

ABSTRACT

of the dissertation work by Zhalelov Dulat Beibituly on the topic "Regulatory support of the technology for the production of highly digestible combined feeds of a new generation", submitted for the degree of Doctor of Philosophy (PhD) under the educational program "8D07501 – Standardization and certification (by industry)"

Relevance of the research topic.

On behalf of the President of the Republic of Kazakhstan, a large-scale project "Development of meat farming for 2018-2027" is being implemented in Kazakhstan, the main task of which is to increase the number of livestock in the meat sector for the production of products for export. Subsidies for the purchase of livestock, feed, breeding and breeding work are increasing annually.

At the same time, the key stake in the program is on the development of farms, At the same time, in recent years, the production and consumption of combined feeds, premixes and various feed additives in Kazakhstan has significantly decreased, without which productivity, fertility of animals and the safety of young animals significantly decreases, the quality of livestock products deteriorates, and the profitability of the industry decreases. All these factors are caused not only by a small proportion of highly productive livestock, but also by poor feeding and poor quality of the feed produced. The area of grain crops was reduced by 40%, including grain crops – by 70%. The area of forage crops was particularly sharply reduced – by more than 4 times. The yield of forage crops remains low, and the collection of forage units from 1 ha does not exceed 2.5-6.0 kg/ha. The lack of protein in the diet of animals leads to over expenditure of feed by 30-40%, increasing its cost. When fattening young animals, during the period of adaptation of the enzymatic system of the food tract, the vegetable part of the combined feeds is poorly absorbed.

World practice shows that the use of moisture-thermal and barothermomechanical processing (expansion, extrusion, micronization, granulation, flocking, steaming) of cereals and legumes, as well as vacuum spraying and coating with thermolabile components (multi-enzyme complexes, vitamins, fat, amino acids, etc.) will allow the production of highly efficient environmentally friendly, highly nutritious, easily digestible combined feeds of a new generation (with programmable properties), providing a synergistic effect of improving the quality of combined feeds. During baro thermo mechanical processing, under the influence of moisture and heat, starch gelatinization occurs and the starch grains transition into a more digestible form, which also contributes to its better assimilation. In addition, bacterial contamination decreases, coliform bacteria, E. coli, mold fungi and salmonella are completely destroyed.

Grain components account for more than 75% of compound feeds, and 30-40% in EU countries. An analysis of foreign and domestic technical achievements and scientific research in the field of extrusion processing of grain mixtures of compound feeds has shown that extrusion is the most effective way to increase the nutritional value of cereals and leguminous components of the feed mass. In this case, the

destruction of starch macromolecules occurs with the formation of various dextrans and sugars, as a result of which the digestibility of compound feeds is significantly increased. At the same time, the process of enzymatic hydrolysis of starch is significantly facilitated, which ensures the formation of a significant amount of dextrans and sugars of various molecular weights. Extruded granules become more accessible to the effects of animal stomach enzymes, which increases digestibility by up to 90%.

World experience also shows that in the prevention and treatment of gastrointestinal diseases of young animals, substitution therapy is of great importance, aimed at restoring intestinal biocenosis by regularly introducing live bacteria – representatives of the normal intestinal microflora.

The above gives every reason to conduct scientific research on the use of probiotic drugs in compound feeds and their use in order to study the role in increasing body resistance, increasing animal productivity, as well as in the prevention and treatment of patients with gastrointestinal and respiratory diseases in our country in modern market conditions.

To control the quality and organization of production of the proposed type of compound feeds, the KazNARU enterprise Standard for extruded combined feeds has been developed. The draft of the developed STP complies with the basic provisions of GOST 9268-2015. A technological instruction has also been developed, which applies to the production technology of extruded combined feeds manufactured in accordance with the requirements of the KazNARU STP project.

The purpose of the dissertation research is to develop scientific and technological solutions for the production of highly nutritious, easily digestible extruded compound feeds of a new generation for the normalized feeding of farm animals with nutritionally balanced components.

Research objectives:

- Analysis of the world experience in creating technology for the production of highly digestible compound feeds with the identification of the most promising technologies for the production of highly digestible compound feeds.

- Substantiation and development of innovative technology for the production of highly digestible compound feeds.

- Scientific substantiation of the choice of a prescription composition for the production of highly nutritious, easily digestible compound feeds of a new generation of production for the normalized feeding of farm animals.

- Substantiation and selection of rational parameters of the studied processes for obtaining highly digestible compound feeds of a new generation.

- To study the effect of the use of probiotics on the nutritional value and digestibility of compound feeds.

- The effects of the results of feeding young cattle with highly nutritious and easily digestible compound feeds on the health, growth and fecal microbiota of growing calves.

- Improving the design of the cone-ring channel of extrusion equipment in order to obtain products of the required quality.

- Development of a technological line for the production of highly digestible compound feeds of a new generation for various groups of farm animals.
- Development of a methodological recommendation on resource-saving technologies for the production of highly digestible compound feeds of a new generation.
- Development of the organization 's standard for resource - saving technologies for the production of highly digestible compound feeds of a new generation

Substantiation of the novelty and practical significance of the results obtained.

Scientific novelty.

1. The design of the feed extruder has been improved by optimizing the melt flow in the cone-ring channel using the Flow Vision computer program.
2. Liquid probiotics "SACCHAROMYCES CEREVISIAE BOULARDII T8-3C" (SCB) are applied to the surface of the extrudate with continuous stirring. Further, the pressure gradually increases to atmospheric pressure and the liquid components effectively penetrate into the porous structure of the extruded granules due to the pressure drop.

Practical significance. Production of highly nutritious and easily digestible extruded feed with the addition of probiotic for young cattle.

The author's personal contribution consists in setting the necessary tasks, planning and conducting experiments, statistical processing of the results obtained and their publication, conducting industrial testing of the proposed highly digestible compound feeds of a new generation; participating in the development of regulatory and technical documentation.

Compliance with the directions of science development or state programs:

The scientific work was carried out in accordance with the Erasmus+KA107 international mobility program. The research work was carried out at the leading foreign university Suleyman Demirel University (Turkey) for 6 months.

Scientific provisions submitted for protection:

- development of scientific and practical foundations for the development of technology for the production of highly nutritious and easily digestible extruded feeds with the addition of probiotics;
- improving the design of the feed extruder by optimizing the melt flow in the cone-ring channel;
- regulatory and technical support for the production of highly nutritious and easily digestible extruded feeds with the addition of probiotics.

Approbation of the work.

The main results of the study were tested in the Department of Animal Husbandry of the Isparta University of Applied Sciences in Isparta, Turkey. Analytical studies were conducted on the basis of the Kazakh National Agrarian Research University (hereinafter – KazNARU), in particular in the conditions of research laboratories of the International Scientific Center for Food and Processing Technologies and the agrotechnological hub.

The main results of the dissertation work were reported at the International Scientific and Practical Conference "Seifullin Readings - 18(2): "Science of the XXI century - the era of transformation" (Astana) on October 6, 2022.

The developed technology has passed production testing and scientific and economic experience on the basis of the Beibit farm located in the Almaty region (Appendix B).

Implementation of the results of the work. The results of the work are carried out in the production of compound feeds, in particular, in the production of highly nutritious and easily digestible extruded feeds with the addition of probiotic for young cattle.

Description of the doctoral student's contribution to the preparation of each publication: all the results and conclusions given in the dissertation work were obtained and formulated with the direct participation of the applicant in accordance with the individual research plans of the doctoral student. The doctoral student mastered the modern research methodology, took an active part in the discussion and publication of the results obtained, the preparation and design of scientific articles for publication in domestic and foreign scientific journals.

Publications. 4 scientific papers have been published on the topic of the dissertation, two of them have been published in scientific journals included in the Scopus database "Eastern-European Journal of Enterprise Technologies" (Cite Score 2022 - 2.0, percentile – 46), Potravinarstvo Slovak Journal of Food Sciences (Cite Score 2022 - 2.5, percentile – 44) and 1 at international scientific and practical conferences and 1 publication in journals recommended by the Committee for Quality Control in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan.

The structure and scope of the dissertation. The dissertation work consists of an introduction, four chapters, a conclusion, a list of 106 references and appendices. The dissertation is presented on 149 pages, contains 45 tables, 72 figures.