

ABSTRACT

of the dissertation for the degree of doctor of philosophy (PhD) on the specialty 6D070100 – Biotechnology

Shoinbayeva Karlygash Bolatovna

«Production and conservation technology of drone brood biologically active homogenate for stimulation of sexual function of high-valuable purebred breeders»

General description of work. The thesis is devoted to the development of the technology for the production and storage of a biologically active drug from an unconventional, new product of bees, a homogenate of the drone brood, and to the study of its stimulating effect on the sexual functions of purebred breeders: rams and boars.

Relevance of the research topic. The major priority trends of agricultural development in Kazakhstan are the full provision of domestic needs of the country's products, also realization of the export potential of the industry.

Kazakhstan has a high export potential in the agro-industrial sector. The area of agriculture is 215 million hectare - 4% of the world's resources. In agriculture, 20% of the population (1.6 million people) are employed.

The fulfillment of the program "Agrobusiness - 2020" requires the production of high-quality and competitive domestic products in full volume, satisfying rational consumption standards, that meet modern requirements for healthy eating.

High production and technological pressure on the organism of producers influences their general physiological state and as a result leads to changes in the clinical, physiological and ontogenetic parameters of animal development. It should be noted that when conducting a breeding economy, it is impossible to prevent stress factors arising from the growth, development and functioning of the genitals, changes in the type of nutrition, regrouping, and the condition of keeping, hygienic and ecological conditions.

According to scientists opinion, the effects of technological stress on the animal, reduce productivity by 25-30%. The implementation of such measures as the introduction of changes in livestock work, the use of computer technology, biologically active substances and stimulants, the development of various biologically active drugs for the cultivation of highly productive animals, the use of hormones and hormonal active substances, proper nutrition, optimization of the conditions of content allows increasing the productivity of farm animals.

One of the most important tasks of biotechnology is the full and comprehensive use of biological resources, the development of technology for the production and storage of biologically active substances from natural raw materials. The main sources of biologically active substances are fruits, vegetables,

medicinal and vegetable raw materials and products of honey bees. The main products of honey bees are: honey, pepper, wax, royal jelly, bee venom, drone brood. Currently, many research institutes abroad are working on the creation of a drug for various sectors of the national economy, by processing bee products. Although it is possible to obtain a large share of the drone brood from the hives, it undergoes oxidation in ordinary temperature conditions for one hour, the composition changes and loses its biological activity. Also, in the production and storage technologies stimulating the sexual activity of the biopreparation, no work was done to find an effective preservative.

Despite the development of biotechnology in the pharmaceutical industry, there is a limited number of domestic biologically active drugs on the domestic market that are used to stimulate the sexual function of producers. At present, the production of a biopreparation based on this product does not take place in Kazakhstan. Since one of the main tasks of biotechnology is the supply of livestock and veterinary industry with effective and high-quality, native, domestic biopreparations. We have made an attempt to fill this gap, to study the effect of a biologically active preparation, in particular a vacuum-free lyophilized biologically active preparation from the drone brood, on the reproductive capacity and productivity of high-value breeding producers. At present, this issue becomes especially urgent in connection with the intensification and increase in the productivity of farm animals.

Purpose and objectives of the study. The purpose of the work is to develop a technology for the production and storage of biologically active preparation from the homogenate of the drone brood to stimulate the sexual function of high-value breeding producers.

To achieve this goal, the following tasks were identified:

- determine the optimal selection period, quantity, age, duration of selection for the production purposes of the drone brood in the apiaries of Turkestan region, study the physical and chemical properties and macro and microelement, hormonal, vitamin composition of the drone brood;

- creation of a complex of biotechnological methods for the preparation of a biologically active drug based on the drone brood, production and storage of the biopreparation in the form of a vacuum-free lyophilized powder and an alcohol extract;

- determination of the dose of acute toxicity of the biopreparation obtained by vacuum-freeze drying in laboratory conditions, as well as the effect on blood hematologic parameters and the sexual function of warm-blooded animals;

- to study the influence of the biological product on the stimulating and reproductive ability of breeding producers of sheep and boars;

- development of a technological scheme for the production and storage of biopreparations and an assessment of economic efficiency.

Objects of research. 9-11 day brood brood, carpathian breed selected from South Kazakhstan apiaries, as well as experimental animals, pedigree producers:

sheep, boars used to study the effect of biologically active drug in the form of vacuum-freeze-dried powder "Apistimul".

Methods of research. In the course of the work biological, biotechnological, microbiological, physicochemical, zootechnical methods were used.

Scientific novelty of the work. For the first time, the technology of production, storage and use of a biologically active drug based on the drone brood *Drone larvae* used to regulate the sexual function of high-value breeding animals was developed and scientifically substantiated.

The effective age of production of a 9-11 day biologically active drone brood was determined, the time and the optimal amount.

While preserving the biologically active components of the drone brood homogenate, a biopreparation was prepared in the form of an alcohol extract and a vacuum lyophilized powder. The biologically active preparation is obtained in the form of a vacuum-free lyophilized powder, which allows it to store its biological activity in normal conditions - 20⁰C during the year, which was called "Apistimul" (published on January 19, 2017 in patent No. 2591).

The effective dose of feeding the biopreparation "Apistimul" to the pedigree producers of the recommended recipe of 10 mg / kg was determined, which will improve the quality and fertility of their seed, thereby increasing the yield by 97.5% in sheep and 20% higher than in the control group in sows.

Practical value and implementation of the results of work. The theoretical significance of the work expands the concept of production and storage, the biotechnological foundations for the use of biologically active preparations based on bee drone brood. The results of the dissertation research and basic data can be used for training bachelors, masters and doctoral students. The results of the dissertation research are included in the educational process of the department "Biotechnology" M.Auezov SKSU on the disciplines "Biotechnology of biologically active substances and protein preparations", "Biotechnology of animals", "Biotechnology of the pharmaceutical and medical industry".

Recommendations for selection, homogenization and storage of drone brood were introduced in the farm "Paseka-Bal" in Kazygurt region, biological preparation "Apistimul" in the form of a biological product has been introduced into production in the farm "Shubar" which deals with the reproduction of breeding boars, as well as a in the farm "Kelte-Mashat" as a biological product stimulating the sexual function of breeding sheep producers.

The results of the studies made it possible to create a biotechnological scheme for obtaining and storing in the powdered "Apistimul" form and as an alcohol extract, as well as to determine the level of storage of biologically active substances, the effect of homogenate on sperm production and the multiplicity of queens, morphological and biochemical parameters of blood.

An accelerated method for the determination of 10-hydroxy 2-decenoic acid using IR spectral analysis, which determines the uniqueness of the drone brood, is presented.

The amount of estradiol during the storage of the biopreparation "Apistimul" during the year at -20°C was 1004.36 - 979.12 pmol/l, and testosterone remained within 4.56-4.28 nmol/l.

The use of biopreparation Apistimul in the recommended amount of 10 mg / kg in breeding of pedigree producers made it possible to increase the fertilization of sheep in the experimental groups, which amounted to 97.5%, and 115.4% of lambs were obtained. From 6 sows of the experimental group received for each 12.7 pigs and 75 total, and from 6 control 60 or 20% less piglets.

Obtaining a patent for a method for producing a biologically active preparation "A method for preparing a tablet preparation" to stimulate the sexual function of pedigree producers (utility model patent No. 2591 published on January 19, 2017).

In peasant farms engaged in beekeeping, the additional production of tine brood increases the profitability of production.

Basic provisions to be protected:

1. Technological elements of production of drone brood in the South Kazakhstan region: the optimal selection period, age, quantity, ways to increase the number of brood, the duration of production, ways to increase the amount and physico-chemical properties, macroelement, hormonal and vitamin composition;

2. The technology of production and storage of biologically active drug from the drone brood in the form of alcohol extract and vacuum lyophilized powder "Apistimul";

3. Pharmacological and toxicological effect of biologically active drug "Apistimul" on laboratory animals;

4. The rationale and results of using the biopreparation "Apistimul" as a stimulating sexual function and increasing the reproductive capacity of boars and rams producers. Technological scheme of production and storage of biopreparation, economic efficiency.

Publications and approbation of work. The main provisions of the dissertation research were reported and discussed in the following international scientific and practical conferences: Biology and medicine. International. Open access journal (2015, India); International scientific - practical conference: "Auezov Readings - 13:" Nurly Zhol "- a strategic step on the way of industrial-innovative and socio-economic development of the country (2015, Shymkent); International scientific and practical conference "Auezov Readings - 15: The Third Modernization of Kazakhstan - New Concepts and Modern Solutions" dedicated to the 120th anniversary of Mukhtar Omarhanovich Auezov (2017, Shymkent); XI International Scientific and Practical Conference "Scientific Fisheries of the European Continent" (2015, Prague); XXV International scientific-practical conference "Actual problems in modern science and ways to solve them" (2016, Moscow, Russia); Proceedings of the international scientific and practical conference "Integration of science, education and production - the basis for the implementation of the Plan of the Nation" (Saginov Readings No. 9) (RK, Karaganda, 2017).

Publications. According to the main scientific results of the thesis 15 works were published, 6 of them in scientific editions recommended by the Committee on control in education and science sphere of the Ministry of education and science of the Republic of Kazakhstan, 2 articles in scientific publications included in the international database Scopus, Web of Science, 3 articles in the materials of international conferences, and 3 theses in the publications of foreign conferences, received 1 patent "Method of obtaining a tablet preparation" of the RK for a utility model.

Structure and scope of the dissertation. The thesis consists of 136 pages, including normative references, definitions and abbreviations, a review of literature, research objects and methods, research results and analysis, conclusion, list of references. The number of used literature consists of 258 titles, 30 tables, 24 images and 11 applications.