

Project Name: IRN AP19174684 Veterinary and sanitary assessment of livestock products produced using extruded feed containing off-grade potatoes

Relevance: An important direction in the development of fodder production is the production of complete, environmentally friendly feed, as well as the provision of feed production with protein raw materials of plant and animal origin. In European countries, about 45% of grain raw materials are used for the production of animal feed. Therefore, along with improving the quality of products, an important factor is the rational use of raw materials. The solution of this problem is facilitated by the use in agriculture of modern resource-energy-saving technologies for processing traditional raw materials and the development of technologies that provide for the rational replacement of its main types. An effective and cost-effective way to increase the nutritional value of grain and leguminous components of the feed mass is the production of extruded products based on multicomponent mixtures. Recently, much attention has been paid to the use of natural feed additives in the diet of animals, balanced in terms of the content of macro- and micronutrients, which have high nutritional and feed properties. In animal feeding, potatoes, as well as waste from potato production, are used to great effect and serve as a good substitute for cereals which have valuable nutritional and feed properties.

Goal: Develop a technology for extruding non-sorted potatoes and give a veterinary and sanitary assessment of the quality and safety of livestock products after the use of extruded feed using non-varietal potatoes for animals, which will allow the introduction of waste-free potato production and increase animal productivity

Expected and achieved results: As a result of the project implementation, extruded feed will be developed and introduced into production, containing off-grade potatoes of domestic production, which will increase the productivity of animals; the optimal scheme of its application will be determined; a scientifically based assessment of the quality, safety and nutritional value of the resulting livestock products as a result of the use of feed is given; a patent application will be filed; economic efficiency is determined when using off-grade potatoes

At least 2 (two) articles will be published in journals from the first three quartiles by impact factor in the Web of Science database or with a CiteScore percentile in the Scopus database of at least 50.

Members of the research group:

Project manager Gulzhikhan Talgatovna Ismagulova - Project Manager (Postdoctoral fellow) Master of Veterinary Sciences, in 2020 she completed the full course of the doctoral program, h-index 1 (Author ID Scopus – 57204944879, ORCID - <https://orcid.org/0000-0002-3567-967X>).

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Information for potential users: The essence of extrusion lies in the fact that the raw material is subjected to short-term, but very intense mechanical and barothermic effects due to high temperature and pressure. As a result, the structural-mechanical and

chemical composition of the feedstock changes. During extrusion, starch gelatinization occurs, its content decreases by 12%, and the amount of sugars increases by 14%. A high-molecular polysaccharide - starch, the main component of potato raw materials, is hydrolyzed and converted into simple monosaccharides and dextrins. In a short processing time, proteins do not have time to coagulate, as a result, vitamins and nutritional properties of the product are preserved [8].

Extruded feed retains all vitamins and physiologically active substances, while bacteria and molds are destroyed. Starch partially turns into sucrose. Toxic substances decompose into inactive substances and cease to be dangerous. Due to a sharp drop in pressure at the exit of the heated grain mass, an increase in the volume of the product occurs, which sharply increases its digestibility [9]. Due to the deformations that the material undergoes in the extruder, in addition to the main processes, additional mixing and grinding occurs. In addition, during the extrusion process, the product can lose moisture up to 50% of the original, which allows us to consider the possibility of including components with a high moisture content, which include potatoes [10].

Additional information: In the process of R&D, an innovative patent of the Republic of Kazakhstan will be issued, while the patent holder will be NAO "S. Seifullin KATI".