ANNOTATION

of the dissertation for the degree of Doctor of Philosophy (PhD) Ismailova Ainur Zharkynovna on the topic «The effect of polysol mineral feedings on the digestion and milk synthesis for dairy cows» under the educational program 8D08201 – «Animal Science», in the field of training D132 – Animal husbandry.

In the biogeochemical regions of the republic, an urgent scientific and production task is to ensure the mineral content of feeding rations for productive animals. The dissertation work presents the influence of polysalt mineral and vitamin supplements based on natural zeolites of the East Kazakhstan zone on the digestion and biosynthesis of dairy cow products. The effect of the addition of specially prepared and patented zeolite-chlorella premix on the metabolism and digestion, metabolism and physiological and mineral status of dairy cows during the entire production cycle has been studied.

In scientific, economic and physiological experiments, the effect of enrichment with mineral-vitamin polysolic premix on scar metabolism, the volume and ratio of volatile fatty acids, microbial protein synthesis and the enzymatic activity of the contents of the chyme has been established. The beneficial effect of increasing the mineral and vitamin value of dairy cow diets on milk synthesis and fetal embryonic development during pregnancy has been established.

The relevance of the thesis topic. To ensure the nutritional needs and increase the productivity of dairy cows, it is important to ensure the energy, structural, mineral and biological usefulness of feeding rations in accordance with the physiological needs of their body. Due to the different concentrations of biogenic elements in the biosphere of different biogeochemical zones, their replenishment in the diets of productive animals is an important urgent problem of scientific and industrial importance. At the same time, the preservation of health and ensuring high productivity of farmed livestock, along with the energy and structural nutritional value of feeding diets, are also influenced by mineral and vitamin value. Therefore, the quality of the products produced is responsible for replenishing the diet of dairy cows with missing mineral elements and vitamins in economic conditions.

The purpose of the study is to study the effect of polysalt additives based on local natural zeolites on the absorption of feed nutrients and the productivity of dairy cows in the East Kazakhstan region.

Research objectives:

- to develop a polysalt premix top dressing based on local natural zeolites, which increases the mineral and vitamin nutritional value of dairy cows' diets;
- to determine the effect of the addition of premix to the diets of dairy cows on digestion, metabolism and metabolism;
- to establish the effect of the addition of premix to the diets of dairy cows on the conversion of feed nutrients and dairy cows;
- to investigate the effect of premix addition to pregnant cows' diets on the course of pregnancy and fetal embryonic development;

- calculate the effect of enriching dairy cows' diets with zeolite additives on the profitability of dairy production.

To fulfill the goals and objectives of dissertation research using the analogue group method, scientific and economic experiments were carried out in which the physiological state, digestive metabolism, conversion of feed nutrients into products, as well as feed consumption per unit of production and production efficiency were monitored throughout the entire production cycle.

Research methods.

The chemical composition and nutritional value of feed were studied using "NIRS2500" installations, the composition and quality of milk – using the "Laktan-1M" analyzer, somatic cells were counted using "Somatos mini", hematological indicators using "MS4VET". Rumen metabolism was determined by the acidity of the chyme, the development of microflora, the synthesis of microbial protein, the volume and ratio of volatile fatty acids, as well as the enzyme activity of the chyme fluid.

Scientific and economic experiments were conducted using the method of analog groups. In the experimental groups of analog cows, the control group was fed an economic diet, and the experimental group was fed an experimental diet with the addition of a zeolite-chlorella premix based on local zeolites. The milk production and quality of cows were controlled by decade-long control milk yields. The obtained research results were processed using regression analysis methods of the Excel program.

Description of the main provisions and results of the dissertation research:

Main provisions submitted for defense:

- chemical composition and nutritional value of household feeds and diets of dairy cows;
- the composition and nutritional value of a polysalt supplement that increases the mineral and vitamin nutritional value of dairy cows' diets;
- the effect of polysalt mineral and vitamin supplements based on natural zeolites on the metabolism of rumen and digestion of dairy cows;
- the effect of polysalt mineral and vitamin supplements on the conversion of dry matter in the diet into milk, milk production and quality of cows' milk;
- the effect of polysalt mineral and vitamin supplements on fertilization, pregnancy rate of cows and fetal embryonic development;
- calculations of the economic efficiency of adding a polysalt mineral-vitamin supplement to the diets of dairy cows.

Description of the main results of the study:

1. Based on zeolites from the East Kazakhstan region, a zeolite-chlorella premix additive has been tested and patented, consisting of 28-29% natural zeolites, 1.5-2% Chlorella vulgaris powder and 70-72% sunflower meal, with targeted selective adsorption and ion filtration properties;

2. The addition of premix to the diet of dairy cows significantly improved the metabolism of rumen, increasing the number of ciliates in the chyme from 153.1±12.0 to 194.2±12.4 thousand /ml and the volume of volatile fatty acids from 6.12±0.60 to 6.91±0.35 mmol/100 ml, which improves metabolism, as evidenced by

an increase in the number of red blood cells in the blood up to 0.79±0.01 million/mm³, white blood cells up to 1.19±0.01 thousand/mm³ and hemoglobin up to 1.56±0.10 g%.

3. The introduction of premix into the diet of dairy cows increases the intake of dry matter per cow's head by 0.6±0.03 kg and increases the degree of its conversion into milk from 0.81 to 0.88, which increased daily milk production by 1.8± 0.16 kg, protein in milk by 0.13%, fat by 0.16% and a decrease in the number of somatic cells to 111.4±14.4 thousand/ml.

4. The addition of premix to the diet of pregnant cows shortens the insemination period by 4.0 ±0.4 days, increases the live weight gain by 12.3 ±0.6, increases the condition by 3.23-3.33 points and improves fetal embryonic development by increasing the live weight of newborn calves to 7.3% of the cow's weight.

5. The use of the proposed premix in the diet of dairy cows increases basic milk productivity from 3492.7 kg to 3983.6 kg (by 11.4%, $P<0.001$), improves the biological value of milk from 65.1 to 75.3, increases the biological efficiency coefficient of dairy cows from 84.3 to 94.3 and by reducing feed consumption per unit of production increases the profitability of dairy production from 17.6% up to 19.6%.

Research methodology.

The composition and nutritional value of the feed were studied on the NIRS2500 units, the composition and quality of milk in terms of acidity, density, protein content and fat content were tested on the Lactan-1M analyzer, somatic cells were counted on the Somatos mini unit, and hematological parameters were measured on the MS4VET unit. The metabolism of the scar was determined by the acidity of the chyme, the development of microflora, the synthesis of microbial protein, the volume and ratio of volatile fatty acids, as well as the enzymatic activity of the chyme fluid.

Scientific, economic and physiological experiments were conducted with cows of the Simental breed of dairy and meat production in the farms "Bagration-2" and "Kairat" of the Ulan district of the East Kazakhstan region. In the scientific and economic experiments conducted by the method of analog groups, the cows of the control group were fed an economic diet, and a zeolite-chlorellic premix based on local natural zeolites was added to the diets of the experimental groups.

The milk content and milk quality of the cows of the experimental groups were controlled by the average samples of the quarterly control milk yields. The results were subjected to statistical regression analysis using the Excel program.

Scientific novelty and significance of research.

The scientific novelty of the research lies in the development and testing of a polysolic mineral and vitamin supplement based on local zeolites, which increase the mineral and vitamin nutritional value of dairy cows and increase their productivity.

The practical significance. Increasing the mineral nutritional value of dairy cow diets with polysalt top dressing based on local zeolites is an affordable measure in farm conditions that allows increasing milk yields and improving milk quality. In addition to increasing milk yields of dairy cows and improving the quality of milk

produced, polysalt mineral fertilizers contribute to shortening the period of fruitful insemination of cows after calving, a favorable course of pregnancy and a reduction in bed intervals. Zeolite polysalt fertilizers have a positive effect on the increase in live weight of pregnant cows, increasing their condition by the end of pregnancy, which ensures better development and weight gain of the fetus by the end of embryonic development and the birth of large viable calves. Thus, during the entire production cycle of dairy cows, the nutritional value of feeding rations increases, which improves digestion and the degree of conversion of digested nutrients into products, reduces feed consumption per unit of production. Together, these factors contribute to an increase in the economic profitability of the industry's development.

Compliance of dissertation research with state programs. Dissertation research was conducted within the framework of the multi-year project of the Ministry of Agriculture of the Republic of Kazakhstan PCF BR10764965 - "Development of technologies for keeping, feeding, growing and reproduction in dairy cattle breeding based on the use of adapted resource-energy-saving and digital technologies for various natural and climatic zones of Kazakhstan."

The contribution of the doctoral student to the preparation of each publication.

The doctoral student collected and analyzed literary sources on the topic of the dissertation, took direct part in laboratory research and scientific and economic experiments. A statistical correlation and regression analysis of the study results was performed and regression comparisons were made reflecting the effect of the polysalt mineral supplement used on the status and productivity of dairy cows. Prepared the text of the dissertation, compiled the results and made a personal contribution to the publication of materials in scientific journals.

List of scientific papers published based on the results of the study:

- N. Omarkozhauly, K. Shaikenova, A. Ismailova, K. Satieva, M. Kamenov. Effect of zeolite-chlorella top dressing on scar metabolism and conversion of dairy cows' feed. Brazilian Journal of Biology, vol. 83, (2023). - P. 1-7. Q2, Percentil: 59. https://doi.org/10.1590/1519-6984.274763

- Ismailova A. Zh., Nussupov A.M., Kuzhebaev B. Zh., Shaikenova K. H. Omarkozhauly N. The effect of zeolite-chlorellal premix on the conversion of dairy cow feed. Bulletin of Science of the Kazakh Agrotechnical University named after S. Seifullin, 2 (213), 2022, pp. 116-122.

- Omarkozhauly N., Shaikenova K. H., Nusupov A.M., Ismailova A. J. The effect of zeolite compounds on metobalism and conversion of dairy cow feed. Multidisciplinary journal "3i: intellect, idea, innovation" No. 3, Kostanay, 2022. pp. 126-133.

- Omarkozhauly N., Uskenov R., Kozhebaev B., Nusupov A., Ismailova A. The relationship of dairy cow productivity with feed ration parameters. Bulletin of Science of the Kazakh Agrotechnical University named after S. Seifullin, 3(118), - 2022, pp. 4-13.

- Nurbergen Omarqozhauly, Ainur Zh. Ismailova. The effect of an additive in the feeding diet of pregnant dry cows with mineral and vitamin top dressing. Bulletin

of Science of the Kazakh Agrotechnical University named after S. Seifullin, 1(124), -2025, pp. 4-12.

The results of dissertation research were reported at international scientific and practical conferences: Seifullin Readings-18 (Astana, 2022); "The state and prospects of industrial and innovative development of the agroindustrial complex of the Republic of Kazakhstan" (Semey, 2022); "Scientific and practical support for the dynamic development of modern animal husbandry" (Almaty, 2023); " The state and development of veterinary medicine and Animal Husbandry of the Republic of Kazakhstan" (Almaty, 2023); "Seifullin Readings-20" Astana, 2024) and published in conference proceedings.

The scientific novelty of the results of dissertation research is confirmed by the Pathet of the Eurasian Patent Office:

- Kozhebaev B., Omarkozhauly N., Shaikenova K., Nusupov A., Ismailova A. Premix for lactating cows. Patent for the invention of the Eurasian Patent Office No. 041496 dated 31.10.2022

The structure and scope of the dissertation: The text of the dissertation is typed on a computer on 97 A4 pages, contains 36 tables, 7 figures, 151 literature sources.