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## **The effect of carboxylates of food acids and substances of neurotropic-metabolic effect on biochemical indicators of blood and reproductive qualities of new-calved cows**

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**Abstract.** After calving, changes occur in the reproductive system of cows, aimed at restoring the ability to reproduce. These processes occur against the background of exhaustion from childbirth, lactation, and a negative energy balance, which often leads to violations of the reproductive function, so the search for methods that contribute to its restoration is urgent. The aim of the work was to investigate the effect of the drug with neurotropic-metabolic action as a stimulator of postpartum recovery in cows and improvement of fertility. The drug included L-arginine, sodium succinate, sodium glutamate and carboxylates of food acids (Fe, Ca, Mn, Cu, Zn). The study was conducted by the method of groups on cows of the Holstein breed. A control and two experimental groups of 15 heads each were formed. Cows of experimental group 1 were given injections in the subcaudal fold on the 5th, 7th and 9th day after calving, dividing the active substance into 3 parts. Cows of experimental group 2 were administered the drug intraparentherally in the first 1.5-2 hours after calving in a full dose once 21st days after calving, the cows of the experimental groups did not show any deviations in blood biochemical parameters compared to the reference values. But there was a tendency to decrease the amount of calcium, phosphorus, protein and carotene, compared to cows of the control group, which indicates the presence of an influence on metabolic processes. The content of total protein in the blood of cows of experimental group 2 was close to the lower limit of the physiological norm. No placental retention was observed in the cows of the experimental groups, while in the control group this disorder was present in 33% of cows. The introduction of the drug made it possible to reduce the frequency of endometritis by 20%, to shorten the period until the beginning of the first oestrus by 7th and 10th days, to increase fertility after the first insemination by 6 and 13 percentage points, and to shorten the service period by 16th and 22nd days. The second experimental group obtained a higher efficiency of using the drug. It is advisable to use the results of research on dairy farms. Intraparentheral administration of the drug 1.5-2 hours after calving will improve the process of restoring the sexual function of cows and their fertility

**Keywords:** Holstein breed; service period; L-arginine; sodium succinate; sodium glutamate; oestrus

## Introduction

Restoring the reproductive function of cows after calving is an important element of ensuring the sustainability of the technological process of milk production and reproduction of herds. The genetic characteristics of cows associated with the rapid growth of milk productivity at the beginning of lactation is one of the reasons for the negative energy balance, which leads to a decrease in the fertility of cows. O.B. Pascottini *et al.* (2022) believe that about half of the cows after calving fail to adapt to the changes of the transit period and within 5 weeks they develop one or more clinical and subclinical diseases, which is accompanied by a violation of reproductive capacity. Rapid recovery of cows after calving is very important to ensure efficient

reproduction. There are a number of genetic and environmental factors that affect the reproductive function of cows, which affects the length of the service period (Ruban & Matvieiev, 2020).

Since it is difficult to fully balance the needs of cows in the postpartum period, there is a need to find additional ways to maintain the energy balance and stimulate the body's resistance and reproductive function. Significant efforts in this direction are aimed at balancing the energy requirements for calving and initiation of lactation in conditions of limited feed intake. In particular, they studied the possibility of additional administration of L-carnitine to cows, which could increase the efficiency of  $\beta$ -oxidation and reduce the level of negative energy

balance (Meyer *et al.*, 2020). Cows treated with L-carnitine had higher milk fat in early lactation and higher plasma triacylglyceride concentrations, indicating increased efficiency of fat oxidation, but this did not affect cow recovery after calving, energy balance and lipomobilization.

Physiological methods of stimulating cows that are safe for production are of great interest. In particular, research was conducted on the effect of biostimulation on the restoration of ovarian activity, improvement of the reproductive function of cows in the postpartum period by ensuring contact of cows with the bull (Damarany, 2019). The results showed that contact with the bull contributed to an increase in the number of cows that recovered ovarian function during the postpartum period, contributed to a reduction in the interval from calving to the first oestrus and ovulation after calving, reduced the proportion of cows with anestrus, the number of inseminations per insemination and the length of the period from calving before fertilization. But keeping bulls with cows does not solve all reproduction problems and is not always technologically possible, so the search for drugs that could improve the reproductive function of cows at various stages of the production cycle continues. In particular, during embryo transplantation, non-steroidal anti-inflammatory drugs, such as flunixin, have proven themselves well meglumine or ibuprofen (Spencer *et al.*, 2020), but prophylactic administration of these drugs to all cows after calving is not considered sufficiently justified. To optimize the involution of genital organs and restore sexual cycles and timely insemination of cows, it is recommended (Nacu *et al.*, 2021) application of cloprostenol in the first 6 hours after calving with repeated administration on day 11. The use of drugs with neurotropic and metabolic action showed good results at the cellular level. In particular, supplementing the culture medium with L-arginine increased the percentage of oocytes at the stage of germinal vesicle disintegration after 7 hours of cultivation and oocytes that

reached metaphase I after 15 hours (Dubeibe *et al.*, 2017). L-arginine plays an important role in nitrogen metabolism and, in particular, protein synthesis, blood flow, nutrient absorption and ruminant health. There is evidence (Wu *et al.*, 2022) that feed supplements with rumen-protected L-arginine can improve performance and fertility traits in cows without negative effects on metabolism or health.

One of the ways to improve the reproduction function of cows is the use of trace elements. M.O. Yazlık *et al.* (2021) found that the injection of certain microelements during the last third of the pregnancy, on the day of calving and 10 days after it contributed to the increase of the phagocytic activity of the blood of cows and increased the probability of fertilization. In the studies of Y.M. Somagond *et al.* (2023) proved that injections of multivitamins and multiminerals to cows before and after calving are effective in improving the immune response and reducing inflammatory processes during the transit period. Considering the fact that the problem of restoring the reproduction function of cows after calving remains widespread, the search for additional ways of stimulating the activity of the reproductive system is urgent. Among the promising directions, the use of complex drugs that affect the body of cows at the cellular level and contain additional supporting biologically active substances, in particular microelements, should be considered. The purpose of the study is to check the effectiveness of a complex drug of neurotropic and metabolic action, supplemented with a complex of carboxylates of food acids, on the course of the postpartum period of cows and the restoration of reproductive function.

## Materials and Methods

The experiment was conducted on Holstein cows at the Zhadkivske dairy farm in the Ichnyan district of the Chernihiv region, in the winter period. Research was conducted by the group method in accordance with European

Convention "For the Protection of Vertebrates Animals Used for Research and other Scientific Purposes" (1986). To create the control and experimental groups, physiologically healthy cows were randomly selected immediately after calving. Cows had a live weight ranging from 500 to 550 kg, had a second calving or older, but their age did not exceed 6 years. During the dry period cows were kept tethered. During the experiment, the animals received a mixed diet, which in terms of composition, energy content and nutrients met the needs of cows of the corresponding technological period.

As a stimulating factor for the postpartum period and restoration of reproductive function in cows, a complex of neurotropic and metabolic

substances was used, in particular L-arginine ( $C_6H_{14}N_4O_2$ ), sodium succinate ( $Na_2C_4H_4O_4$ ), glutamate sodium ( $C_5H_8NNaO_4$ ) and carboxylates of food acids: iron, calcium, manganese, copper, and zinc (Fe, Ca, Mn, Cu, Zn). The animals were divided into 3 groups of 15 animals. The complex of substances was administered according to the scheme shown in Table 1. In experimental group 1, the complex of substances was injected into the subcaudal fold at a dose of 20 cm<sup>3</sup> on the 5th, 7th, 9th day after calving, in experimental group 2 the complex of substances was administered intraparentherally in the first 1.5...2 hours after calving in a volume of 60 cm<sup>3</sup> once. Animals of the control group were not administered the drug.

**Table 1.** Formation of groups of animals for research

Group	n	Introduction of a complex of substances				the total amount of the active substance during the period of the experiment, g
		period of introduction	injection volume, cm <sup>3</sup> /head	active substance, g	multiplicity of input	
Control	15	—	—	—	—	—
Experimental 1	15	5, 7, 9 days after calving	20	1.3	3	3.9
Experimental 2	15	1.5...2 hours after calving	60	3.9	1	3.9

**Source:** author's development

In order to establish the general physiological state of cows, before the experiment, blood tests were carried out 1.5-2 hours after calving. The following biochemical indicators of blood were monitored: the content of calcium, phosphorus, total protein, carotene and reserve alkalinity. Repeated blood analysis was performed 21st days after calving. Haematological indicators were studied in 5 randomly selected cows from each group. The results of haematological analysis were compared with reference indicators (Haidenko & Yevtushenko, 2017) and data of blood indicators in Holstein cows (Cozzi *et al.*, 2011).

During the experiment, a clinical examination of the cows of the experimental and control groups was carried out, and all the changes that occurred in the genital organs of

the animals during this period were recorded. Clinical studies of experimental animals were based on the external and internal examination of the genital organs of animals. The internal examination consisted in palpation of the internal genital organs with the hand through the rectum of the research animal. The physiological process of genital involution in the postpartum period was traced by rectal examination of cows. Daily visual observation of cows was also carried out to detect the first signs of the oestrus stage of the sexual cycle after calving. After the cows showed clinical signs of the oestrus stage and showed sexual desire, they were artificially inseminated with an interval of 12 hours (morning and evening). Fertilization was carried out by the cervical method, with rectal fixation of the cervix

by hand. The first insemination was carried out no earlier than 42nd days after the cow calved. Under conditions of manifestation of oestrus in cows earlier than 42nd days, insemination was skipped, waiting for the next oestrus.

Based on the results of observation, the manifestation of signs of reproduction function was evaluated in each of the groups of cows. In particular, the number with retained placenta and postpartum endometritis, the duration of the period from calving to the first coming into sexual desire, fertilization after the first insemination, the number of pregnant animals 90th days after calving, the length of the service period, and the value and index of insemination were determined. Average values, statistical error, and the share of animals in percent were determined by the research indicators.

## Results and Discussion

A cow's reproductive organs and hormone activity undergo active changes during the

transition period. After calving, the uterus involutes, restores its mucous membrane, and resumes the sexual cycle. These processes occur against the background of lactation and increasing milk productivity of cows. The clinical condition of the cow and provision of the body's needs for energy and nutrients are of great importance for the renewal of the sexual cycle and the manifestation of high productivity. During the transition period, there is a high risk of metabolic disorders, which can be caused by nutritional deficiencies and postpartum complications. In order to establish the general physiological condition of the animals, the first biochemical tests of the blood of cows were carried out before the experiment (Table 2). Based on the characteristic clinical signs and blood analysis, it is possible to conclude whether the cows have an acidotic state, disorders of protein, mineral, fat and carbohydrate metabolism, osteodystrophy or other disorders.

**Table 2.** Biochemical indicators of blood before the experiment

Group	Ca, mg%	P, mg%	Total protein, g%	Reserve alkalinity, vol.% CO <sub>2</sub>	Carotene, mg%
Control	10.4±0.7	5.9±0.4	8.2±0.9	45.5±1.2	0.98±0.01
Experimental 1	10.5±0.2	5.7±0.4	7.8±0.7	45.7±0.4	0.96±0.02
Experimental 2	10.5±0.7	4.8±0.4	7.7±0.6	45.0±0.4	0.82±0.05
Physiological norm	9.5-13.5	4.5-6.5	7.25-8.6	46.0-58.0	≥0.45

**Source:** author's development

The most critical at the very beginning of lactation are indicators of mineral balance, protein content, vitamin nutrition and acid-alkaline balance in the body. The obtained results indicate that the biochemical parameters of the blood of cows in the experimental groups were within the physiological norm. No significant difference between the groups was found, although in the cows of the experimental group 2, the content of mineral phosphorus in the blood was 0.9 and 1.1 mg% less than in the experimental 1 and

control groups and approached the lower limit of the physiological norm. In general, the effect of the conditions of prenatal care of cows did not lead to negative disturbances of metabolic processes, so the study of the effect of the complex drug took place in similar groups. The re-analysis was carried out 21st days after calving, when all experimental cows were treated, and it was possible to analyse the influence of neurotropic-metabolic substances and carboxylates of food acids on biochemical blood parameters (Table 3).

**Table 3.** Biochemical indicators of blood after administration of drugs

Group	Ca, mg%	P, mg%	Total protein, g%	Reserve alkalinity, vol.%	Carotene, mg%
Control	10.4±1.2	6.0±1.2	8.1±1.1	45.3±0.6	0.98±0.05
Experimental 1	10.2±0.3	5.5±0.3	7.8±0.6	45.0±7.0	0.93±0.09
Experimental 2	10.2±0.8	5.3±0.1	7.3±0.9	45.0±8.0	0.81±0.01
Physiological norm	9.5-13.5	4.5-6.5	7.25-8.6	46.0-58.0	≥0.45

Source: author's development

Three weeks after calving, the general trend of the biochemical parameters of the cows' blood practically did not change. Cows of the control group had slightly higher levels of calcium, phosphorus, protein, and carotene in the blood, but were characterized by greater variability of these characteristics. A higher content of total protein in the blood of cows of the control group may be an indication of inflammatory processes, but no significant difference in biochemical blood parameters was found between the groups. All established average indicators in the control and experimental groups were within the reference values. It should be noted that in experimental group 2, the total protein index was close to the lower limit of the physiological norm, which may indicate an increased level of protein use in the

body, in particular for milk synthesis or deposition in tissues. A decrease in the content of total protein in the blood of cows of experimental group 2 indicates the activation of milk synthesis processes after treatment with a complex drug according to the scheme of single administration in the first 1.5-2 hours after calving.

During the observation of the animals of the experimental groups, a number of postpartum complications were revealed, among which the most common were retained placenta and endometritis. The use of a complex of biologically active substances with a neurotropic-metabolic effect and carboxylates of food acids allow to a certain extent to normalize the metabolism of newly-calved cows and reduce the number of gynaecological diseases (Table 4).

**Table 4.** Reproductive qualities of newly-calved cows

Indexes	Groups		
	Control	experimental 1	experimental 2
The period from calving to the first onset of sexual desire, days	42±2.0	35±1.0**	32±2.0**
Body weight 90 days after calving, %	40	53	60
Fertilization after the first insemination, %	27	33	40
Service period, days	152±3.0	136±2.0***	130±4.0*
Number of retained placentas, %	33	0	0
Number of endometritis, %	27	7	7

Notes: \* – p<0.05; \*\* – p<0.01; \*\*\* – p<0.001

Source: author's development

A 20-percentage point decrease in the frequency of endometritis was noted in the two experimental groups. Retained placenta was

not detected in the experimental groups, while in the control group this postpartum complication was observed in a third of all cows, which

could have caused an increase in the frequency of endometritis. It is likely that the intrapar-enteral administration of a complex of neurotropic-metabolic substances and microelements in the form of carboxylates of food acids contributed to the optimization of postpartum processes in the cows of the second research group. The low frequency of postpartum disorders, in particular, placental retention in cows of experimental group 1, which began to be administered the complex drug only on the 5th day after calving, remains not fully understood.

The cows of the experimental groups, compared to the control, had a shorter period from calving to the first oestrus. Cows of the first group came into heat 7th and the second 10th days earlier after calving. This indicates the accelerated involution of the uterus and the restoration of the sexual cycle. The cows of the experimental groups had 6 and 13 percentage points higher fertility after the first insemination than the control ones. The proportion of fat cows on the 90th day of lactation was greater in the experimental groups by 13 and 20 percentage points, compared to the control. The final indicator for evaluating the reproductive function of cows is the service period. The use of a complex of substances of neurotropic and metabolic action made it possible to reduce the duration of the service period in experimental group 1st by 16th days, and in experimental group 2nd by 22nd days, due to the activation of the reproductive function and increasing the fertility of cows for the first insemination.

Comparing different methods of using the complex drug, the most effective option was the scheme of administration to experimental group 2. In the group of cows that were injected with a complex of substances into the abdominal cavity once in the first 1.5...2 hours after calving, the indicators of reproductive function were better. In particular, the period from calving to the recovery of the sexual cycle and the duration of the service period were shorter by 3rd and 6th days, respectively, and the fertility

after the first insemination was higher by 7 percentage points. The obtained difference is probably due to the effect of the drug in the most critical period for the cow, immediately after calving, which allows her to recover faster.

The reproductive function of cows depends on a number of factors. As noted by T. Abdisa (2018), among the main reproductive problems of cows, which directly lead to significant economic losses, are abortions, dystocia, placental retention, metritis, uterine and vaginal prolapse, lack of oestrus, low fertility. Most of these disorders are associated with the postpartum period. The most common problem is retention of the placenta, which leads to a number of problems after its removal. According to T.T. Tucho & W.M. Ahmed (2017), due to the placental retention, the number of microorganisms in the uterus increases, inflammation occurs and the interval to fertilization is extended. Placenta retention is recommended to be treated. There are a number of protocols. In particular, S. Imhof *et al.* (2019) recommend the use of intrauterine devices boluses of tetracycline or introduction of ozone foam without attempts to remove the placenta manually. It is also considered effective (Dubeibe *et al.*, 2017) feeding for three consecutive days of herbal powder from *Leonurus artemisia*, *Angelica sinensis*, *Ligusticum chuanxiong*, *Sparganium stoloniferum*, *Buch.-Ham. exjuz*, *Curcuma zedoaria*, *Cyperu srotundus* Linn. and *Glycyrrhiza uralensis*, which helps to improve the subsequent fertility of cows with retained placenta. In the author's research, it was established that it is possible to significantly reduce the share of placental retention in cows, if in the first 1.5...2 hours after calving, a single administration of a complex drug of neurotropic-metabolic compounds and carboxylates of food acids is provided. Prevention of placental abruption is more appropriate than further treatment. To avoid the risks associated with postpartum complications, other authors also recommend using preventive methods. As a way to reduce

the risk of placental abruption, especially under the conditions of limited consumption of vitamin by cows in dry and postpartum periods, E. Pontes *et al.* (2015) recommend injections of  $\alpha$ -tocopherol. According to the authors, the use of  $\alpha$ -tocopherol injection reduced the number of retained placentas from 20.1 to 13.5%, and subsequently increased the frequency of pregnancy after insemination by 22%. In the study, the introduction of a complex drug of neurotropic-metabolic compounds and carboxylates of food acids in the first 1.5...2 hours after calving made it possible to completely exclude placental retention in the cows of the experimental group. The method is more relevant for carrying out multiple vitamin injections, as it coincides with the postpartum care of the cow and has a better positive result.

Retained placenta is one of the risk factors for the development of endometritis. Usually, the share of endometritis in cows is high and reaches 20% 50th days after calving (Grimard *et al.*, 2017). According to I.M. Sheldon *et al.* (2019) up to 40% of cows have postpartum uterine diseases. Clinical endometritis has a strong negative effect on the frequency of first insemination and lengthening the duration of the period from calving to insemination. In Holstein cows, cytologically diagnosed endometritis was associated with a violation of reproductive function, which was manifested in the extension of the period from calving to fertilization and a decrease in the percentage of pregnancy after the first insemination (Gilbert *et al.*, 2005). In research conducted by P. Nyabinwa *et al.* (2020), in cows, that had a positive test for endometritis, in addition to the above-mentioned problems, an increase in the frequency of inseminations to obtain a body and an increased duration of anoestrus after calving were observed. Z.A. Mohammed *et al.* (2019) notes that endometritis increases the likelihood of atypical functioning of the ovaries, in particular the onset and duration of luteal activity. due to the use of a drug from a

complex of neurotropic-metabolic substances, it was possible to reduce the proportion of endometritis by 3.8 times, compared to control cows. This is probably related to both the decrease in the percentage of placental retention and the stimulating effect of the drug's components. In particular, O.V. Chernev (2014) proves that the use of sodium succinate, which was also included in the complex drug, affects cellular respiration, and during high physical exertion improves the lability and functional mobility of nervous processes. Researchers I.I. Hevkan *et al.* (2011) revealed the positive effect of the drug, which includes sodium succinate, it helps to increase the level of metabolic processes in the organs of the reproductive system of cows and accelerates the involution of the endometrium after calving.

There are other ways to reduce the risk of metritis and endometritis in cows. A.A. Barragan *et al.* (2021) proved that the administration of boluses with acetylsalicylic acid twice, starting 12 hours after calving and again 24 hours later, allowed reducing the proportion of cows that developed clinical metritis and clinical endometritis, as well as to shorten the period from calving to calving by 18th days fertilization. Acetylsalicylic acid is a nonsteroidal anti-inflammatory agent that has a short half-life and does not, unlike complex preparations with trace elements, have a supporting effect. In this regard, the use of complex drugs, in particular substances of neurotropic and metabolic action and carboxylates, which stimulate the recovery of the functions of the reproductive system after calving, has a certain advantage.

Not only endometritis, but also other infectious diseases and metabolic disorders caused by a negative energy balance at the beginning of lactation delay the first ovulation after childbirth. The manifestation of the first ovulation after calving is a coordinated process that includes the restoration of the somatotropin hormone-insulin-like growth factor 1 connection in the liver, the increase of follicles and

steroidogenesis, as well as the elimination of negative feedback with estradiol in the hypothalamus (Hevkan *et al.*, 2011). Long periods of anovulation after childbirth have a negative effect on reproductive efficiency. Anovulation of cows requires treatment. C.R. Burke *et al.* (2022) have proved the effectiveness of a long-acting synthetic derivative of kisspeptin to stimulate ovulation when a mature dominant follicle is present in the ovaries, but non-hormonal methods of prevention of this functional disorder are of greater interest. In the study, cows treated with the drug had their first oestrus on average at 35th and 32nd days, or 7th and 10th days earlier than untreated cows. This is a fairly early indicator. S.Yu. Ruban & M.A. Matvieiev (2020) note that it is necessary to allow cows to inseminate (voluntary waiting period) no earlier than 6 weeks after calving, therefore, if oestrus appears earlier, cows are not inseminated. But the early onset of the first oestrus after calving is evidence of the effective effect of a complex of substances with neurotropic-metabolic action and carboxylates of food acids of trace elements on the restoration of ovarian functions. Other complex preparations also have a positive result of stimulating the reproductive function of cows. In particular, the increased level of steroidogenesis, which was manifested by the increase in the blood of cows, cholesterol, as well as glucose, triglycerides and total protein, was detected when the reproductive function of cows was stimulated on the 1st-3rd day of the sexual cycle with the drug "Quatronan-Se" and carboxylates Se, Cu, Mn, Cr, and Ge (Seba *et al.*, 2016). This, in addition to the research, confirms the effectiveness of complex drugs for stimulating the functional activity of the reproductive system of cows and preventing disorders that may require treatment in the future.

### Conclusions

The use of a complex of neurotropic-metabolic substances, which include L-arginine, sodium

succinate, sodium glutamate and carboxylates of food acids of iron, calcium, manganese, copper, and zinc affect the biochemical parameters of the blood of newborn cows and the recovery of reproductive function after calving. Cows administered the drug 21st days after calving had less variability in blood biochemical parameters and lower calcium, phosphorus, protein, and carotene content. The use of the complex drug in the cows of the experimental groups, compared to the control group, made it possible to avoid the manifestations of placental retention and reduce the frequency of postpartum endometritis by 3.8 times. Treated cows significantly shortened the period of postpartum uterine involution and recovery of ovarian function. The manifestation of the first oestrus in them was observed 7th-10th days earlier. The reproductive capacity of cows in the experimental groups was also better than in the control group. In the experimental groups, there was an increase in fertility by 6-13 percentage points after the first insemination, an increase in the proportion of heifer cows on the 90th day of lactation by 13-20%, and a reduction in the period from calving to conception by 10.5-14.5%.

If comparing different schemes of administration of the complex drug to cows, the best results are obtained with a single intraparentral administration of 60 cm<sup>3</sup> (3.9 g of the active substance) in the first 1.5...2 hours after calving. Cows that were treated according to this scheme (experimental group 2) 21st days after calving, according to blood biochemical indicators, showed signs of increased activity of anabolic processes and tended to be superior to cows of the first experimental group in terms of the onset of sexual activity, fertility after the first insemination and average the duration of the period from calving to fertilization. The reason for this advantage is probably the supporting and stimulating effect of the drug from the first day after calving. The obtained results indicate the impracticality of postponing the first treatment of new-calved cows with a

complex drug for 5 days after calving and dividing the active substance into three injections.

In further studies, it is advisable to study the influence of carboxylates of food acids and substances of neurotropic-metabolic action on the peculiarities of milk productivity of cows in the post-calving period, in particular on changes in daily milk yield and chemical

composition of milk, energy balance and manifestation of metabolic disorders.

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### Conflict of interest

None.

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## **Вплив карбоксилатів харчових кислот та речовин нейротропно-метаболічної дії на біохімічні показники крові та відтворні якості новотільних корів**

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**Анотація.** Після отелення проходять зміни в статевій системі корів, спрямовані на поновлення здатності до відтворення. Ці процеси відбуваються на фоні виснаження родами, лактації та негативного енергетичного балансу, що часто призводить до порушень відтворювальної функції, тому пошуки методів які сприяють її відновленню, актуальні. Метою роботи було дослідити вплив препарату неротропно-метаболічної дії, як стимулятора післяродового

відновлення корів та поліпшення плодючості. Препарат включав L-аргінін, сукцинат натрію, глутамат натрію та карбоксилати харчових кислот (Fe, Ca, Mn, Cu, Zn). Дослідження проведено методом груп на коровах голштинської породи. Було сформовано контрольну і дві дослідні групи по 15 голів. Коровам дослідної групи 1 робили ін'єкції у підхвостову складку на 5, 7 і 9 добу після отелення, розподіливши активну речовину на 3 частини. Коровам дослідної групи 2 препарат вводили інтрапарентерально в перші 1,5-2 години після отелення в повній дозі одноразово. Через 21 день після отелення у корів дослідних груп не виявлено зміщень біохімічних показників крові, порівняно з референтними значеннями. Але простежувалась тенденція зменшення кількості кальцію, фосфору, білка і каротину, порівняно з коровами контрольної групи, що вказує на наявність впливу на метаболічні процеси. Вміст загального білка в крові корів дослідної групи 2 був наближеним до нижньої межі фізіологічної норми. У корів дослідних груп не спостерігали затримок плаценти, в той час, як у контрольній групі цей розлад був у 33 % корів. Введення препарату дозволило на 20 відсоткових пунктів зменшити частоту виникнення ендометритів, на 7 і 10 днів скоротити період до початку першої тічки, на 6 і 13 відсоткових пункти підвищити заплідненість після першого осіменіння та на 16 і 22 дні скоротити сервіс-період. Вищу ефективність використання препарату отримали в другій дослідній групі. Використовувати результати досліджень доцільно на молочних фермах. Інтрапарентеральне введення препарату через 1,5-2 години після отелення дозволить поліпшити процес відновлення статевої функції корів і їх плодючість

**Ключові слова:** голштинська порода; сервіс-період; L-аргінін; сукцинат натрію; глутамінат натрію; еструс