



INSTITUTE OF ANIMAL SCIENCE

Prague Uhřetěves

2023



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Welcome to the Institute of Animal Science (IAS),

a centre of research into the biological and bio-technological basis of animal science.

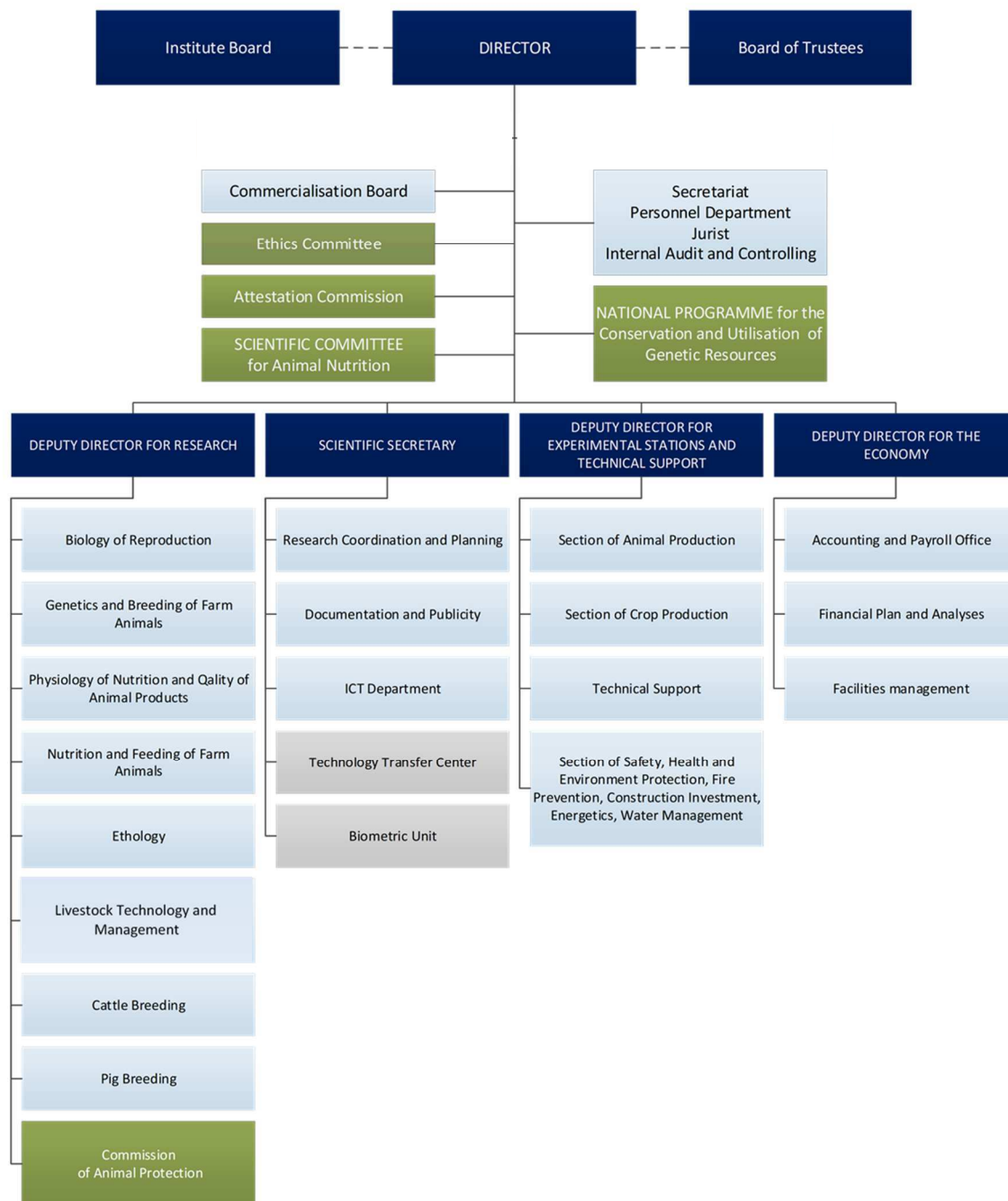
IAS carries out basic and applied research focusing on innovation and the practical use of knowledge in animal science. Eight research departments investigate animal genetics and breeding, bio-technology and reproduction, nutrition, quality of products, animal ethology and welfare, breeding technology, herd management and production economy. We work mainly with dairy and beef cattle, pigs, poultry, rabbits, deer, horses, sheep and goats.

In addition to basic and applied research, IAS carries out other expert activities. One of the most significant is the implementation of the National Programme for Conservation and Utilization of Farm Animal Genetic Resources, where the Institute is an expert reference, coordinator and administrator and also takes care of the related international agenda. The Institute also provides for the activity of the Scientific Board for Animal Nutrition, and has been entrusted by the Ministry of Agriculture to represent the Czech Republic in the European Federation of Animal Science (EAAP).



IAS has its own comprehensive experimental base and a farmstead. It works on almost 700 hectares of farmland in Uhřetěves, Netluky and Královice. In addition, it owns and runs a pig breeding facility in Kostelec nad Orlicí.

ORGANIZATION STRUCTURE



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RESEARCH DEPARTMENTS

BIOLOGY OF REPRODUCTION



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EMBRYO BIOTECHNOLOGY

The aim is to use animal models for clarifying and addressing human reproduction issues and embryo technology methods for the preservation of endangered species.

We focus on developing new embryo technology and preservation of biological material from animals in the “genetic resource” category. The methods include namely the micro-handling of reproductive cells and embryos, derivation of stem cells, epigenetic characterisation of embryos and preservation of biological material using non-conventional methods. Methods are being developed through trials on animal models which could increase the efficiency of human assisted reproduction.

REGULATION AND MATURING OF MAMMALIAN OOCYTES

The aim is to produce high quality oocytes for the reproduction biotechnology purposes.

Research in the reproduction of farm animal females has two main directions: the first follows the direction of gaseous signalling molecules, so-called gas transmitters, on the maturing and fertilisation of mammalian oocytes; the second is concerned with the negative impacts of environmental pollutants on the mammalian oocyte quality. We pay special attention to agents capable of upsetting the hormonal balance of the organism, so-called endocrine disruptors.

vuzv.cz/reproduction

RUNNING PROJECTS

QK1910082	Addressing the problem of the occurrence of bacterial, protozoan and viral zoonotic agents in small ruminant breeds <i>responsible coordinator: Jitka Kyselová, Ph.D.</i>	2019–2023
QK1910156	New approaches for the preservation of endangered livestock populations <i>responsible coordinator: Jana Rychtářová, Ph.D.</i>	2019–2023
MZE-RO0723	Preservation and storage of biological material from animals belonging into a category „Genetic Resources“ as well as from other endangered mammalian species. <i>responsible coordinator: Josef Fulka, Ph.D.</i>	2023–2027

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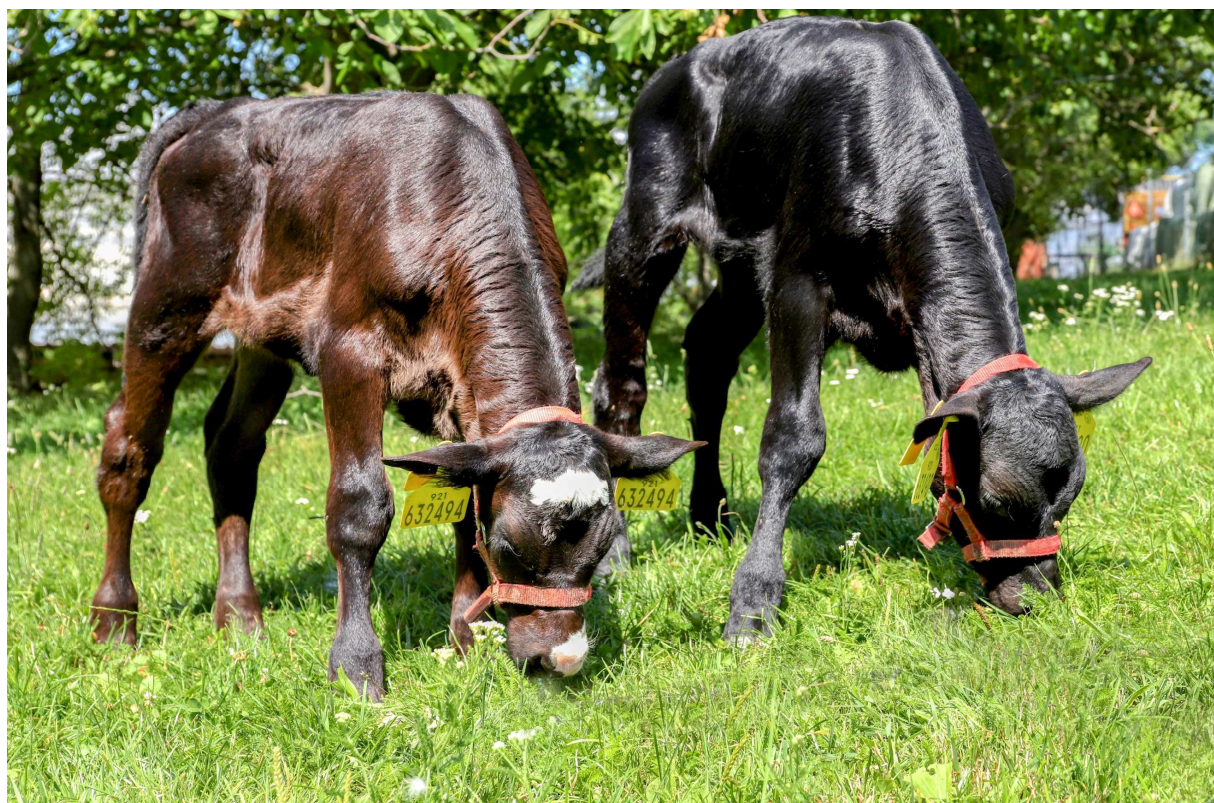
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FULKOVÁ, Helena, LOI Pasqualino, PALAZZESE, Luca, BENC, Michal a FULKA, Jr. Josef. Nucleus reprogramming/remodeling through selective enucleation (SE) of immature oocytes and zygotes: a nucleolus point of view. *Journal of Reproduction and Development*, 2022, 68, 165-172. ISSN 0916-8818.

BRZÁKOVÁ, Michaela, RYCHTÁŘOVÁ, Jana, ČÍTEK, Jindřich a SZTANKÓOVÁ, Zuzana. A Candidate Gene Association Study for Economically Important Traits in Czech Dairy Goat Breeds. *Animals*, 2021, 11, Article Number 1796. ISSN 2076-2615.



Test-Tube Heifer

The scientific team of the Biology of Reproduction department has successfully implemented artificial insemination in cattle.

GENETICS AND BREEDING OF FARM ANIMALS



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The main goal of our department is to incorporate the findings from genetics and other disciplines into comprehensive selection and hybridisation programmes for the main species of farm animals (dairy and beef cattle, pigs, sheep, poultry and horses).

The focal point is the development of modern methods for prediction of breeding values (genetic evaluation) for livestock, including the genomic breeding values estimations, suitable procedures for the assessment of productivity, together with design and verification of new selection criteria and quantifications of relationships (genetic and phenotypic) between them by using modern statistical methods.

In dairy cattle, we focus on genomic breeding for improved health status (clinical mastitis, claw and foot disorders, selected reproduction disorders) and we participate on the development of the national system for cattle health monitoring.

In beef cattle, we aim on development of a system of genetic evaluation, collection and evaluation of new traits, estimation of genetic parameters and prediction of breeding values. Furthermore, the team members are actively involved in the development of international genetic evaluation of beef cattle in the Interbeef project.

Following this we design selection indices, profit functions and bio-economic models for the economic evaluation of individual traits, partial measures in breeding, production types and purpose.

Another area is the optimisation of selection and hybridisation programmes and a simulation of genetic processes in the populations of animals, including the development of methods for preserving the genetic diversity within and between populations and endangered genetic animal resources.

We develop our own software to address the issues mentioned above, for example ECOWEIGHT programme for bio-economic models.

We closely cooperate with associations of breeders, organisations registering and evaluating animals and international breeding organisations, such as Interbull and Interbeef.

We are involved in regular teaching programmes on genetics and breeding at universities. The main working tools are processes used in the population and quantitative genetics. Working groups:

- DAIRY AND BEEF CATTLE GENETICS
- PIG GENETICS
- SMALL RUMINANT GENETICS
- HORSE GENETICS
- MOLECULAR GENETICS
- BREEDING ECONOMY AND ECOWEIGHT PROGRAMME

vuzv.cz/genetics

RUNNING PROJECTS

QK1910082	Addressing the problem of the occurrence of bacterial, protozoan and viral zoonotic agents in small ruminant breeds <i>responsible coordinator: Jitka Kyselová, Ph.D.</i>	2019–2023
QK1910156	New approaches for the preservation of endangered livestock populations <i>responsible coordinator: Jana Rychtářová, Ph.D.</i>	2019–2023
QK1910217	Creation of a reference population and development of methods for estimating genomic breeding values of pig traits included into the Czech National Breeding Program <i>responsible coordinator: Emil Krupa, Ph.D.</i>	2019–2023
QK1910059	Use of genomic information and optimization of beef cattle breeding programs <i>responsible coordinator: Zdeňka Veselá, Ph.D.</i>	2019–2023
QK1910320	Research of dairy cattle breeding methods with the goal to improve disease resistance using genomic approach, systemic health data collecting <i>responsible coordinator: Ludmila Zavadilová, Ph.D.</i>	2019–2023
QK22020280	Use of genomic selection to optimise the resilience of dairy cattleresponsible coordinator: Eva Kašná, Ph.D.	2022–2024
MZE-RO0723	Genetics and breeding <i>responsible coordinator: Ludmila Zavadilová, Ph.D.</i>	2023–2027

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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI. Prediction of genomic breeding values to increase resistance to foot and claw disorders in Holstein cattle. Authors: ZAVADILOVÁ, Ludmila, KAŠNÁ, Eva and KRUPOVÁ, Zuzana. Česká republika. Certifikovaná metodika 978-80-7403-273-8. 2022-11-23.



NUTRITION AND FEEDING OF FARM ANIMALS



Petr Homolka, Assoc. Prof.
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PREDICTION OF NUTRITIONAL VALUE OF FEEDS AND DIGESTION IN RUMINANTS

The goal is to define and evaluate the nutritional value of conventional and unconventional feeds for ruminants and horses and to recommend and use optimum technologies in the ensilaging of forage.

We deal with the nutritional value of feeds and their degradability and digestibility by ruminants and horses. *In vitro*, *in sacco* and mobile bag techniques are developed and applied to determine these values. Our team studies the rate of degradation of fibre fractions, ratio of digestible neutral detergent fibre (NDF) to non-digestible NDF, relationship between degradability parameters of crude protein (CP) and NDF in relation to forage harvest timing.

In addition to traditional feeds, we test different varieties of white and narrow-leaved lupines for forage quality at different stages of growth by analysing for CP fractions.

We verify technological procedures of forage conservation and ensiling and effects of chemical preservatives and inoculants on the quality of silage.

NUTRITION OF HIGH PERFORMANCE DAIRY COWS

The goal is to improve nutrition of high-performing dairy cows during the entire transition period.

We verify of feeding TMR, deal with the issue of feeding techniques during the dry period and the feeding of unconventional forage.

Research in the field of milk quality focuses mainly on improving profiles of fatty acids and aminoacids in milk.

We are validating TMR feeding strategies, addressing the issue of feeding techniques during the dry period and feeding of unconventional forages.

Our research on dairy cow nutrition primarily focuses on effects of feeding on metabolism and production. More specifically, we are validating feedstuffs and feeding strategies, especially in transition period that promote animal health and performance. Regarding the food production, our research focuses on improving the fatty acid and amino acid profiles in milk. Due to the increased need for sustainable livestock production, our research focuses on alternative feedstuffs such as energy by-products, and we also test secondary plant metabolites as additives in ruminant diets that can improve rumen fermentation efficiency and reduce environmental impact food production from dairy cows. Techniques applied are *in vivo*, *in sacco* and *in vitro*.

vuzv.cz/nutrition

RUNNING PROJECTS

QK23020011	Development of strategies to reduce greenhouse gases and ammonia emissions from livestock in the Czech Republic <i>responsible coordinator: Miroslav Joch, Ph.D.</i>	2023–2025
QK1910438	Reduction the use of antibiotics by environmentally-friendly prebiotic and probiotic feed additives in the nutrition of calves <i>responsible coordinator: Petr Homolka, Assoc. Prof.</i>	2019–2023
QK21010344	Effective resources of proteins in nutrition of cattle <i>responsible coordinator: Petr Homolka, Assoc. Prof.</i>	2021–2025
QK1910242	Elimination of risk factors for dairy cow health and reproduction using systems of automatic measurement and collection of data <i>responsible coordinator: Luděk Bartoň, Ph.D.</i>	2019–2023
MZE-RO0723	Livestock nutrition strategies to increase competitiveness and reduce the impact of global changes in the biosphere <i>responsible coordinator: Petr Homolka, Assoc. Prof.</i>	2023–2027

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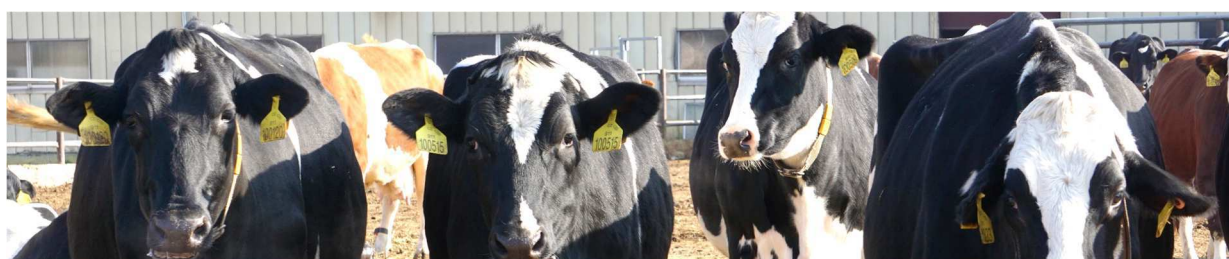
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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI. Technology of harvesting and preservation of maize using precision farming methods. Authors: LOUČKA, Radko, JAMBOR, Václav, NEDĚLNÍK, Jan, JANČÍK, Filip, KUBELKOVÁ, Petra, TYROLOVÁ, Yvona, VÝBORNÁ, Alena, HOMOLKA, Petr and LANG, Jaroslav. Česká republika. Ověřená technologie OT/VÚŽV/03/2022. 2022-03-29.



NUTRITIONAL PHYSIOLOGY AND ANIMAL PRODUCT QUALITY



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Nutrition physiology and problems of products quality in the Institute of Animal Science are studied since 2003. Immediately from the beginning of our work we used the unique possibility to participate in reconstruction of laboratories, vivarium building and building of experimental facilities for poultry and rabbits. Our research includes study of biochemical processes and study of microbiota in the digestive tract of poultry and rabbits. In microbiological studies we put the accent on antibiotic resistance of bacteria which is one of main problems of contemporary microbiology. In this respect we investigate the cross resistance of natural antimicrobials and antibiotics used in human medicine.

Animal nutrition and quality of animal products are interrelated. Similarly, quality of products and health of Czech population are closely interrelated. Our research pays particular attention to utilization of domestic feeds and use of advanced analytical methods, which were in many cases developed without foreign help. Our results were verified in animal experiments and can be used in design of feed mixtures and handed over to feed producers. Complex research of poultry and rabbit nutrition carried out in the Institute of Animal Science is unique in the Czech Republic. For a long time, we cooperate with the Kielanowski Institute of Polish Academy of Science and Department of Veterinary Medicine and Animal Production of the University of Milan. We participate in education of animal nutritionists in the Czech Agricultural University in Prague and we are research workers in several joint projects

IMPORTANT RESULTS

Results of our long-term research on the use of carotenoids in animal nutrition were published in prestigious journal Critical Reviews in Food Science and Nutrition. This journal is in the group of ten best journals in this field according to the Web of Science. Also, our work on the use of tannin in young layers is worthy of attention. Using tannin from chestnut the strength of eggshell and content of lipophilic vitamins were increased (Italian Journal of Animal Science, 2022, 21, 1343-1351. ISSN 1594-4077). In another work the synergy of Zn-pyrithione and gentamycine has been described. This combination of antimicrobials is efficient against streptococci and staphylococci, which are bacteria responsible for bovine mastitis and dermatitis (Antibiotics Basel, 2022, 11, article no. 960. ISSN 2079-6382). Another work describes the effect of housing system on growth of rabbits, carcass parameters and meat quality (Meat Science, 2022, 193, article no. 108953. ISSN 0309-1740).

We organized two international workshops. The first dealt with analytical chemistry and discussed problems of cannabinoids determination. The main speaker was Prof. Marian Czauderna from Polish Academy of Science, who worked in the IAS for three months on basis of the EU project Mobility. The second workshop dealt with active compounds present in linseed and hempseed. Speakers outlined possibilities of linseed and hempseed use in the feed and food industry. In this workshop the main speaker was Dr. Davide Lanzoni from the

University of Milan. His presentation has been focused on important compounds in hempseed and linseed as alternative components of feeds and foods. Three other papers were presented by members of staff of the IAS. We appreciate award Golden Ear obtained at International Agricultural Show in České Budějovice 2022. Also, our design of feed "Feed mixture for chickens containing hempseed and linseed" was appreciated.

RUNNING PROJECTS

QK1910387	Quality and safety meat of chicken fed with insect meal, limited feed intake and pasture <i>responsible coordinator: Michaela Englmaierová, Ph.D.</i>	2019-2023
MZE-RO0723	Physiology of nutrition and products quality from the point of view of sustainable development aims and animal nutrition programme <i>responsible coordinator: Věra Skřivanová, Prof.</i>	2023-2027

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ETHOLOGY



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ETHOLOGY AND WELFARE OF CERVIDS AND EQUINES

We are engaged in the research of the basic and applied biology of behaviour of farm animals but also other species kept in extensive conditions or in zoos or, as the case may be, feral animals.

We research various aspects of their behaviour which may have an impact on breeding and welfare, namely: social behaviour and relationships, parental (maternal) behaviour and rearing and weaning of litter, intra-species communication and communication with humans, emotions and cognitive abilities of animals.

Our research also focuses on the impact of animal management and stable environment on the behaviour, physiology, welfare, reproduction and productivity and, in specific species, on the working and social use (cervids, horses, dogs, companion animals).

ETHOLOGY AND WELFARE OF CATTLE AND PIGS

The goal is to support the development of economically viable and ethically acceptable husbandry of pigs and cattle in the Czech Republic and EU.

We focus on the influence of housing and social factors on the behaviour, welfare, health and production of cattle and pigs. The research covers a wide range of topics, combining various approaches from theoretical studies (e.g. social interaction modelling) to experimental research on maternal behaviour, agonistic behaviour, play behaviour, communication between animals and ontogenesis of behaviour.

We also investigate practical issues, such as a comparison of various types of housing and management in intensive and alternative farming of cattle and pigs or the development of new methods for the evaluation of animal welfare on farms.

Special attention is paid to the stage of rearing with an emphasis on health, mortality, welfare, stress resistance and the development of production and behavioural capabilities of piglets and calves.

vuzv.cz/ethology

RUNNING PROJECTS

QK1910242	Elimination of risk factors for dairy cow health and reproduction using systems of automatic measurement and collection of data <i>responsible coordinator: Luděk Bartoň, Ph.D.</i>	2019–2023
MZE-RO0723	Animal behaviour and welfare within current agro-political, environmental as well social challenges <i>responsible coordinator: Jitka Bartošová, Assoc. Prof.</i>	2023–2027

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RORVANG, Maria Vilain, NIČOVÁ, Klára a YNGVESSON, Jenny. Horse odor exploration behavior is influenced by pregnancy and age. *Frontiers in Behavioral Neuroscience*, 2022, 16, Article number: 941517. ISSN 1662-5153.



LIVESTOCK TECHNOLOGY AND MANAGEMENT



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CREATING AND EVALUATING REARING ENVIRONMENT

We specialize in the formation and evaluation of rearing environment from the point of view of the dependence of animal, technical, technological and human factors.

The research addresses the evaluation and formation of the rearing environment, namely in terms of adaptation and thermoregulatory abilities of animals (mainly large and small ruminants), the impact of technical elements or complete technologies on animal health and welfare, including the macro- and micro-climatic conditions and non-standard factors of livestock rearing and their elimination in farm buildings. To meet the objectives, we use state-of-the-art measurement and diagnostic equipment

TECHNOLOGY AND MANAGEMENT OF RUMINANTS

We look into the issue of technologies in stables and animal management in terms of production, welfare, health and biosecurity.

We specialize in the evaluation of housing systems using various technologies and in the evaluation of the level of rearing (specifying the technology and zootechnical reserves) and in the determination of "critical control points".

We also investigate the influence of rearing environment and other selected factors on milk quality and, last but not least, we focus on the hygiene and biosecurity.

RUNNING PROJECTS

QK23020011	Development of strategies to reduce greenhouse gases and ammonia emissions from livestock in the Czech Republic <i>responsible coordinator: Miroslav Joch, Ph.D.</i>	2023–2025
QK1910438	Reduction the use of antibiotics by environmentally-friendly prebiotic and probiotic feed additives in the nutrition of calves <i>responsible coordinator: Petr Homolka, Assoc. Prof.</i>	2019–2023
QK1910059	Use of genomic information and optimization of beef cattle breeding programs <i>responsible coordinator: Zdeňka Veselá, Ph.D.</i>	2019–2023
QK21020304	The influence of the level of livestock management and prevention of diseases, including biosecurity, on the reduction of antimicrobials usage and the spread of antimicrobial resistance <i>responsible coordinator: Gabriela Malá, Ph.D.</i>	2021–2023
MZE-RO0723	Innovation and optimization of livestock production systems to ensure the welfare of farmed animals <i>responsible coordinator: Ivana Knížková, Assoc. Prof.</i>	2023–2027

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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI. Automatic non-contact body temperature measuring system. Authors: KUNC, Petr and KNÍŽKOVÁ, Ivana. Česká republika. Ověřená technologie OT/VÚŽV/04/2022. 2022-03-29.

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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI. Cooling system for dairy cows with central autonomous control of sprinkler nozzles. Authors: KUNC, Petr and KNÍŽKOVÁ, Ivana. Česká republika. Ověřená technologie OT/VÚŽV/06/2022. 2022-11-28.

VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI a ČESKÁ ZEMĚDĚLSKÁ UNIVERZITA V PRAZE. A locator of stabled animals. Authors: HART, Jan, KNÍŽKOVÁ, Ivana, HARTOVÁ, Veronika and KUNC, Petr. Česká republika. Patentový spis CZ 309188 B6. 2022-03-16.

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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. V UHŘÍNĚVSI. The effect of ventilation in outdoor individual hutches for calf welfare. Authors: MALÁ, Gabriela, NOVÁK, Pavel, JIROUTOVÁ, Pavlína, KNÍŽEK, Josef, NEJEDLÁ, Eliška, PROCHÁZKA, David and KOČÍ, Martina. Česká republika. Certifikovaná metodika 978-80-7403-286-8. 2022-12-22.



CATTLE BREEDING



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DAIRY CATTLE BREEDING

Together we try to establish paths to sustainable breeding of healthy dairy cattle herds.

We monitor animal health (mastitis, leg diseases) and apply obtained data in the selection and breeding of cattle. Currently we address the early indication of negative energy balance using modern technological equipment at farms and milking parlours which could play an important role in the prevention of metabolic disorders and could improve the health of animals.

BEEF CATTLE BREEDING AND QUALITY OF MEAT

The goal is the research aimed at economically viable production of beef while meeting the current demands on its nutritional value and organoleptic properties.

We do research in the area of fattening, intensity of growth, carcass quality of cattle and quality of beef. In addition to benchmarking the fattening performance and meat quality of different breeds and crossbreeds we evaluate the influence of practicing various methods of feeding on the meat productivity of cattle.

We study genetic and other effects on meat composition, namely as regards the content of intramuscular fat and fatty acids profile. Along with this we evaluate factors influencing the organoleptic and technological properties of beef.

We also investigate farming systems applied in beef cattle farming, classification of beef carcasses and the technology of rearing and fattening of farmed cervids with the aim to achieve economically viable meat production.

ECONOMICS OF CATTLE PRODUCTION

Finding and defining economic indicators of cattle breeding in the Czech Republic and EU.

We focus on the economic indicators of cattle breeding and the issues of the EU common agricultural policy. We regularly analyse and evaluate statistical information on the dairy and beef cattle breeding with an emphasis on the economics of production. The results are compared with other EU member states.

For over ten years we have been collecting and evaluating data from Czech agricultural businesses with the aim of defining the economic context of milk production. The collection and evaluation of production and economic indicators has been performed in beef cattle since 2013. For breeders there is free online economic software, FarmProfit, which is used for the calculation of economic indicators in the basic agricultural sectors.

vuzv.cz/cattle

RUNNING PROJECTS		
QK1910242	Elimination of risk factors for dairy cow health and reproduction using systems of automatic measurement and collection of data <i>responsible coordinator: Luděk Bartoň, Ph.D.</i>	2019–2023
QK1910320	Research of dairy cattle breeding methods with the goal to improve disease resistance using genomic approach, systemic health data collecting <i>responsible coordinator: Ludmila Zavadilová, Ph.D.</i>	2019–2023
QK21010344	Effective resources of proteins in nutrition of cattle <i>responsible coordinator: Petr Homolka, Assoc. Prof.</i>	2021–2025
QK21010038	Early prediction of health risks and reproduction disorders in dairy cows using the extended spectrum of parameters obtained from milk composition analysis <i>responsible coordinator: Luděk Bartoň, Ph.D.</i>	2021–2025
QK22020132	New methods of pig carcass classification <i>responsible coordinator: Jaroslava Bělková, Ph.D.</i>	2022–2024
MZE-RO0723	Livestock production systems with emphasis on the health and reproduction of dairy cows, the quality and safety of animal products and the economics of cattle and other ruminant husbandry <i>responsible coordinator: Luděk Bartoň, Ph.D.</i>	2023–2027

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PIG BREEDING



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PIG PRODUCTION SYSTEMS

Continuous improvement of pig breeding systems leads to finding solutions to issues in the breeding of pigs.

We deal with issues of nutrition, technology and welfare of pigs with a focus on their application in the management of production and breeding farms.

Part of the workplace is certified nucleus breeding herd of Přestice Black-Pied Pigs and the breeding of laboratory mini pigs.

We provide consultancy for the breeder community and publish the Research in Pig Breeding scientific journal. We regularly organise the international workshop Research in Pig Breeding and participate in the organisation of the international symposium "Innovative research for the future of agriculture and rural development".

PIG REPRODUCTION

We follow up on the tradition of the former Research Institute of Pig Breeding.

We organise insemination training courses (for the insemination and embryo transfer in sows in the trainees' workplaces) and are involved in the programme for the conservation of genetic resources as a specialised workplace for the cryopreservation of semen and other biological material.

CLASSIFICATION OF PIG CARCASSES

The goal is to provide information about the composition and quality of pig carcasses in the final stages of production and commercialisation.

We focus on monitoring the factors that affect the selected quantitative and qualitative indicators of the pig carcass value. The emphasis is mainly on the objective classification methods, their development and further application in the conditions of slaughterhouse operations in the Czech Republic.

An important part of the activity is a close cooperation with the professional community – both with breeders and with processors. Regular specialised training courses are held under a mandate from the Ministry of Agriculture on the implementation of classification procedures for graders of pig carcasses and for classification inspectors.

The workplace is also a contact point under Article 20 of Council Regulation EC 1099/2009 on the protection of animals at the time of slaughtering.

RUNNING PROJECTS

QK1910400	The fattening of entire male boars as an economically and ethically acceptable option to resolve the ban or restriction on surgical castration <i>responsible coordinator: Miroslav Rozkot, Ph.D.</i>	2019–2023
QK22020132	New methods of pig carcass classification <i>responsible coordinator: Jaroslava Bělková, Ph.D.</i>	2022–2024
QK23020085	New approaches in piglet production with focus on welfare, environmental protection and production economics <i>responsible coordinator: Eva Weisbauerová (Václavková), Ph.D.</i>	2023–2025
MZE-RO0723	Stabilization and development of the production systems in pig farming <i>responsible coordinator: Miroslav Rozkot, Ph.D.</i>	2023–2027

SELECTED PUBLICATIONS

WEISBAUEROVÁ, Eva, ROZKOT, Miroslav, NEVRKLA, P. and HADAŠ, Z. Effect of litter size on piglet losses in different parities. *Research in Pig Breeding*, 2022, vol. 16(1), p. 14-18. ISSN 1802-7547.

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BĚLKOVÁ, Jaroslava and WEISBAUEROVÁ, Eva. African swine fever is also transmitted through feed. *Náš chov*, 2022, vol. 82(3), p. 23-25.

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LABORATORIES

The laboratories are utilized to carry out experimental analyses for research projects and grants.

Laboratory of physiology of nutrition and quality of animal products

- ✓ Laboratory of microbiology
 - Aerobic and anaerobic cultivation of microorganism, DNA and RNA extraction from various organic materials, denaturing gradient electrophoresis, DNA agarose electrophoresis, PCR with DNA, RNA including qPCR and reverse transcription
 - Absolute and relative quantification of PCR products, identification of microorganism based on sequencing of different parts of the gene, preparation of DNA libraries and determination of minimum inhibitory concentrations of antibacterial agents
- ✓ Laboratory of enzymatic analysis
 - Monitoring of enzymatic activity in digestive tract of animals
- ✓ Laboratory of chemical analysis
 - Analysis of feed and additives, for example determination of phenol or tannin concentration
- ✓ Laboratory of amino acids
 - Analysis of basic proteinogenic amino acids with HPLC
- ✓ Laboratory of elemental analysis
 - Dry or microwave mineralization of samples
 - Analysis of elements Ca, Mg, Na, K, Zn, Fe, Mn, Cu, Pb, Cd, Co, Ni, Cr, Se, P and S
- ✓ Laboratory of chromatography
 - Analysis of fatty acids, cholesterol, vitamin E, A, β -carotene and vitamin C, lutein, zeaxanthin, bile acids, volatile fatty acids, fecal sterols, oxidized sterols, alkanes and malondialdehyde

The laboratories are equipped with state-of-the-art technologies, ensuring high-quality analytical results that make us competitive in the world of science.



Laboratory of nutrition and feeding of farm animals

- ✓ Laboratory of feeds
 - The determination of dry matter, ash, ether extract, crude fiber and fiber fractions (ADF, NDF, ADL), crude protein and nitrogen fractions (A, B1, B2, B3, C), starch, sugar, pH, acidity of water extract, volatile fatty acids, ammonia, gross energy, digestibility of feeds
- ✓ Laboratory of meat
 - The laboratory analysis of meat, meat products, eggs and blood
 - The determination of crude protein according to Kjeldahl method, ether extract, ash, mineral contents, hydroxyproline, collagen
 - The sensory evaluation of quality of meat, meat products and eggs

Laboratory of genetics and breeding of farm animals

- ✓ Laboratory of isolation and purification of DNA and RNA from fresh and frozen biological material
 - Nucleic acids (NA) storage
 - Evidence of biological samples of livestock kept mainly in the Czech Republic
 - Database of reference samples
- ✓ Laboratory for molecular analysis of NA, genotyping of gene variants, gene expression and photodocumentation
 - Genotyping service for breeders
 - Milk protein genes in ruminants
 - Booroola gene in sheep
 - Coat color genes in horses
 - Paternity test of livestock (horses, cattle, sheep, goats, poultry)
 - Sex determination in birds

EXPERIMENTAL FARM

The experimental base which provides conditions and facilities mainly for the research activities of individual departments of the Institute consists of 20 buildings in the locations of Uhřetěves, Netluky, Královice and Kostelec nad Orlicí. In addition to the experimental facilities the farmstead enables the Institute to test technologies and to apply research findings in practice and to demonstrate them for the education and awareness purposes of the breeding and consulting community. On the basis of cooperation with the University of Agriculture in Prague students come on internship and specialised training. These locations also organise excursions for primary and secondary schools and specialised training courses for livestock hauliers. The sites and facilities are being upgraded and equipped on an ongoing basis in order to meet the requirements of the planned experiments:

- 660 ha of farmland,
- feed mixing plant, experimental slaughterhouse, pig insemination centre, cryobank.

NUMBERS OF INDIVIDUAL SPECIES AND CATEGORIES OF LIVESTOCK IN 2/2023

Category	number
Cattle total	654
of which dairy cows	233
Pigs Uhřetěves total	494
of which sows	29
Pigs Kostelec	139

Category	number
Deer and fawns	48
Rabbits	196
Laying hens	240



EXPERT ACTIVITIES

SCIENTIFIC BOARD FOR ANIMAL NUTRITION

The scientific board for animal nutrition was established in 2002 as an advisory body of the food safety coordination group. Its main task is to prepare scientific studies, offer expert views, and prepare proposals for measures ensuring safety throughout the entire chain of food and feed production. It cooperates with another three scientific boards. The board's views are used as independent scientific points of reference for experts preparing legal regulations in the European Union. Members of the board are leading experts from universities, research institutes and companies active in the field of animal nutrition. Information on the board's activities is available at: yuzv.cz/scientific-comm

EXPERT STUDIES /2023

- Fibre in nutrition of broiler chickens
- Quality of fat in commercial nuts
- Antibiotic group treatment in European farm animals – key factors, conditions and alternatives.
- Hempseed and linseed in feeds for layers and fattened chickens



CLASSIFICATION OF BOVINE AND PIG CARCASSES

The Institute delivers tasks associated with the development and implementation of the SEUROP classification system for the evaluation of bovine and pig carcasses. This activity involves:

- membership of IAS specialists in expert groups for the classification of carcasses of cattle and pigs,
- training courses for cattle and pig carcass classifiers,
- theoretical and practical education of classification inspectors.

ACTIVITIES /2023

- basic and follow-up training courses for cattle carcass classifiers,
- basic and follow-up training courses for pig carcass classifiers,
- additional courses for cattle and pig carcass classification inspectors,
- participation of Daniel Bureš in the “Better training for safer food” in Ireland designed for beef carcass classifiers with the aim to increase the uniformity of classification in EU member states.
- participation in the project QK22020132 - New methods of pig carcass classification, with the aim to collect data needed for developing of innovative regression equations and approving new methods for the classification of pig carcasses



NATIONAL PROGRAMME FOR THE CONSERVATION AND UTILISATION OF GENETIC RESOURCES

The programme was established in 1996 by the Ministry of Agriculture to guarantee conservation genetic diversity of domesticated animals' species traditionally bred in the Czech Republic. It covers cattle, horses, pigs, sheep and goats, chickens and waterfowls, honey bees and fish in aquacultures.

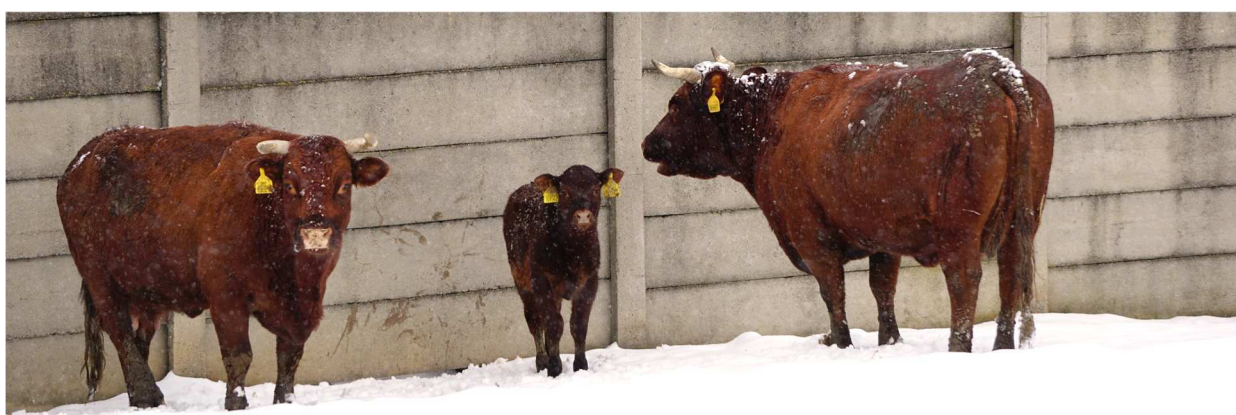
In 2016, the IAS has been designated as The National Centre for Genetic Resources to coordinate and implement the National programme, together with a range of stakeholders. The key activities of the National Centre are:

- ongoing monitoring of genetic resources in connection with an early warning system for risk of livestock diversity loss,
- facilitation long term ex situ conservation by development and breeding of special conservation herds (living gene banks) and organizing cryopreservation,
- research to facilitate characterisation, evaluation and scientifically sound and cost-effective breeding programmes,
- education, promotion and raising public awareness,
- dealing with the agenda of supports provided for the breeding of genetic resources and inspection of supported program participants,
- representing Czech Republic in international activities and cooperation.

ACTIVITIES /2023

- Conservation nucleus of national cattle breeds (the Czech Red and the Czech Red Pied) on the Institute's experimental farm Netluky – cryoconservation of embryos and embryo transfer,
- conservation herd of the Přestice Black-Pied Pigs and the boar Artificial Insemination Station in Kostelec nad Orlicí quality testing of historical insemination doses (in vivo test),
- quarantine boar breeding facility for PRRS-free breeding farms,
- cryopreservation of bull, ram, goat and stallion semen,
- revitalization program of the Czech Gold-Speckled Hen,
- the National Program innovation for the period 2022-2026.

vuzv.cz/genetic-resources



SERVICES & CONSULTANCY

COLLABORATION AND CONTRACT RESEARCH

- Contract research following the partners' assignment
- Services of accredited experimental stables including the provision of defined animals for experiments and carrying out experiments in line with legislation on the protection of animals
- Expert cooperation on the verification of materials, technologies and processing of livestock production

EXPERT REPORTS

- Preparation of analyses, studies and research on individual demand
- Defining genetic variants of milk protein genes for cattle, sheep and goats
- Defining genetic variants of Booroola genes for sheep
- Defining genetic variants of genes for the colouring of horses

ECONOMIC ANALYSES FOR BREEDERS

- ECOWEIGHT software for the calculation of economic weight of important traits in beef cattle, dairy cattle and sheep
- FarmProfit – economic software for the evaluation of profitability of agricultural commodity production

CONSULTANCY

- Addressing topical issues in the breeding of dairy cattle, beef cattle, goats and sheep, pigs, poultry, rabbits, horses and cervids
- E-mail and telephone consultancy
- Online consultancy: poradenstvi@vuzv.cz

TRAINING COURSES AND EXPERT SEMINARS

- Pig insemination training courses
- Training of specialists in the classification of carcasses of pigs and adult cattle (SEUROP)
- Training of consultants in the field of livestock production
- Expert visits and practical instruction for the training of livestock hauliers
- Invited lectures for breeders, students and agricultural business staff on specific topics

PLANNED SEMINARS AND WORKSHOPS IN 2023

RESEARCH IN EQUINE PHYSICAL THERAPY IN THE CZECH REPUBLIC Conference/Workshop	3/23
19TH INTERNATIONAL SYMPOSIUM FORAGE CONSERVATION	4/23
INTENSIVE PIG FARMING IN THE CZECH REPUBLIC Seminar	5/23
OPTIONS OF INCREASING THE PROFITABILITY OF MILK PRODUCTION IN THE CZECH REPUBLIC Workshop	6/23
FOLLOW-UP TRAINING COURSE ON BOVINE AND PORCINE CARCASS GRADING	6/23
PIG BREEDING Seminar	6/23
DEER FARMING IN CONTEXT – NUTRITION AND PRODUCTION WITH REGARD TO NEW LEGISLATION, COMMON AGRICULTURAL POLICY AND THE ENVIRONMENT Seminar	6/23
INTERNATIONAL SOCIETY FOR APPLIED ETHOLOGY Regional online conferences	9/23
RESEARCH IN PIG BREEDING International workshop	10/23
BASIC AND FOLLOW-UP TRAINING COURSES FOR CATTLE CARCASS CLASSIFIERS	11/23
CURRENT TRENDS IN ANIMAL BREEDING Seminar	11/23
UPDATES ON ANIMAL BIOCLIMATOLOGY 2023 International conference	11/23
CURRENT ISSUES IN EXTENSIVE PIG FARMING Seminar	11/23
NEW TRENDS IN INTENSIVE AND HOBBY RABBIT FARMING Seminar	11/23
OPEN FARM DAY – VELKÁ CHYŠKA Seminar	11/23
LEGUMES AND THEIR USE IN FARM ANIMAL NUTRITION Workshop	11/23
UPDATES ON ANIMAL NUTRITION, HEALTH AND PRODUCT SAFETY 2023 Conference	11/23



STUDENTS AT IAS

IAS participates in the education of students at all levels of secondary and university education.

Provided educational activities:

- teaching at agricultural universities,
- preparation, education and guidance of students (undergraduates and Ph.D. students),
- specialized excursions,
- practical training for students of vocational schools, higher vocational schools, secondary schools of agriculture and universities.



PUBLIC EVENTS AT IAS

IAS is an institution open to the public, namely to the young generation of school children and secondary school students. At the experimental farmstead excursions are held during the year and once a year the farmstead hosts a popular event called Food Story.

Events for the public:

- teaching and demonstrations,
- excursions for primary schools and kindergartens in Prague,
- FOOD STORY – nature trail for the youngest school children,
- FARM SCHOOL, SCIENCE STORY – educational events,
- NIGHT OF SCIENTISTS.



EVENTS OF THE PAST YEAR

Commemorative plaque for the Institute of Animal Science

Dean of the Faculty of Engineering of Czech University of Life Sciences Prague, Assoc. Prof. Jiří Mašek, M.S., Ph.D. awarded a commemorative plaque to the Institute of Animal Science Uhřetěves on the occasion of the 70th anniversary of the Faculty of Engineering founding for long-term cooperation in the development of scientific research activities.

Test-Tube Heifer

The scientific team of the Biology of Reproduction department, lead by Jana Rychtářová, has successfully implemented artificial insemination in cattle. A heifer was born from an embryo produced by IVF (in vitro fertilization) on the farm of 1st Agricultural a.s. Chorušice. The heifer is a crossbreed, but in the future scientists plan to produce embryos of purebred cattle of the genetic resources such as Czech Red Cattle and Czech Fleckvieh in this way. Kristýna Vacková and Magdalena Zajíčková played a key role in the team's success.



Golden Cob and Recognition in the Award of the Minister of Agriculture for the Institute of Animal Science

As part of the presentation and promotion at the 48th year of the exhibition Země živitelka (Nourishing Earth), the Institute of Animal Science received three important awards: two prizes in the Golden Cob competition and the Recognition in the Award of the Minister of Agriculture for the best implemented result in 2022.

In the GOLDEN COB 2022 competition, in the category „livestock production“, the Institute of Animal Science won two prizes:

The Golden Cob was awarded to the exhibit Kotelnice. Kotelnice is a fixed circular enclosure which protects sheep grazed outside all year round from predators. The exhibit is an outcome of the project TP01010047 „Transfer of research, development and innovation results into practice in the field of livestock farming and economic improvement“, sub-project TG2P07” Kotelnica – an enclosure to harbour sheep during the winter and lambing season“, conducted by the authors Dr. Michal Milerski, Dr. Radko Loučka, Dr. Jitka Schmidová, Assoc. Prof. Petr Homolka and Dr. Gabriela Malá.



The Golden Cob was awarded to the functional sample Complete Feed for Broiler Chicks Containing Hemp Seed and Flaxseed. The authors of the functional sample are Dr. Michaela Englmaierová, Prof. Miloš Skřivan, and Prof. Věra Skřivanová. The exhibit is the outcome of the project TP01010047 „Transfer of research, development and innovation results into practice in the field of livestock production and economic improvement“, sub-project TG2P09 “New formula of complete feed for broiler chicks to improve bone strength and meat quality” conducted by Prof. Věra Skřivanová et al.

Traditional Farmers Day in Velká Chyška near Pacov

The already traditional and successful Farmers Day in Velká Chyška took place on Tuesday, 8th November, 2022 in Velká Chyška near Pacov. The seminar was organized by the Czech Technology Platform for Agriculture in cooperation with the Institute of Animal Science and the Agricultural Cooperative Velká Chyška. The seminar was focused on new regulations and obligations of farmers, the impact of negative energy balance on reproduction, analysis and development of feed costs and wages on dairy farms, methane production in ruminant livestock and others.

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