

Etiopathology and Group Prevention of Cow Infertility in the Conditions of the Republic of Karakalpakstan

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Annotation: The article investigates the causes of infertility in cows kept in specialized livestock farms of the Republic of Karakalpakstan. The study revealed that during the dry period, cows often experience an unbalanced diet and a deficiency of vitamins and microelements; after calving, during the period of increased lactation, the cows' need for nutrients, vitamins, and minerals is not met, which leads to the development of alimentary-climatic infertility.

Introducing the "Sammix Eco Premix" preparation into the herd's diet, mixed with the total feed at a dose of 150 g per head for 30 days, along with a single intramuscular injection of 2 ml "Fergalin" on the 20th day of treatment, normalizes metabolic processes in the body, increases productivity by 33.7%, raises the live weight of newborn calves by 18.4%, increases daily milk yield by 6–6.5 liters, and prevents nutrient deficiencies.

Keywords: infertility, digestible protein, sugar, carotene, calcium, phosphorus, vitamins, microelements,

hemoglobin, alimentary, hypocoalosis, alimentary anemia, osteodystrophy.

Modernization and accelerated development of livestock farming in our republic is an important part of the development strategy of the entire agricultural sector. In order to further improve the sustainable provision of the population with affordable and high-quality milk and dairy products, a number of systematic measures have been implemented in recent years. The “Development Strategy of New Uzbekistan” for 2022-2026 sets out such important tasks as “...Increasing the production volumes of livestock products by 1.5-2 times, implementing new projects to increase the number of livestock and increase their productivity, artificially insemination of 2.4 million (52 percent) cows and calves of calving age in households, strengthening the feed base of livestock, breeding high-yielding varieties of fodder crops, harvesting 2-3 times a year and increasing productivity by 1.2 times”. In order to increase livestock production in Uzbekistan, one of the important tasks is to increase the productivity of breeds, strengthen the feed base, create highly productive herds of cows, and use cattle adapted to udder-shaped milking machines.[1]

Relevance of the topic. The negative change in the ecological situation in the Republic of Karakalpakstan, the strong salinization of the land, the increase in micronutrient deficiencies such as iodine, cobalt, copper, manganese, zinc among cattle raised in these regions, are causing a high incidence of infertility among dairy cows. Therefore, studying the causes, pathogenesis, diagnostics, treatment and prevention of infertility in cows raised in the conditions of farms specialized in cattle breeding in the Republic of Karakalpakstan is an urgent issue.

Infertility is observed in cases of latent metabolic disorders, especially in diseases of the gastrointestinal tract and other organs, even when productive animals are fed normally [2,5].

The lack of improvement in diets for cows, especially in the second half of lactation and during the weaning period, leads to a deficiency of carotene and some minerals (calcium, sulfur, magnesium, cobalt, copper, manganese, zinc, iodine) in the diet. This, in turn, leads to infertility due to the low energy reserves in the body of cows during childbirth and their long-term failure to restore them [3,4].

Object and methods of research. In order to study the prevalence and causes of infertility in cows, a zootechnical analysis of the composition and nutritional value of diets was carried out, the amounts of digestible protein, sugar, carotene, calcium, phosphorus, and fiber in their content were determined, and the level of satisfaction of the needs of the animal organism was studied based on comparison with feeding standards.

From the “Saparov Umurbek” fattening farm of the Beruni district of the Republic of Karakalpakstan, which was weaned 2 months before calving, “standard” groups were formed based on the principle of “similar pairs”, and their clinical and physiological status and some morphobiochemical blood parameters were determined. In cows, appetite, body temperature, heart rate and respiratory rate, the condition of the foregut were determined using generally accepted clinical examination methods, and attention was paid to the presence or absence of clinical signs characteristic of vitamin and mineral metabolism disorders. The cows in the experiment underwent clinical and hematological examinations every 20 days from calving until their insemination.

Group preventive scientific and economic experiments were carried out to prevent alimentary infertility in imported cows.

The studies were conducted to establish a group prophylaxis of vitamin-mineral metabolism disorders that cause infertility in cows. For this, two groups were formed, each consisting of 20 cows that were weaned from milk and were 7 months old. The cows in the first experimental

group were given 150 g of Sammix ECO primex per head per day, mixed with general feed for 30 days, and 2 ml of Fergalin was injected intramuscularly once on the 20th day of the experiment.

The cows in the control group were fed only with farm rations.

Analysis of the results obtained. The diet of the dairy cows in the farm consisted of 7.91% alfalfa hay, 12.66% spring wheat straw, 63.3% corn silage, 3.16% cottonseed meal, 3.16% corn grits, 6.3% wheat grits and 3.16% cottonseed meal. The total nutritional value of the diet was 11.02 food units, and it was found that the digestible protein was 87.5 g, sugar 908 g, calcium 6.2 g, phosphorus - 27.2 g, carotene - 45.3 mg compared to the feeding standards.

The carbohydrate part of the diet is characterized by a deficiency of sugar. The sugar-protein ratio in the diet was 0.25 instead of the standard 0.8:1. A decrease in the sugar-protein ratio in the diet leads to a decrease in the digestion of food in the rumen, a change in the rumen fluid environment and a violation of the ratio of volatile fatty acids, as well as the development of an acidosis in the body.

The satisfaction of the body's needs for digestible protein in the diet of dairy cows was 93.56 percent, sugar - 25.8 percent, carotene - 92.6 percent, calcium - 93.6 percent, phosphorus - 60.1 percent and crude fiber - 100.1 percent.

The amount of carotene in the diet of dairy cows was 564.7 mg instead of the norm of 610 mg. The calcium content of dairy cows was 93.6%, phosphorus content - 60.1%, the ratio of phosphorus to calcium was 0.46 instead of the norm 1:2.

When analyzing the ration of dairy cows, it was established that the ration is of a silage-concentrate type, with a shortage of hay and an excess of fatty acids in the silage, a discrepancy between the sugar-protein ratio and the phosphorus-calcium ratio with the normative indicators, the composition and nutritional value of the ration do not fully satisfy the needs of the body of cows weighing 450-500 kg and having an average milk yield of 18 kg.

The results of the study of the conditions of care and feeding of productive cows, the analysis of the composition and nutritional value of the ration showed that the imperfection of the ration in terms of nutritional value and composition, the incomplete satisfaction of the body's needs for nutrients, biologically active substances, and minerals in pregnant cows leads to the occurrence of alimentary-climatic infertility in them. According to the results of research by scientists, in pregnant cows raised on rations with a deficiency of macro- and microelements, an increase in the service life after calving and infertility can be noted.

During the experiments in the cows of the experimental group, the clinical signs characteristic of vitamin and mineral metabolism disorders in the animal body gradually decreased. In cows of this group, clinical signs were observed, such as improved appetite, increased activity, an increased response to external stimuli, and a change in the color of visible mucous membranes to light purple. In some cows of the control group, at the end of the experiments, clinical and physiological indicators characteristic of vitamin and mineral metabolism disorders in the body were preserved: indifference to external influences, changes in appetite, rarefaction of rumination and hypotonia of the forestomach, paleness of mucous membranes, and mobility of incisors.

In cows of the experimental group, the body temperature at the beginning of the experiments, i.e., in the last month of pregnancy, averaged $38.1 \pm 0.04^\circ\text{C}$, by the end of the experiments this indicator averaged $38.2 \pm 0.04^\circ\text{C}$ in the 2nd month of lactation, the heart rate per minute averaged 72.6 ± 2.2 times, by the end of the experiments it decreased by an average of 61.8 ± 2.1 times, the respiratory rate per minute decreased by an average of 27.6 ± 2.4 times to 20.5 ± 2.2 times, and the movement of the large abdominal wall in 5 minutes increased by an average of 6.4 ± 0.3 times to 11.2 ± 0.4 times (norm 8-12 times in 5 minutes).

By the end of the experiments, this indicator reached $38.5 \pm 0.04^\circ\text{C}$, the heart rate increased from an average of 73.6 ± 2.5 beats per minute to an average of 76.7 ± 3.1 beats by the end of the

experiments, the number of breaths increased from 25.4 ± 2.3 to 27.7 ± 3.4 times, respectively, the movement of the large abdominal wall increased by 5 minutes.

In cows of the control group, the body temperature at the beginning of the experiments averaged $38.2 \pm 0.04^\circ\text{C}$, and by the end of the experiments this indicator was $38.5 \pm 0.04^\circ\text{C}$, the heart rate per minute on average increased from 73.6 ± 2.5 times to 76.7 ± 3.1 times by the end of the experiments, the respiratory rate increased from 25.4 ± 2.3 times to 27.7 ± 3.4 times, respectively, and the movement of the large abdominal wall decreased from 6.8 ± 0.5 times to 5.8 ± 0.5 times in 5 minutes.

Some morphobiochemical indicators of the blood of pregnant cows in the experiment were characterized by similar indicators in all groups before the start of the experiments, while in the control group these indicators remained practically unchanged until the end of the experiments, and in the experimental group of cows, an improvement within physiological norms was noted.

In the cows of the experimental group, the morphobiochemical parameters of the blood improved compared to the initial indicators, the number of erythrocytes increased on average from 4.9 ± 1.4 million/ μl to 5.76 ± 1.3 million/ μl , hemoglobin - from 87.4 ± 1.18 g/l to 107.7 ± 2.24 g/l, glucose - from 1.76 ± 0.06 mmol/l to 2.65 ± 0.06 mmol/l, total protein - from 67.6 ± 1.32 g/l to 75.6 ± 0.88 g/l, alkaline reserve - from 44.8 ± 1.14 vol.%CO₂ to 49.6 ± 1.12 vol.%CO₂. The improvement of some morphobiochemical blood parameters within physiological norms can be explained by the positive effect of the used drugs on the state of metabolism in cows.

In the control group, during the experiments, a decrease in the number of erythrocytes in the blood by an average of 0.42 million/ μl , hemoglobin by 3.2 g/l, glucose by 0.25 mmol/l, total protein by 2.6 g/l, and alkaline reserve by 1.8 vol.%CO₂ was noted. A slight decrease in morphobiochemical blood parameters in cows of this group is explained by an increase in the animal's need for vitamins and minerals during lactation.

The average weight of the calves obtained from the cows of the experimental group was 38 kg, and in the calves obtained from the cows of the control group - 30 kg. Calves born from the experimental group had an average of $38 \text{ kg} - 30.5 \text{ kg} = 7.5 \text{ kg}$ (24.6%) higher body weight compared to the control group.

The average daily growth of calves born from cows in the experimental group was 420 g, and in calves born from cows in the control group - 340 g.

The daily milk yield of the cows in the experimental group averaged 18 liters, and in the control group - 13 liters, i.e., compared to the cows in the control group, $18 - 13 = 5 \text{ l} \times 60 \text{ days} = 300$ liters more milk was obtained from the cows of the experimental group over 60 days.

In the experimental group, out of 20 cows, 17 (85%) were inseminated by the 60th day after calving.

In the control group, the fertilization rate was 50%, that is, by the 60th day after calving, out of 20 cows in the group, 10 were fertilized.

The lengthening of the service life of cows and the low fertility rate are attributed, on the one hand, to the unmet need for vitamins and minerals in the animal's body, and on the other hand, to shortcomings in their maintenance and care, such as the lack of a feeding area and a shortage of ration.

To determine hormonal changes in the farm's cows, the amount of progesterone hormone in the blood was determined. Progesterone is a corpus luteum hormone, the level of which in the blood indicates the animals' readiness for fertilization. At the lowest level of progesterone, the cow's fertilization is good. If the corpus luteum is not fully absorbed, there is a higher level of progesterone in the blood; if vitamin and mineral metabolism is good, animals are fed nutritionally and in comfortable conditions, incomplete absorption of the corpus luteum in cows does not occur. The level of progesterone in the blood was determined within 72 hours after the administration of

the drug Fergalin. In infertile cows, the average progesterone level was higher than 4.7 nmol/l, and during pregnancy - 7.0-27 nmol/l.

CONCLUSIONS

1. The main alimentary factors in the occurrence of infertility in cows raised in livestock farms of the Republic of Karakalpakstan are the incomplete satisfaction of the body's needs for energy and nutrients, vitamins, macro- and microelements. A simultaneous deficiency of several vitamins, macro- and microelements in the body of cows is observed as a complex pathology, which leads to the development of alimentary infertility in cows after calving.
2. Additionally to the ration of weaned cows, Sammiks ECO premix 150 g per head mixed with general feed for 30 days, intramuscular injection of Fergalin 2 ml once on the 20th day of treatment normalizes metabolism in the body, increases fertility by 33.7%, increases the weight of newborn calves by 18.4% compared to the control group, increases daily milk yield by 6-6.5 liters, and prevents alimentary infertility.

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