



Academia de Științe Agricole și Silvicultură „Gheorghe Ionescu-Șișești”

Institutul Național de Cercetare-Dezvoltare pentru Biologie și

Nutriție Animală – IBNA Balotești

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National Research – Development Institute for Animal Biology and Nutrition (IBNA Balotești)

- Mission, research directions and objectives, representative projects -

MISSION:

According to HG 1882 / 2005, the mission of the institute is to run **scientific research and technological development activities in the field of animal nutrition**, to draw up the **development strategy of the institute in its field of activity** and to accomplish the scientific, technological and innovation objectives **set by the national RDI programs**.

GENERAL OVERVIEW:

The institute has been established in **1970** as the **Research Institute for Animal Nutrition**, by assuming the role of the former Institute for Zootechnical Research (HCM 565/1970); in 1981, the activity of the institute was enlarged with animal biology research, while the name of the institute was renewed as **Institute for Animal Biology and Nutrition** (Decree 170/1981); as of 2005, it works as national institute (HG 1882/2005).

The status of national institute was reconfirmed by the evaluations from 2007-2008 and 2011-2012, when the **institute scored the highest performance for the agricultural research system**.

The institute has a **staff of 153, of which 53 people working in research activities**, and an **annual turnover of 20 million lei**. Each year it runs **30 to 40 research projects** within the **national RDI programs** (Nucleus, Partnerships, Ideas, capacities, Innovation, Structural etc.), within **international programs** (FP7, COST, bilateral etc.) or **financed by the private sector**.

The institute has a research department with four laboratories (Animal Biology, Chemistry and Nutrition Physiology, Animal Nutrition, Biotechnologies), a development department and two compartments (Pilot station for protein-vitamin-mineral premixes and tailored compound feeds and the Experimental vegetal-animal farm), which form the framework for the research and technological transfer activities; their activity is supported by auxiliary compartments (PORUS, economic, etc.)

Among the **strengths** of the institute there are:

- The timely accomplishment of the **institutional reform** (organisation, research directions, project running manner, efficiency of the technological transfer, etc.), aiming to increase the **role**

of the institute within the animal production sector and the integration within the European Research Area.

- Its capacity to approach both **fundamental researches** (relevant at the national level) and applied researches, whose results can be **rapidly transferred into the agricultural practice** (during the run of the research projects).
- Extensive network of **collaborations, with the potential beneficiaries of the research outputs** (farmers, professional associations, authorities, etc.), contractual collaborations included, which ensure the **practical relevance** of the research directions and the **high impact** of their results)
- The **particular international visibility** – by the number of participations in international projects (such as FP6 506144, FP6 043077, FP6 506087, FP7 207043, FP7266061, FP7266367) / number and relevance of collaborations/presence in working groups, commissions, etc.).
- High proportion (over 50%) of **researchers with medium and long-period training stages abroad** (PhD and post-doctoral training), who developed relations with the host institutions and who work at international standards.
- High competition capacity / adaptability / speed of reaction

RESEARCH DIRECTIONS AND OBJECTIVES:

- Improve the **quality and safety of animal forages and animal products** (meat, eggs, milk) in view of **meeting consumers/processors preferences** and to **observe the related legislation** (subjects: **mycotoxins, functional foods, ecological/traditional foods, food chain**, etc.);
- Development of **sustainable systems of animal production management** adapted to the local conditions, to protect the genetic resources and to promote animal welfare;
- Enhance the **competitiveness of the animal farms to the European level**, by a more efficient **use of the forages using local feed sources** (to reduce the imports) and by using **new feed sources** (such as by-products from the bio-fuels and starch industries, etc.);
- Alleviate the adverse **environmental impact** of the animal industry;
- Identification, characterization, classification and utilization of the **animal genetic resources** (**preservation of the biodiversity, genetic markers-assisted selection**, etc.);
- Interdisciplinary research to promote the **public health** (obesity, cardiovascular diseases, osteoporosis) using healthy animal products;
- **Adaptation of the feeding strategies** of the farm animals to the global (market, climatic, socio-economic) changes;

The institute also runs **connected activities**, such as:

- **Making use of the research outputs** by disseminating **feeding technologies and recommendations**, marketing specific products (compound feeds, premixes, biotechnological preparations) and by providing specific services (feed quality analysis, estimation of the feeding value);
- Mass **technological transfer** through two **scientific journals** (English/Romanian) and through a variety of **dissemination materials** (brochures, leaflets, guidebooks, etc.);
- **Annual organisation of an international symposium** and of many other scientific events;
- **Development of strategies** for animal breeding and related fields, advisory activities, technical expertise, etc.;
- **Training activities** in the specific field of activity of the institute, both for own staff and for third parties (PhD students, practitioners, students, etc.)

REPRESENTATIVE PROJECTS

1. Nutrimicodim (PN 52-122) “Ensure the security and quality of feed and animal products by new nutritional solutions to decrease the negative effect of *Fusarium* mycotoxins, natural contaminants of feed and food chain”

The project has been coordinated by our institute and had as partners two national institutes (INCD for Chemistry- Pharmacology and INCD for Pathology and Biomedical Sciences, “Victor Babes”) a university (University of Agricultural Sciences and Veterinary Medicine of Banat, Timișoara), a research centre (Biotehnol) and a company (SIAT SA), their profile and expertise ensuring a high level of interdisciplinarity of the project.

The opportunity of the project comes from the fact that *Feed safety and quality* is an increasing concern for the agro-industry and for animal and human nutrition, particularly in terms of consumer health. Within this context, the presence of the contaminants, among which mycotoxins, is a major problem – acknowledged as such by the national and European RDI programs. For some mycotoxins there are no European/national regulations (limits of tolerance) set yet, while the strategies for detoxification or control of the adverse effects are not yet fully developed.

Within this context, the project focused on the study of Zearalenone effects on the immune system of the piglets and on a possible strategy of control using simultaneously a growth promoter (*Rhodotorula rubra*) and a prebiotic (inulin) in piglet diets.

The project involved in vivo and in vitro studies which determined the effects of the mycotoxin on the cell functions, the integrity and functionality of the cell barrier, the metabolism and productive performance of the contaminated animals, as well as the potential of the surveyed symbionts (*Rhodotorula rubra* + inulin) to control the effects of the mycotoxin on the mentioned parameters.

The project determined the contamination level at which the immune mechanisms of the piglets are switched on ($< 100 \mu\text{M}$ zearalenone) and which adverse effects can be decreased by the dietary use of these symbionts. The in vivo studies have shown that zearalenone, even at 250 ppb, didn't influence the production performance of the animals, but altered several immune functions (increasing their vulnerability to diseases). They also confirmed the in vitro results, e.g. that the two symbionts alleviated some of the negative effects of ZEN. The project supported the production of **6 articles (of which 3 ISI), 2 books and one international communication.**

The initiation of this project relied on the previous participation in FP6 projects, while the topic of the project is continued in another project, currently in progress – Ideas 101. This new project was the only fundamental research project in the field of agriculture which was financed following the 2011 PNCD2-Idei competition. Its purpose is to quantify the gene-toxicity of zearalenone (ZEA) in pigs using new techniques of genomic and proteomics (PCR array, real time PCR, western blot) and to perform in-depth studies at cellular and molecular level. These data will allow determining the tolerance limits for ZEA in the forages for weaned piglets, category for which European or national norms are yet to be determined.

3. OmegaNutrioSan (CEEX 22) “Optimization of the nutritional factors to obtain table eggs enriched in polyunsaturated omega 3, functional food for Romanian market”

The project was coordinated by our institute, assisted by 9 other partners: 3 institutes (Institute for Food Bioresources (IBA), Institute of Endocrinology „C.I.Parhon” and Pasteur Institute), two universities (USAMV Bucharest and Craiova University) and 4 SMEs (SC Natural Research Craiova, SC Cortina Bioprod SRL, SC Avicola Bucharest and Hofigal SA Bucharest).

The purpose of the project was the development of a new functional food – eggs enriched naturally in omega 3 fatty acids via layer diets. This product was patented and is already marketed in many shops and in several hypermarkets across the country under the trademark EurOu.

Besides the development of two new products and of a feeding technology, the project also supported the production of 5 scientific articles and 8 scientific communications.

The run of this project was the basis for the initiation, submission and gaining several new projects on this topic, within the Eureka program, together with several SMEs active in poultry production and compound feeds manufacture in Romania and Slovenia.

3. PP-NAF “Farm animals’ nutrition”

The project was coordinated by our institute, having as partners 3 farms specialised in pig production (SC. Suintest Oarja SA) and poultry production (Avicola București SA, SC.Semar Trading SRL). The project had a strong applied character (according to the requirements of the financing program) and was run within the early 2000 years ban of using animal meals in monogastric animals feeding. The objective of the project was to identify alternative solutions to animal meals and to the soybean meal (expensive raw material, mostly imported), which to allow maintaining the production performance of the animals.

The project studied, using modern methodologies specific to nutrition physiology studies, the effect of replacing the animal meals and the soybean meal by alternative sources such as other meals, grains/seeds of oleo-proteaginous crops, by-products from corn grains processing, etc., in the compound feed formulations for farm animals. This project reevaluated the quality and possibilities of using vegetal and microbial protein sources for farm animals; made a complex and detailed characterization of some vegetal resources (amino acids, fatty acids, vitamins, minerals); determined the ways to balance the compound feeds formulations taking into account the latest field novelties; increased the rate of the vegetal protein resources availability for the animal organism; determined ways of maintaining the bioproductive performance and increasing the economic efficiency; evaluation of the animal products quality, etc.

Project outputs materialized in **4 new products**: CPVM –BNA PCS 35 for broilers, starter stage 0-14 days; CPVM –BNA PCC 30 for broilers, grower stage 15-35 days; CPVM –BNA GO 35 for layers; CPVM – P3R40 for fattening-finishing pigs, as well as in 2 articles, 4 scientific communications and several lectures during the meetings with farmers.

5. OPECGEN (PN 52-163) “Economic and genetic optimization of the breeding programs for sheep within the context of the European harmonization”

The project was coordinated by INCDBNA, which had the following partners: P1 – ICDOC Palas – Constanta Institute, Academy of Economic Studies Bucharest, Bucharest University – Faculty of Biology and USAMV Bucharest – Faculty of Animal Husbandry. The project aimed to optimize the breeding programs for sheep, with the purpose to increase the meat and milk production under the conditions of sustainable agriculture, animal welfare and environmental

protection. The novelty element was that for the first time ever in Romania, the optimization of breeding programs for sheep relied on economic and genetic criteria, aspect which allowed an annual genetic progress of 1.5% for milk production and of 2-3% for meat production.

The project made the genetic evaluation of the candidates to selection for the traits involved in the increase of the milk and meat productions. The genetic evaluation of the candidates was done with the purpose to identify and maintain the best individuals for production, which to ensure the next generation of progeny. To this purpose the project used three categories of inputs: phenotypic performance, genealogy and the molecular markers, which is an innovative element. All the stages of the selection plan have been optimized: size of the dam stock, average period of exploitation, demographic parameters, selection method, etc.).

The project produced several variants of breeding programs optimized in economic and genetic terms, for each type of production (milk and meat) which were eventually disseminated to the interested farmers. The practical implementation of such programs guarantees the increase of the milk and meat productions in sheep, which enhances the economic profitability of the sheep.

We are further interested to go deeper with our researches, with the purpose to integrate genomic information, such as the SNPs (Single Nucleotide Polymorphism), into the genetic breeding programs.

5. FP7 “SOLID” (266367/2011) “Sustainable organic and low-input dairying”

This project is coordinated by Aberystwyth University from the United Kingdom and has 25 partners (prestigious Western Europe institutions), our institute being the only Eastern Europe partner (New Member States).



Our institute contributes with activities in 4 working packages (1. Innovation through stakeholder engagement and participatory research; 2. Welfare and health of the dairy cows; 3. Feeding strategies using efficiently industrial by-products; 7. Knowledge exchange, training and dissemination), all these aspects being approached within the context of low-input dairy systems, as most dairy farms in Romania are.

Project specificity relies in the participatory research: 11 SMEs throughout Europe were associated to 11 research units (institutes, universities) and are directly involved in the identification of the research priorities (on the basis of farm diagnosis), in running specific research (in production farms included) and in implementing the research outputs on the basis of demonstrative activities and broad dissemination. In Romania, our institute collaborates with a SME whose object of activity is dairy cows rearing, the collaboration being focused in the study of some by-products from the food/non-food processing of plants that are less used in animal feeding. The institute also collaborates with many dairy farms, in order to identify the specific technical problems and to develop solution through participative research (involving the farmers) and for the technological transfer of the research outputs. The project is still running (2011-2016).

