

Development and application of biotechnological methods in animal production

Principal investigator: Assoc. Prof. Peter Chrenek, DSc.

Duration of the task: from 01/2010 to 12/2012

Objective of this task is research on embryogenesis, new regulators of reproduction, and application of modern biotechnological methods in control of reproduction processes in farm animals to improve efficiency in animal production. Research on extra and intracellular mediators as well as application of new predictive markers and regulators of reproduction in farm animals will bring new knowledge about mechanisms of reproduction control and new effective regulators of endocrine functions. Using the available fluorescent, confocal and electron microscopy will help to clarify the quality of manipulated embryos and stem cells in dependence on their origin and genetic modification. Based on obtained results will be recommended modifications of biotechnological methods in recovery and genetic modification of embryos and embryonic stem cells to improve their experimental and practical utilization.

Primary information on genetic variability in the population of endangered Valachian sheep breed in the Slovak Republic will be obtained by the analysis of microsatellites (number of alleles for individual markers, PIC, heterozygosity) in representative set of sheep.

Effective utilization of feed from the viewpoint of cost reduction in primary production and quality improvement in animal products

Principal investigator: Ing. Vladimír Foltys, PhD.

Duration of the task: from 01/2010 to 12/2012

Nutrition influences crucially the optimum utilization of genetic potential in farm animals, their health and efficiency. The efficient change of nutrients from feed to foodstuffs of high quality of animal origin plays principal and decisive role. Heterogeneity of feedstuff production basis in Slovakia necessitates systematic innovation of evaluation and analytical methods with the aim to predict utilization of nutrients in organism of animals and elimination of their excretion into environment as precise as possible. Assessment and utilization of data on really digestible amino acids has a biological basis and it enables to formulate and cover requirement more objectively, and to utilize effectively the potential of alternative feeds considering the effect of different factors, as imbalance of amino acids, influence of high temperature, in difference to the used chemical and analytical data.

The main objective of this task is to formulate biologically substantiated parameters, processes and strategies, treatments, storages, transformations and effective utilization of the nutritive and biological potential of traditional and alternative nutrition resources. The aim is to make their requirement, conditions of effective utilization in organism of animals more precise, to eliminate negative influence on the environment, and at the same time to make the production and quality of milk more effective. Direct benefits for practice are as follows: elaboration of proposal of utilization of methods for assessment of new qualitative parameters of feeds; elaboration of documents and programme for health and hygienic safety of raw cow's milk; elaboration of documents and recommendations for application of rape in feed rations for monogastric animals; elaboration of proposal of feed mixture formulas and composition of feed rations; principles of veterinary and zootechnic care and welfare of cloven-hoofed game.

Improvement of efficiency in farm animal breeding using modern breeding methods

Principal investigator: Mgr. Dana Peškovičová, PhD.

Duration of the task: from 01/2010 to 12/2012

In recent years was in our country placed emphasis particularly on optimization of production conditions with the aim to increase efficiency in farm animals. Genetic improvement of population was done mainly by the import of insemination doses, to a small extent of embryos and breeding animals. Possibilities of selection, mainly in the female part of population, were used insufficiently. It is necessary to determine exactly the selection criteria not only on the level of populations but also of individual herds, taking into account the main objective – economically effective, competitive production of good quality foodstuffs. It is possible only by usage of the newest methods of genetic assessment in combination with determination of economic values in individual properties, which are decisive for the quality of production, with subsequent selection and breeding of the genetically best animals. Of course, balance must be kept between economically effective production and preservation of genetic diversity of populations.

The objective of the task is to extend genetic estimation of animals by new parameters connected with quality and efficiency of production, assess their economic value and recommend selection criteria on the level of populations and herds with emphasis on female part of populations. Possibilities to assess genetic variability of populations will be studied as well. Study of these problems is divided into three research stages: E 01 – Optimization of genetic estimation in farm animals, E 02 – Assessment of economic values in parameters of farm animals and proposal of selection strategies, E 03 – Application of modern methods to evaluate quality of carcass and meat in vivo and post mortem.

Outcome for the practice: Recommendations aimed at control, selection and marketing of herds will be elaborated for breeders. Complex characteristics of production, reproduction and functional properties of the new production type of milk sheep in Slovakia will be elaborated for sheep breeders.

The Ministry of Agriculture SK will use the research results to amend relevant legislation on national as well as European level (Selection Act and relevant regulations), to propose subsidiary measures for farmers.

For recognized breeders' organizations will be recommended optimum selection strategies on the level of populations for individual breeds of farm animals and proposal of innovated regression equations for evaluation of carcass quality in pigs in vivo (PIGLOG) and post mortem by the apparatus FoM, Ultra FoM will be prepared.

For the charged breeders' organization (PSSR) will be elaborated methods of breeding value estimation in farm animals and a proposal of innovated regression equations for evaluation of quality in pig carcasses in vivo.

Improvement of welfare in farm animals by optimization of breeding technology and technique

Principal investigator: Assoc. Prof. Ing. Jan Brouček, DSc.

Duration of the task: from 01/2010 to 12/2012

Objective of the work is to broaden knowledge of the influence of different breeding-technological parameters on production and welfare in farm animals, to provide optimum microclimate in housing area. Influence of environment on production and behaviour of animals, mutual relation of production environment and reactions of animals and influences of breeding on environment will be assessed by means of exact methods.

Parameters of housing, watering and feeding in individual categories of pigs will be evaluated. System of cooling in pigs will be elaborated; creation of ammonia and glasshouse gas emissions in pig housing on slatted floor will be assessed in the course of the year. Decrease in ammonia concentration will be tested in housing of pigs and poultry using low emission technologies. Influences of density of housed animals on social and comfort behaviour, disorders, mortality, production and quality of eggs in range system of hens

keeping will be analysed. Causes of startle and fear manifestations will be studied in large concentrations of hens. The most used cooling systems for dairy cows will be compared and their optimization will be proposed in dependence on construction-technological layout of the building. Proposal of a breeding method to make the production of milk sheep more intensive will be elaborated with emphasis on improvement of lamb raising.

Suitable material for production of mattresses for lying boxes for dairy cows will be proposed. Improvement of labour organisation at milking of cows and ewes will be elaborated with emphasis on biological needs of animals and technical equipment of milking parlours. Utilization of electronic measurers of milk conductivity and motion activity for heat detection, gravidity, lameness and inflammation of mammary gland will be examined. Milk composition and mastitis incidence in ewes will be analysed on the basis of their milkability and suitability for machine milking. The influence of raising method on lambs and way of drying off on mastitis in ewes will be evaluated. Research results and recommendations will be prepared for individual interested persons from practice; the aim is to disseminate the obtained results as quick as possible.

The research results will be used to amend relevant legislation on national as well as European level.

Production and ecological functions of small farm animals and free-living game

Principal investigator: Assoc. Prof. Ing. Jaroslav Slamečka, PhD.

Duration of the task: from 01/2010 to 12/2012

In the present situation in animal production, it is necessary to aim research at topic needs of small-scale breeders and hunters, as alternative forms of biological material utilization in our country. Benefits of such work are visible in the sphere of economy, ecology and society. Production potential of small farm animals represents a significant source of food and processing raw materials.

During the last years, there is a threat of mass decay of bee colonies. Beekeepers assume that it is the result of increased aridisation in environment, diseases and undesirable effects of new agrochemicals.

One of the objectives of this task is to stabilise the bee colonies in order to preserve biodiversity in the country by increase of varroa-tolerant bee colonies; to provide high quality bee products harmless to health and to propose replacement of classic therapeutic interventions by medicaments on natural basis; to propose ways of biological struggle against varroaosis in bees. Objective of this task is also to propose proper management of pesticides utilization in order to minimize the risk of damage or death in bee colonies.

Benefit to beekeepers will be increase of resistance in bee colonies, decrease in therapeutic intervention with synthetic medicaments to suppress varroaosis, which will have positive effect on quality of bee products. At the same time, it will minimize the risk at chemical protection of plants.

Result of this task will be the monitoring system of natural occurrence of *Varroa destructor* in the regions of Slovakia and tests of new conventional medicaments and ways of their application as well as search for therapeutic effective natural substances. Methods of bee colonies treatment and varroaosis control will be elaborated as well as methods to increase natural resistance to pathogens in order to decrease mortality in bee colonies. Determination of pesticides utilization in cultivation of crops will minimize the risks for bees and will provide hygienic safety of bee products.

Research in rabbit breeding is aimed at improvement, stabilization of original lines of broiler rabbits (M91 and P91) bred in the Animal Production Research Centre Nitra and at production of new lines with the possibility to incorporate them into production and experimental breeding systems. Another objective is replacement of common scheme of

hormonal oestrus stimulation and ovulation in females by non-traditional biotechnical methods with regard to animal welfare and necessity to keep natural quality of animal products. Results will serve for elaboration of methods, which use alternative bio-stimulating procedures to provide high and hygienic production of rabbit meat.

In the research of free-living game, we will bring knowledge about parameters of brown hare populations in south-western Slovakia with the aim to propose measures to stop the decrease in abundance of populations. The main means will be ecologization of the country and improvement of quality in biotopes of game in agrarian landscape. Results will serve for elaboration of methods used to manage brown hare in our conditions and possibilities of biotope adjustment within the agro-system.