



Institute of Animal Physiology

Slovak Academy of Sciences

Košice



28th November 2016



- The Institute is dealing with the basic research in the field of **animal physiology**, the only institute of Slovak Academy of Sciences in this field.

- Research is focused on:
 - 1- physiology of the gastrointestinal tract, with the accent on the molecular diagnostics of commensal microbiota in the relationship with nutrition, digestion, metabolism and physiologic regulations of macroorganism
 - 2- reproductive physiology, with the accent on regulation of early embryonic development under physiological and pathological conditions

The main focus of research

„healthy animals - healthy food - healthy people“

„nutrition – microorganism – digestion – host organism“

„maternal environment – embryo – healthy offspring“

- based on a complex analytic approach (from the molecular and cellular level to the systemic view)
- based on the experiments on animal models (sheep, pig, poultry, mouse, rat) as well as on *in vitro* models (RUSITEC, cell culture, embryo culture, etc.)





27 researchers and **10** PhD students working in two departments (**average numbers**).

Department of Digestive Tract Physiology

Laboratory of physiology and metabolism

Laboratory of digestion and nutrition

Laboratory of animal microbiology

Laboratory of microbial genetics

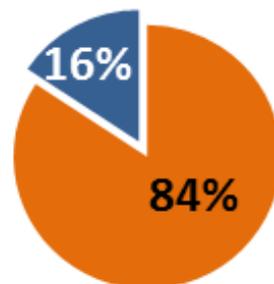
Department of Developmental Physiology

Laboratory of reproduction and embryology

Laboratory of cell signalization

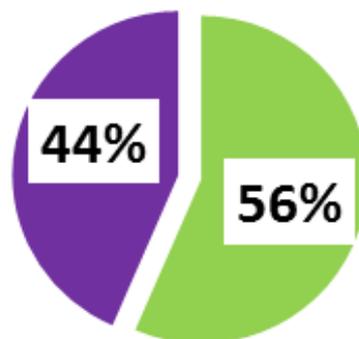
Number of publications 2012-2015

■ Animal (91) ■ Other (17)



SCIMAGO Journal ranks

■ Q1+Q2 (26+35=61) ■ Q3+Q4 (36+11=47)



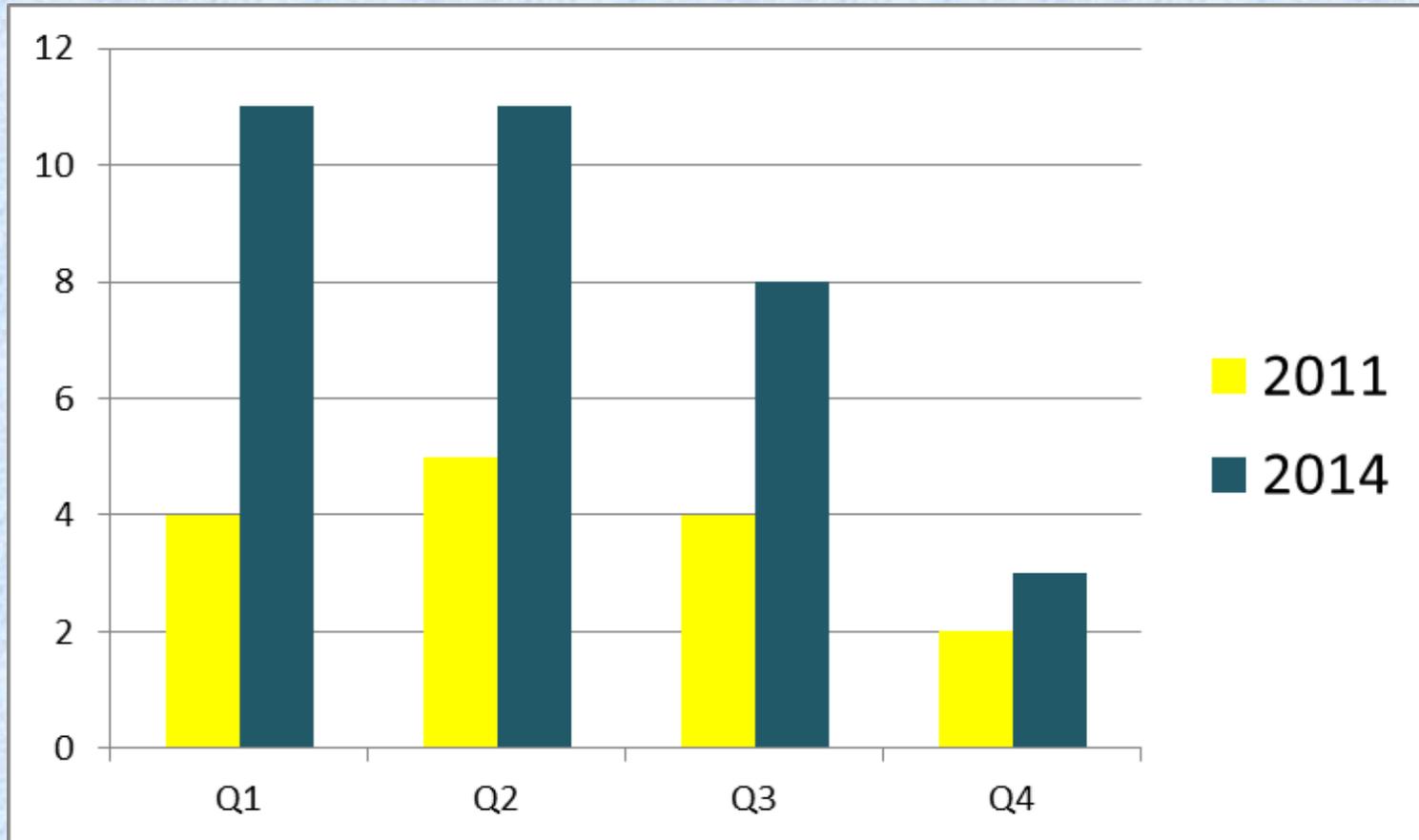
Before 2011



Today



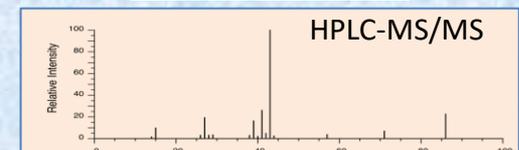
SCIMAGO journal ranks





Department of Digestive Tract Physiology

- The major focus is on host - microorganism interactions and the possibilities of digestion manipulation by probiotic bacteria, antimicrobial substances of plant origin and bacteriocins.
- The molecular design of new potential antibacterial agents, based on enzybiotics-degrading of bacterial cell wall is developed.
- The metabolism and antioxidant effects of dietary trace elements and essential oils are studied in poultry and ruminants.
- The modulation of rumen digestion by diets enriched with polyunsaturated fatty acids.



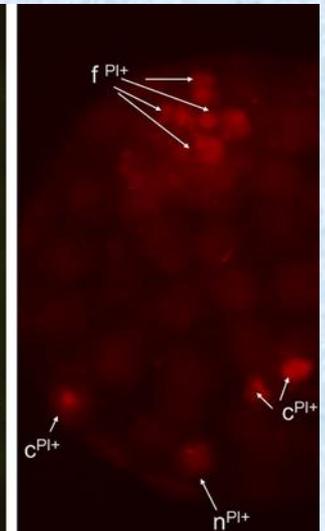
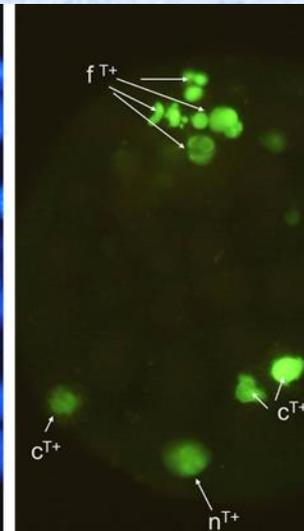
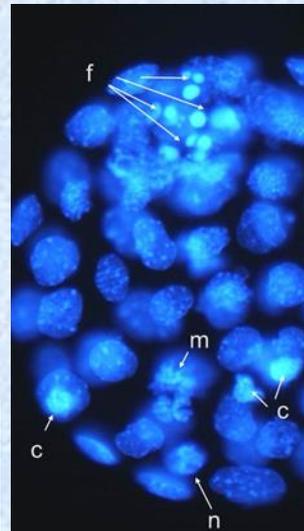
Department of Developmental Physiology

➤ Period of preimplantation embryonic development:

- Expression and physiological activities of selected cell receptors
- Apoptosis as an adaptation mechanism on unfavourable environmental effects
- Regulatory mechanisms of early embryo cell cycle



**Confocal microscope with LCI system
(Live - Cell Imaging)**



Digestive Tract Physiology and Developmental Physiology

Obesity:

- The morphological and functional maturation of the small intestine in relation to the overnutrition in young animals and adults
- The effect of intestinal microbiota on development of obesity
- The effect of maternal obesity on embryo development



MRI - Magnetic Resonance Imaging
Echo Medical Systems, Houston, TX, USA



Cooperation with universities

An **agreement** was signed on joint research activities between Institute of Animal Physiology SAS and:

University of Pavol Jozef Šafarik in Košice

University of Veterinary Medicine and Pharmacy in Košice

Participation in the education of students at the masters and doctoral studies.





Cooperation with industry

Projects of structural funds funded by European Regional Development Fund (ERDF)

Competence center for biomodulators and nutritional supplements.

Coordinated by Institute of Animal Physiology with participation of 2 institutes of SAS, 2 universities and 2 industrial companies)

Isolation, identification and characterization of lactic acid bacteria for application in dairy industry

Coordinated by Dairy Research Institute, Žilina, Slovak Republic

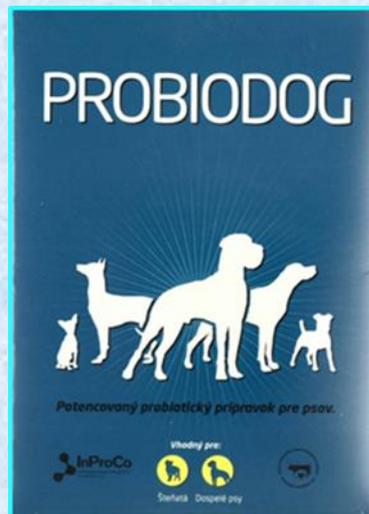
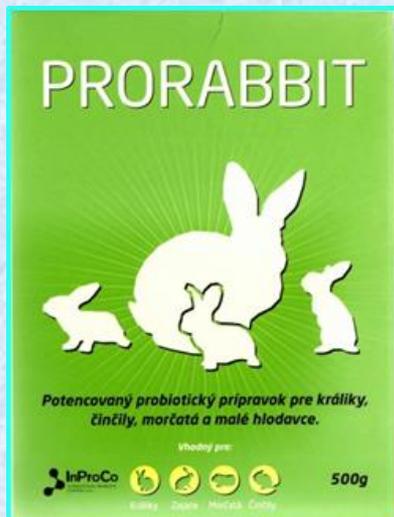


Identification of rumen and intestinal bacteria, including lactobacilli, bifidobacteria and enterococci

Maldi TOF bacterial protein analysis.

Applications

- Possible applications of our basic research results:
 - veterinary diagnostic,
 - rationalization of antibiotic therapy,
 - optimizations of digestive physiology and food intake,
 - reproductive biotechnology,
 - environment protection.



Licence Agreement between **Institute of Animal Physiology, SASci** and **International Probiotic Company** Košice, on realisation of research results in commercial practice .



Main cooperation within Europe

Kielanowski Institute of Animal Physiology and Nutrition PAS, Poland

Institute of Animal Physiology and Genetics AS ČR, v. v. i., Czech Republic

University of Martin Luther in Halle/Salle, Germany

Other collaborative partnerships:

- **Institute of Parasitology**, Ceske Budejovice, **Czech Republic**
- **Poznan University of Life Sciences**, Department of Animal Nutrition and Feed Management, Poznan, **Poland**
- **Institute of Soil Biology**, Biology Centre ASCR, České Budějovice, **Czech Republic**
- **Lethbridge Research Centre for Agriculture and Agri-Food**, **Canada**
- **The Faculty of Veterinary Medicine**, University of Lisbon, Lisbon, **Portugal**
- **Institute of Animal Nutrition and Functional Plant Compounds** in Vienna, **Austria**



List of accredited programs of doctoral studies

- Biochemistry - Faculty of Science, Pavol Jozef Šafárik University in Košice
- Animal physiology - Faculty of Science, Pavol Jozef Šafárik University in Košice
- Animal physiology - Faculty of Science, Comenius University in Bratislava
- Veterinary morphology and physiology - University of Veterinary Medicine and Pharmacy in Košice
- Microbiology - University of Veterinary Medicine and Pharmacy in Košice

Scientific foreign internships of young researchers

Name	Year	Days	Country	Host institution
Ján Burkuš (pd)	2013	30	Germany	University of Martin Luther in Halle/Salle
Monika Wencelová	2014 2015	86 21	Italy	DiRPA AGRIS-Department of Animal Sciences, Olmedo Sassari, Sardegna
Vladimíra Oceľová	2014	91	Austria	University of Veterinary Medicine in Vienna
Vladimíra Oceľová	2015	87	Austria	University of Veterinary Medicine in Vienna
Janka Kubandová	2014	60	Denmark	University of Copenhagen, Copenhagen
Janka Kubandová (pd)	2015	30	Germany	University of Martin Luther in Halle/Salle
Martina Kačmarová	2015	20	Germany	University of Martin Luther in Halle/Salle
Jana Písařčíková	2015	60	Malta	University of Malta, Department of Chemistry
Jana Písařčíková	2015	54	Switzerland	Institute of Agricultural Sciences, Animal Nutrition, ETH in Zurich
Jana Písařčíková	2015	95	USA	Auburn University Harrison School of Pharmacy



Conference of PhD students dedicated to prof. Boďa memory (founder of the Institute)

Every year since 2005

Participants: PhD students of biological scientific areas from Košice (40 and more)



Aims:

- to provide an opportunity for practical skills in presentation of scientific results in oral and written form (works are published in reviewed proceedings)
- to improve relationships and encourage competition among students (Competition for the best PhD work evaluated by expert committee)





Days of Animal Physiology - from 1975 to 2014

25 common meetings



Liblice, CZ



Smolenice, SK



Institute of Animal Physiology and Genetics

AS ČR, v. v. i.
Czech Republic



Třešť, CZ



Institute of Animal Physiology

Slovak Academy of Sciences
Slovak Republic

Animal Physiology - from 2015 -

Meetings of **researchers** and **teachers** from universities and scientific research institutes.

Institute of Animal Physiology

Slovak Academy of Sciences
Slovak Republic

Pedagogical University in Kraków

Faculty of Geography and Biology
Institute of Biology
Poland

Slovak University of Agriculture in Nitra

Faculty of Biotechnology and Food Sciences
Department of Animal Physiology
Slovak Republic

Mendel University in Brno

Faculty of Agrisciences
Czech Republic

The aim of the conference is to provide the latest results in the research of **animal physiology, physiology of human nutrition, cellular and molecular physiology** at individual workplaces, as well as to provide their scientific research focus.



Today and tomorrow

STRENGTHS:

- Research areas based on quality of infrastructure and research output.
- Up-to date infrastructure
- Collaboration between teams and with national and foreign research institutes.
- Improving quality of personal matrix (PhD students and young scientists with international research experiences)
- Teaching activity at universities

WEAKNESSES:

- Relatively small institute sensible to external fluctuations
- Small number of international projects
- Limited financial resources for staf (recruitment)



Today and tomorrow

OPPORTUNITIES:

- Fusion with animal research oriented SAS institutes (Institute of Parasitology)
- Further infrastructure improvement (structural funds)
- Recruitment of high-quality young scientists, including foreign PhD students
- Intensive international collaboration and application of international projects (Horizon 2020)
- Intensification of the collaboration with the commercial sphere

THREATS:

- Unpredictable fluctuations of research funding in Slovakia
- Long term sustainability of acquired infrastructure
- Fluctuations in research staff due to age differences (small institute)



Thank you for your attention

