

DEPARTMENT OF GENETICS AND BREEDING OF FARM ANIMALS
Molecular Genetics

Our goal is to investigate the effect of genetic variability on the efficiency and functional traits of farm animals and to use the obtained knowledge for achievement of the reasonable balance between a high level of performance and fitness.

OVERVIEW OF ACTIVITIES

Molecular genetic research is oriented on functional genetics and genomics of selected DNA genetic markers, especially cattle, sheep, goats, and horses. The original data are obtained for candidate genes and highly variable regions of the genome - microsatellites. The expert team also records breeding data in databases for experimental purposes of evaluating gene effects. The aim is to estimate the potential influence of molecular markers on the performance, fertility, health, and exterior, and quality of food on the domestic market. We also investigate genomic diversity in the original Czech breeds of cattle and genetic resources and compare them with intensively bred populations. Basic research is focused on variants of immune genes on various second-generation sequencing platforms and their association with functional traits. Another area of our study is to gain knowledge about gene expression and regulation of gene activity in selected tissues in vivo. From the perspective of applied research, the focus of the group's work lies in developing and patenting laboratory procedures and genotyping methods. We also offer breeders a service of genotyping the casein complex in cattle, sheep, and goats, the booroola gene in sheep, and the genes for horse coat color.

MEMBERS OF THE TEAM

Scientists and experts

Jitka Kyselová
Team leader

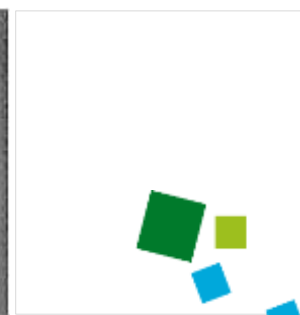
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KEY WORDS

association, DNA polymorphism, functional traits, genetic diversity, genetic marker, genotyping, milk quality



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MAIN THEMES & PROJECTS

- Investigation of DNA polymorphism of farm animals which can influence performance and health traits, is the main topic. Specifically, we are concerned with genotyping of the casein complex, leptin, lactoferrin, innate immune response genes such as toll-like receptors, MyD88 and CD14, and genes involved in milk fatty acid metabolism. The allelic polymorphism is further evaluated about the milk performance, reproduction, mastitis, and somatic cell score, especially in Czech spotted cattle and East Friesian sheep and Brown and White shorthair goats.
- Based on repetitive microsatellite polymorphism, we investigate genetic diversity and determine paternity in small ruminants, including gene resources and estimate the phylogenetic relationship of the Czech and Polish sheep.
- Research on genomic variability in Czech Red and Czech spotted cattle populations from the National Program for the Utilization and Conservation of Genetic Resources is conducted using microarray chip technology.
- Gene expression is measured mainly in different tissues for both myogenic transcription factors for bovine growth and immune genes at different disease stadiums to assess gene activity during organism biological processes.
- Projects of the National agency of agriculture research: Addressing the problem of the occurrence of bacterial, protozoan and viral zoonotic agents in small ruminant breeds (J. Kyselová). New procedures for rescuing endangered livestock populations (J. Rychtářová).

KEY PUBLICATIONS

BJELKA, M., NOVÁK, K. (2020) Association of TLR gene variants in a Czech Red Pied cattle population with reproductive traits. *Vet Immun Immunopat.* 220:109997. doi.org/10.5194/aab-62-477-2019

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VÝZKUMNÝ ÚSTAV ŽIVOČIŠNÉ VÝROBY, v.v.i. v UHŘÍNĚVSI. Sada reakcí pro diagnostiku variant genu MYD88 skotu. Autoři: NOVÁK, K. a VALČÍKOVÁ, T. Česká republika. Utility model CZ 32890 U1. 2019-05-28

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