0.84***

Analysis of these data showed that during the preparatory stage, labor activity was reduced in the animals in the reference group, the fact of whichwas manifested by shorter spasms and longer pauses between them, which was consistent with the opinion of J.E.P. Santos [10] that shortened duration of spasms and increased pauses between the spasms indicated insufficient preparedness of cows for delivery.

It is known that the process of extracting the fetus largely determines the course of involutional processes in the uterus and the duration of the postpartum period. The stage of fetus extraction starts after rupturing of the amniotic shell and fetus wedging into the cervical canal.

Contractions of muscles in the uterus and of the abdominal muscles in the reference group longed for 52.63 sec, which was by 4.55, 11.14, 11.06 sec longer than in the first, the second and the third experimental groups of cows, respectively, which received three injections of "STEMB" in 7 days intervals before labor in the dosages of 0.05, 0.075 and 0.10 ml per 1 kg of live weight.

In the animals from the second and the third experimental groups, the duration of fetus extraction was significantly shorter than in the reference group and in the first experimental group, which received injections of "STEMB" in the dosage of 0.05 ml per 1 kg of live weight. The duration of fetus extraction in the reference group of cows was 44.18 min, in the first experimental group – 42.74 min, in the second experimental group – 32.17 min, and in the third experimental group – 32.15 min.

The duration of the postpartum stage in the reference group was 8.45±1.70 h, which exceeded the indicators of the cows in the first, second and third experimental groups by 1.75; 3.13; and 2.96 h, respectively. The duration of the postpartum stage in the cows from the second and the third experimental groups was 5.32±1.14 and 5.49±0.94 h. The difference in the duration of the postpartum stage in the reference and the second and the third experimental groups was statistically veracious (P<0.05).

The research has shown that, depending on the dosage of "STEMB", labor duration in the examined groups of cows was different. In the reference group, it was 17.01±0.88 h; in the first experimental group – 14.80±0.54 h, in the second experimental group – 12.56±0.45 h, and in the third experimental group - 12.75±0.61 h, which was 4.44 h less than in the reference group of cows, the difference being statistically veracious (P>0.05).

The use of "STEMB" tissue preparation of animal origin at the dosage of 0.075 ml for preventing complications during labor shortened the duration of delivery, prevented retention of placenta, stimulated uterine contractility, which was reflected in the nature of the flow of the postpartum period, and its duration.

Excretion of lochia in the cows in the reference group had stopped by 17.37 days, which was 4.74 days longer than in the animals in the first experimental group, 6.25 days longer than in the animals of the second experimental group, and 6.65 days longer than in the animals in the third experimental group. The difference was statistically veracious (P>0.01). During the first day after calving, all experimental cows excreted lochia in the form of bloody thick opaque mucus without odor.

Uterus involution in reference animals was complete by day 31.74±2.07 of the postpartum period, which was 7.57 days longer than in the first experimental group of cows, 8.66 days longer than in the second experimental group, and 9.69 days longer than in the third experimental group (P<0.001).

Pregnancy corpus luteum regression was shorter in the animals in the third experimental group and amounted to 10.82 days, which was 6.03, 1.34, and 1.94 days less than in the cows in the reference, the first and the second experimental groups, respectively. The difference was statistically veracious (P>0.01). In the ovaries

of the animals in the third experimental group, follicles of the size of a bean were palpable on days 10-12 of rectal examination.

Table 2: The flow of delivery and the postpartum period in the studied groups of cows

The nature of postpartum period %	Groups of animals			
	reference	experimental 1	experimental 2	experimental 3
Normal	50.0	60.0	80.0	80.0
Uterus subinvolution, including	30.0	20.0	20.0	10.0
acute catarrhal pyometra	20.0	20.0	10.0	10.0

Disruption of involutional processes in genital organs in the cows from the experimental groups varied depending on the dosage of "STEMB". In the reference group, in 12 cows (50.0%), the postpartum period proceeded without disruptions of involutional processes, while in the first experimental group, normal flow of the postpartum period was observed in 60.0% of animals that received three subcutaneous injections of "STEMB" 25-30 days before calving in 7 days intervals at the dosages of 0.05 ml per 1 kg of body weight, and in the animals in the second and the third experimental groups, which received injections of "STEMB" at the dosage of 0.075 and 0.10 ml per 1 kg of live weight during the postpartum period,itcorresponded to the norm in 80.0% of animals. In using "STEMB" at the dosage of 0.075 and 0.10 ml per 1 kg of live weight (the second and the third experimental groups), the indicator of normal flow of the postpartum period increased, compared to the use of "STEMB" in the dosage of 0.05 ml per 1 kg of live weight, by 20.0% (the first experimental group), and by 30.0%, compared to the reference group.

Postpartum complications were manifested in the form of uterus subinvolution subsequently complicated by acute catarrhal pyometra with the frequency occurrence depending on the dosage of "STEMB" for preventing postpartum pathology. In case of using "STEMB" in the dosage of 0.05 ml, uterus sub-involution was complicated by acute catarrhal pyometra in 20.0% of cases, and in case of using "STEMB" in the dosage of 0.075 and 0.10 ml, subinvolution was complicated by acute catarrhal pyometra in 10.0% of cases, which was 50.0 % lower.

The data about the flow of postpartum period obtained during the research showed that duration of involutional processes in genital organs in animals from the reference group were more prolonged in terms of excretion of lochia, vibration of uterine arteries, uterine involution, regression of corpus luteum, restoration of the vulva and pelvic ligaments. The difference between the reference and experimental groups of cows was statistically veracious. Prophylactic efficacy of postpartum complications in case of using "STEMB" in the dosage of 0.075 and 0.10 ml was 80.0%.

Therefore, increasing the dosage of "STEMB" by more than 0.075 ml per 1 kg of live weight did not increase its efficacy, and in case of using it in the dosage of 0.05 ml per 1 kg of live weight, its prophylactic efficacy was less by 20.0%.

5. Discussion

The research results have shown that given the strict industrial technology of milk production, it is very difficult to create appropriate conditions for ensuring normal metabolism, which would allow combining high milk yields and normal fertility of cows. Since the discussed problem is multifaceted, the authors first studied preventive properties of "STEMB" dosages that have pathogenetic, immune-stimulating and regenerative properties from the comparative perspective. Delivery in experimental groups of animals was not similar. Duration of delivery in the animals in the first experimental group, which received injections of "STEMB" in the dosage of 0.05 ml per 1 kg of live weight, was longer by 2.24 and 2.05 h than in the animals from the second and third experimental groups that received injections of "STEMB" at the dosage of 0.075 and 0.10 ml, respectively. The duration of labor and spasms in the animals from the second experimental group was longer by 6.59 and 11.14 seconds than in the animals from the first experimental and reference groups, and the difference in the duration of labor and spasms among the animals from the second and the third experimental groups was only 0.08 seconds, which apparently was the consequence of better contractility of the myometrium due to activation of metabolic processes in the organism of the cows in these groups. In the animals from the first experimental group, 3 cases of heamdelay were noted; these data were consistent with the studies by J. Dubuc [11], D.S. Watches [12], who stated that disruptions of metabolic processes in pregnant animals affected functional and morphological state of the placenta, disrupting the uteroplacental blood flow, which resulted in chorionic swelling that led to complete fusion of the fetal and the maternal parts of the placenta, which was the reason for heam delay. When "STEMB" was injected into cows 30 days before calving in the dosage of 0.05 ml, uterus subinvolution was observed in 20% of animals, which in 20% of cases was complicated by purulent catarrhal endometritis. The process of uterus involution in the animals in the second experimental group was completed during 23.08 days. The difference between the uterus involution completion in the animals of the second and the third experimental groups was 1.03 days, and was not statistically significant, which showed that the optimal dosage of "STEMB" was 0.075 ml for preventing postpartum complications in cows 30 days before delivery.

The obtained for the first time experimental data confirm that the dosage of "STEMB" preparation with a wide spectrum of action (immunomodulatory, adaptogenic, bacteriostatic, pathogenic) at the dosage of 0.075 ml per 1 kg of live weight injected subcutaneously three times in 7 days interval for 30 days before delivery can be recommended for use in cows during the prenatal period to prevent postnatal complications, thereby reducing the pathology of delivery and the postpartum period by 80%, and will improve the calves' yield.

6. Conclusion

The results of the research allow drawing a conclusion about the possible use of "STEMB" at the dosage of 0.075 ml per 1 kg of body weight subcutaneously three times in 7 days intervals for 25-30 days before delivery for preventing postnatal complications in veterinary practice.

The data obtained for the first time supplement the data about the efficacy of using tissue preparations of plant and animal origin, and bring new amendments to the method of using tissue therapy for highly productive cows.

The authors have determined the optimum scheme of subcutaneous use of "STEMB" three times in 7 days intervals within 25 to 30 days before delivery for preventing complications during delivery and postnatal complications in the dosage of 0.075 ml per 1 kg of live weight, which is a contribution to the worldwide and national science of veterinary obstetrics and hematology of highly productive cows, as it will allow developing methods of rational use of "STEMB" with regard to the class of animals, their breed, milk productivity and the availability of dry matter in the diet.

7. Prospects for further research

In subsequent works, the influence of dosages of "STEMB" on the morphological and functional status of offspring and on the productivity of cows will be determined, and the possibility of correcting natural resistance of cows before calving will be studied.

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