NATIONAL RESEARCH - DEVELOPMENT INSTITUTE FOR ANIMAL BIOLOGY AND NUTRITION

- research-development potential -
Overview
(organisation, research areas, research objectives, etc.)

Institutional reform, research potential

European integration

Significant results

Research laboratories and teams
IZ – Research Institute for Animal Husbandry (First in Europe)

INZ – National Institute for Animal Science

ICZ – Research Institute for Animal Science

ICNA – Research Institute for Animal Nutrition

IBNA – Research Institute for Animal Biology & Nutrition

INCDBNA – National Research-Development Institute for Animal Biology and Nutrition, under AAFS coordination

INCDBNA – National Research-Development Institute for Animal Biology and Nutrition, under MNE coordination

developing IBNA brand

better adaptability / higher standards than all other institutes in animal science

- good premises for core funding
LABORATORY OF ANIMAL BIOLOGY

Feed safety and immuno-nutrition
6 scientists
Coordinator Ionelia ȚARANU

Animal Genetic Resources Management
6 scientists
Coordinator Horia GROSU

LABORATORY OF CHEMISTRY AND NUTRITION PHYSIOLOGY

Physiology of ruminant animals nutrition
6 scientists
Coordinator Cătălin DRAGOMIR

Physiology of monogastric animals nutrition
6 scientists
Coordinator Rodica Diana CRISTE

LABORATORY OF ANIMAL NUTRITION AND BIOENGINEERIES

Animal Nutrition and Biotechnologies
6 scientists
Coordinator Mihaela HĂBEANU
1. FEED SAFETY AND IMMUNO-NUTRITION
   # Feed safety (mycotoxins)
   # Intestinal barrier (intestine)
   # New feed sources / immune response
   # Phyto-additives / immunity

2. ANIMAL GENETIC RESOURCES MANAGEMENT
   # Breeding programs
   # Biometry & genetic potential for reproduction
   # Vulnerable & endangered populations
   # Genetic markers for selection

3. PHYSIOLOGY OF MONOGASTRIC NUTRITION
   # Nutrient bioavailability
   # Quality of feed & animal products
   # Animal nutrition & the environment
   # Functional foods

4. PHYSIOLOGY OF RUMINANT NUTRITION
   # Efficiency of rumen metabolism
   # Feeding values (tables, prediction)
   # Subacute rumen acidosis
   # Rumen manipulation

5. ANIMAL NUTRITION AND BIOTECHNOLOGIES
   # Feed sources / feeding efficiency
   # Animal welfare / environment
   # Nutrition & organic production systems
   # Feed additives / ensiling with lactic acid bacteria

155 employees: 48 in research, 75 in development, 32 in administration. Of these 31 are researchers
- 21 PhD in sciences + 7 doctoral students
- 3 senior researcher I, 9 senior researcher II, 8 senior researcher III, 7 researchers, 4 research assistants
- Average age: 43
- >40% = studies abroad (PhD, post-doc)

Balance, stability, outstanding potential for 2014-2020

30-40 research projects running each year (of which 5-10 international)
=> Dozens of results each year – applied (towards farmers, processors, etc.)
  - fundamental (ISI papers)
=> Interaction with dozens of animal production companies + related sectors
=> High visibility + European relevance (SE Europe, ERA)

Intense activity to capitalise on the research outputs
- Dozens of commercial contracts each year
- Professional relations with dozens SMEs each year
- Professional relations with almost all associations from animal production and related sectors

Many activities of technological transfer each year, in different ways (classical, modern), financed from own resources.

2020: clear strategy to enhance the role of supplier of scientific knowledge at the national and international levels
**STRENGTHS**

**Timely accomplishment of the institutional reform**
aiming to increase the role of the institute within the animal science sector and to increase its integration within the European Research Area (organisation, research directions, project running, technological transfer efficiency, etc.)

**Capacity to approach both fundamental research** (relevant for the international scientific environment) and applied research, whose outcomes can be rapidly transferred in the agricultural production (during the progress of the research projects)

**Broad network of collaborations** with the potential beneficiaries of the research results (farmers, professional associations, authorities, etc.), which ensures the applied relevance of the research directions and the high impact of the research outputs.

**High international visibility** – by the large number of international projects in which it participated (such as FP6/506144, FP6/043077, FP6/506087, FP7/207043, FP7/266061, FP7/266367); relevance of the international collaborations/ in workgroups, commissions, etc./-flow of scientific publications and communications

**High proportion (over 50%) of researchers with significant specialisations abroad** (PhD, post-doc), who developed relations with the host institutions and who perform at international standards

**High competitional capacity/ adaptability/ speed of reaction**
Position within animal science branch of the Academy of Agricultural and Forestry Sciences (A.A.F.S.)
- > 60% of the projects = in IBNA
- > 60% of the results (~ 80% of the ISI articles) = in IBNA
- Almost all international projects = in IBNA
- Most of the international activity = in IBNA

Position within A.A.F.S.
- Highest financial turnover in 2010 and 2011
- Most intense international activity (projects, articles, events, trainings, etc.)

Position within the Romanian agricultural research
- The only national institute in animal science sector
- One of the highest loads of projects / researcher
- The highest degree of integration within the E.R.A.
- The highest number of international projects and of researchers involved in international collaborations

TURNOVER AND THE RESEARCH BUDGET

Important: the institute never had debts to the state budget or to the local budgets.
1. Institutional development so that IBNA turns into a relevant European actor

2. Increasing IBNA impact on the Romanian animal science/ animal production sector (research directions, technological transfer)

3. Technical and scientific support for the authorities and for the private sector to solve the challenges of the 21st century in the field of animal production
   - Identification of new resources within the context of limited conventional resources
   - Necessity of maintaining food security and safety
   - Climate changes
   - Counteract the competition of the emerging economies (China, Brasil, Argentina)
   - Decrease the dependence on imported protein feeds
   - Adaptation to the evolution of the industries which use forages as raw materials (biofuels)
   - Alleviating the environmental impact of animal production
   - Ensuring animal health and welfare
   - Adaptation to consumer requirements (quality and safety), including target groups, functional foods
**Human resources reform**

- Optimal average age and structure of the staff (stability, potential, promising careers)
- Ability to train the newcomers (in the institute / in the country / abroad)
- IBNA = attractive for early career researchers (research methods unique in Romania, international opportunities)
- Mechanisms for the development of scientific careers
- Good potential for 2014 – 2020

**Scientific reform**

1. Research priorities adapted to the national and international requirements
2. Good participation in EU (FP, etc.) and national programs
3. Project-structured activity (competitiveness, efficiency, monitoring)
4. High capacity to submit project proposals
5. Modernization and enlargement of the projects portfolio
6. IBNA = attractive for the potential collaborators (local/foreign); for instance feeding trials, trials at rumen level, immune-feeding, nutrient bioavailability (for various category of farm animals) – many offers for project proposals resulted
7. Two-fold higher indicators showing the results of the research activity (ISI articles, patents, etc.)
Modernization of the infrastructure

- Laboratory equipment purchased through MAKIS and through own projects
- Research equipment worth more than 1 million Euros purchased during the recent years
- Research equipment single in Romania / rarely met in SE Europe (digestibility cages, in vitro digestibility, etc.)
- Complete infrastructure for research into the biology and nutrition of farm animals (arable land + specific equipment / compound feeds mill, experimental crop and livestock farm – ensuring the autonomy of the specific researches)
- Good coverage of the infrastructure with staff, research methodology, funds for research, etc.
- Very high level of using the infrastructure (large number of projects, research outcomes, etc.)
- High flow of the research outcomes from research projects
- Complex approach – results adapted to the different types of beneficiaries
  - wide range of TT means

**PRODUCTS AND SERVICES**

Dozens of products, outcomes of the R&D projects:
- CPVM-BNA PCD 35;
- NC AGN-3 “Eco”
- Proteostim
- CPVM 2S pig
- NC AGPN
- EurOU / NC EurOU
- ...

Dozens of services resulting from R&D projects:
- Fine chemical composition
- Feeding value
- Rumen degradability
- Digestibility
- Diet optimization
- Feed trials
- ...

**Targets of the technological transfer**
- Farmers
- Processors
- Feed manufacturers
- Associations
- Feed additives companies
- Through territorial G.O.
- ...

**Forms of technological transfer:**
- Brochures, fliers, guidebooks
- Demonstration activities
- Fairs / exhibitions
- Website posts / newsletters
- Mass-media
- ...

=> Impact on the Romanian animal production sector
TRANSFER ACTIVITIES MATERIALISED IN:
- Very efficient / rapid way of transfer of scientific results
- High impact within the private sector / national visibility

Transfer activities materialised in:
- Good national impact of the research outcomes
- Capacity to draw increasingly higher funds from the private sector (such as special analyses: amino acids, van Soest, degradability, feeding value, immune status, mycotoxins, microbiology, etc.)
- Policy of maintaining a high impact on the private sector

JUST TWO EXAMPLES

<table>
<thead>
<tr>
<th>Project</th>
<th>Private partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBNA project</td>
<td>Private partner</td>
</tr>
<tr>
<td>EUREKA</td>
<td>Emona Nutrition RB Department, Slovenia</td>
</tr>
<tr>
<td>SUPLIBOR</td>
<td>SC Natural Research Craiova</td>
</tr>
<tr>
<td>FITOMIN</td>
<td>SC Hofigal SA</td>
</tr>
<tr>
<td>FITOMIN</td>
<td>SC Avicola Bucuresti SA</td>
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<td>FITOMIN</td>
<td>SC Transapicola SA</td>
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<td>METAVIAC</td>
<td>S.C. SIAT S.A.</td>
</tr>
<tr>
<td>FP7 SOLID (Task 3.1)</td>
<td>Agro Solomonescu SRL</td>
</tr>
<tr>
<td>PS 7.1.3.</td>
<td>Societatea Ecologică Aquaterra</td>
</tr>
<tr>
<td>PS 7.1.3.</td>
<td>SC Kaviar House Bucuresti-Filiala Tulcea SRL</td>
</tr>
<tr>
<td>AVIECO</td>
<td>SC AugerPetrus SRL</td>
</tr>
<tr>
<td>FP7 WOOLVATION</td>
<td>Centiv GmbH, Germania (proposal)</td>
</tr>
<tr>
<td>BYPROD_RUM</td>
<td>Ilya Alexandria (proposal)</td>
</tr>
</tbody>
</table>

R&D contract | Private financer
Contr. 908/13.02.2007 | SC AGRALIM SA
Contr. 1166/29.02.2008 | SC Mibos Project SRL Campulung, Arges
Contr. 5740/30.10.2009 | SC TOP NUTRITION
Contr. 1598/26.03.2010 | SC CAN 2000 TRADING SRL
Contr. 3373/30.06.2010 | SC Exploatarea Miniera Harghita
Contr. 4358/20.08.2010 | SC Exploatarea miniera Harghita
Contr. LNA/01.01.2010 | Semar Trading SRL
Contr. 2125/4.05.2011 | SC ANGST RO - SA
Contr. 2154/05.05.2011 | Banvit Food SRL
Contr. 2245/10.05.2011 | SC Exploatarea Miniera Harghita
Contr. 2831/8.06.2011 | HeidiChocolat SA
Contr. 3422/5.07.2011 | SC AGROMAR SRL
Contr. 3715/18.07.2011 | AGCTR
Contr. 3373/01.01.2012 | AGCTR
Contr. 5076/21.09.2011 | SC Exploatarea Miniera Harghita
EXAMPLE OF PARTNERSHIP WITH THE PRIVATE SECTOR

Development of projects on the topic of eggs as functional food

- CEEX Program OMEGANUTRIO SAN project
  
  (Omega 3 eggs on the Romanian market)

- 1 EUREKA project making use of eggshells
- 1 INNOVATION project low-cholesterol eggs
- 1 INNOVATION project natural antioxidants ω 3 eggs
- 1 INNOVATION project egg with xantofilic pigments

Avicola Lumina S.A.

SC VINARIJA SIJACKI, SERBIA

Development of projects on the topic of meat as functional food

- Nucleus Program Project PN 09-38 04.01
  
  Using the camelina meal and grape mark rich in antioxidants to improve pig meat. Development of projects on subject of using industrial by-products and wastes to feed farm animals

- Project MADR/59/7.2.1 – Partnership Sectoral Program ADER 2020
  
  SC. SUINPANAGRO - SRL Dambovita
### SIGNIFICANT RESULTS

<table>
<thead>
<tr>
<th>Updating the farm animal feeding system: feeding norms, feeding values tables, modelling the metabolic processes (1995-2000)</th>
<th>Set of technologies/formulations/products to solve the efficiency problems caused by the ban on animal protein feeds (2000-2005)</th>
</tr>
</thead>
</table>
| **Feedstuffs used** to enhance the quality of animal products and farm competitiveness, within the context of integration on the European market (2005-2010) | **Feeding strategies for alternative production systems** (ecologic, traditional), niche products, alleviate the environmental impact, etc. (2000-…)
| **Modernising the genetic breeding programs** for farm animals: use of genetic markers, of new mathematical models, etc. (2005-…) | **Solutions to adapt animal production to the challenges of the 21st century**> fewer resources, harsher competition, climate changes, globalization (2010-…)

**Updated feeding system**

- Feeding norms, feeding value tables, diet optimization, etc.
- It integrates 10 years of scientific accumulations
- Widely disseminated (guidebooks, technical books, articles, tables, communications); taught to the students learning animal husbandry
- This feeding system is used to develop and update permanently over 80 formulations of standard feeding products of the institute (premixes, protein-vitamin-mineral concentrates, compound feeds)

**Technologies/formulations/products to replace animal feeds**

- IBNA has 10-15 products containing replacers of the animal feeds, which allowed to maintain the economic efficiency
- IBNA was the main source of technical solutions during that period

Examples: feeds based on rapeseed meal, full-fat soya, etc.
SIGNIFICANT RESULTS

Technologies/feed formulation/feed products/norms to support the farmers within the context of European integration (= food quality and safety problems, competitiveness, environmental issues, etc.)

- Integration opened the way for direct competition between the Romanian and European animal producers
- The institute researched, developed and disseminated over 100 products, techniques, feeding strategies and norms:
  Example: products based on camelina meal; safflower meal; corn distiller grains; grape marc, products rich in antioxidants, omega 3 and omega 6 polyunsaturated fatty acids.
  The feed products are patented or patent applications have been submitted, ex.:
- Low-cholesterol eggs
- Eggs, pig meat and cow milk enriched in omega 3 and omega 6 polyunsaturated fatty acids
- Techniques to alleviate acidosis in cows
- Norms for mycotoxins

The systematic popularization of these results allowed their large scale generalization – MANY OF THEM ARE NOW INTEGRATED IN PRACTICAL ANIMAL PRODUCTION

Genetically and economically optimized breeding programs for farm animals

- The implementation of these results may ensure an average 1-2% annual increase of the genetic potential, provided the other factors (feeding, microclimate, etc.) are supplied at a proper level
- Within the current context (unsatisfactory state of the genetic resources) this increase of the genetic potential can be even higher, which means additional economic advantages.
PUBLICATIONS (2012 AT THE MOMENT OF ACCREDITATION)

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**ISI journals:**
- Anim Sci J.
- Animal
- Toxicol in vitro
- J. Agric.
- Food Chem.
- Mol Nutr Food Res.
- Meat Sci.
- Toxicon

**Indexing in databases:**
- CABI – full text products
- PROQUEST
- EBSCO
- IVIS
- ULRICH
- SPRINGERLINK
- + on the way ...

**Conferences/symposia organized by**
- IUPAC,
- Nutrition Society,
- WPSA,
- EAAP

**GOOD POTENTIAL FOR 2012-2020**

The analysis doesn’t include the scientific events organised in Romania (even if they were international).
Growing trend for all indicators
Best performance in agricultural research (productivity/researcher)
# INTERNATIONAL PROJECTS (ACREDITATION 2012)

<table>
<thead>
<tr>
<th>Year</th>
<th>FP6 Feed for Pig Health</th>
<th>FP7 FeedSEG</th>
<th>FP7 Feed to Food</th>
<th>FP7 SOLID</th>
<th>FP7 FoodSEG</th>
<th>bilateral Ro-Slovenia</th>
<th>ECO-NET</th>
<th>bilateral Ro-France (bis)</th>
<th>RFR (bis)</th>
<th>COST FA0802</th>
<th>Eureka</th>
<th>bilateral Ro-Greece</th>
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<td>64...</td>
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</tr>
</tbody>
</table>

- Special focus on FP6 - FP7 (... FP8, H2020); Other kinds of projects = depending on the availability /efficiency /particular interest
- Proven potential for participation in FP projects
- Experience (both FP logistics / scientific)
- Good image / visibility (warranties from former coordinators, repeated invitations to join consortia, etc.)
- IBNA = very open for ERA / swiftness / seriousness
- IBNA = manages to draw each year research funds from European research programs

## EUROPEAN INTEGRATION

Developed European projects, examples:
- FP7 “Solid”
- FP7 “FOODSEG”/2011-2013
- IBNA-MAICH bilateral Grecia MICOEX/2011-2013
- COST FA 0802/ 2008-2013
- FP7 “FEED-TO-FOOD”/2008-2011
- IBNA-INRA bilateral Franta "Reseau Formation recherche”/2006-2009
- FP6 “Food for pig health”/2004-2008

Developed European projects, examples:
- IBNA – France bilateral
- H2020 TEAMING – “BNA-CE”
- H2020 – GeNuM
- BBI “RO – by-products”

Romania = the only partner from the New Member States in both projects = research activities next to western partners

(FP7 SOLID 2011-2016 www.solidairy.eu)
(FP7 FoodSEG 2011-2014)
(FP7 Feed to Food => FOODCLUSTER 2008-2012)
(FP6 Feed for Pig Health 2004-2007)

(The participation in FeedSEG allowed IBNA to be invited in FoodSEG consortium)
Team 1: Food safety and immunonutrition
Team coordinator: Dr. Biol. Ionelia Taranu

Team 2: Genetic resources management
Team coordinator: Prof. Dr. Ing. Horia GROSU

COMPARTMENT FOR IN VITRO CELL CULTURE:
- Primary cells (lymphocytes, monocytes, neutrophils) from blood and immune organs (spleen, lymph nodes)
- Cell lines (intestinal epithelial) – pigs and humans (IPEC-1, Caco2, LLCPK, etc.)

COMPARTMENT OF MOLECULAR BIOLOGY:
which analyses the gene expression of different biomarkers playing an important role in the metabolic and physiologic processes from cells and tissues (blood, organs, muscle, milk);
genomes for:
- Cytokines
- Enzymes
- Signalling molecules
- Proteins

SR=scientist researcher
COMPARTMENT OF BIOCHEMISTRY (PROTEOMIC)
which investigates (using biochemical techniques, electrophoresis, western blot and ELISA) the profile of blood, cell and tissues proteins:
- Immunoglobulins
- Cytokines
- Signalling molecules
- Other proteins

COMPARTMENT OF PHYTOCHEMISTRY
which investigates different bioactive compounds (such as polyphenols) from natural extracts and from forages determining their antioxidant activity, the UV-Vis spectral print and the inhibition of pro-oxidizing enzymes (such as lipoxygenase, etc.).

Micotoxicology:
- ELISA
- TLC

Testing products with biological potential:
- in vitro on pig and human cells
- in vivo on pigs, poultry, dairy cows

Performance and immune response (antibodies, cytotoxicity, cell proliferation, immunoglobulins, cytokines, gut barrier integrity, etc.)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Cost (lei)</th>
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<tbody>
<tr>
<td>Analyses</td>
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<tr>
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<tr>
<td>Ochratoxin A</td>
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<tr>
<td>Zearalenon</td>
<td>65.00</td>
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<tr>
<td>Fumonisins</td>
<td>65.00</td>
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<tr>
<td>Deoxynivalenol</td>
<td>65.00</td>
</tr>
<tr>
<td>Albumin</td>
<td>8.00</td>
</tr>
<tr>
<td>Total bilirubin</td>
<td>7.00</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>14.00</td>
</tr>
<tr>
<td>Calcium</td>
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</tr>
<tr>
<td>Iron</td>
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</tr>
<tr>
<td>Sodium</td>
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<tr>
<td>Magnesium</td>
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<td>Total cholesterol</td>
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<td>IgG</td>
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<tr>
<td>LDH</td>
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</tr>
</tbody>
</table>

Blood metabolic profile

- Albumin
- Total bilirubin
- Phosphorus
- Calcium
- Iron
- Sodium
- Magnesium
- Potassium
- Glucose
- Total cholesterol
- Triglycerides
- IgG
- IgM
- IgA
- Creatinine
- Urea
- Total Protein
- Gama GT
- TGO
- TGP
- Alkaline Phosphatase
- LDH
Team 3: Nutrition physiology of monogastric animals
Team coordinator: Dr. Rodica Diana CRISTE

Team 4: Nutrition physiology of ruminant animals
Team coordinator: Dr. Cătălin DRAGOMIR

Experimental facilities for:
- digestibility
- mineral metabolism
- quality of animal products (meat, eggs)
- environmental effect of animal production
- effect of various factors (microclimate included) on animal production
- efficiency of feed utilization
- etc.
LF INFRASTRUCTURE

EXPERIMENTAL HALLS FOR RUMINANT ANIMALS

Used for trials to determine the:
- rumen metabolism (rumen degradability, environmental effect of the different diets/efficiency of nutrient utilization, manipulation of rumen processes),
- apparent forage digestibility,
- feeding value for ruminants,
- quality of animal products

LABORATORY FOR PHYSICAL-BIOCHEMICAL ANALYSES (RENAR ACCREDITATION, SANITARY-VETERINARY LICENCE)

Basic analyses:
- determination of the basic chemical composition and of the feeding value,
- dynamics of pH and of rumen ammonia,
- determination of egg quality
- in vitro digestibility (ruminants)

In-depth analyses (chromatography, spectrometry):
- content of vitamins/amino acids/minerals of the forages, animal products, biological tissues and fluids,
- cholesterol concentration of animal products,
- metabolites relevant for animal feeding,
- quality of fat,
- contaminants
EQUIPMENT AND METHODOLOGY

RUMINANTS

- fistulised animals (cows, sheep)
- digestibility stands/pens
- in vitro system (anaerobiosis, thermal stirrers, centrifuge)
- equipment for in sacco incubation
- ion-meter (rumen pH, ammonia)
- GC – fatty acids and volatile fatty acids
- HPLC – amino acids
- Dumas system for nitrogen determination

MONOGASTRIC ANIMALS

- efficient utilization of feed resources (by-products, natural feed additives)
- nutrient metabolism (minerals, etc.)
- decrease the environmental impact of animal production
- production of functional foods
- quality of animal products (eggs, meat)
- contaminants – heavy metals

The prices are shown at www.ibna.ro, section of “Products and Services – Physical, chemical and biochemical analyses”
<table>
<thead>
<tr>
<th>Analysis</th>
<th>Method</th>
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<tr>
<td>Sample preparation for analysis</td>
<td>SR ISO 6498 – 2001</td>
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<tr>
<td>Determination of moisture content</td>
<td>gravimetric method</td>
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<td>Determination of nitrogen content</td>
<td>mineralization and steam distillation</td>
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<tr>
<td>Determination of fat content</td>
<td>extraction with organic solvents</td>
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<td>Determination of crude fibre content</td>
<td>with intermediary filtration</td>
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<td>Determination of total ash</td>
<td>gravimetric method</td>
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<td>Determination of urease activity</td>
<td>volumetric method</td>
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<tr>
<td>Kreiss reaction</td>
<td>STAS 12266 – 84</td>
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<td>Fat acidity indicator</td>
<td>volumetric method</td>
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<tr>
<td>Peroxide indicator</td>
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<tr>
<td>Determination of calcium content</td>
<td>atomic absorption spectrometry</td>
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<tr>
<td>Determination of Cd and Pb content</td>
<td>graphite furnace atomic absorption spectrometry</td>
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<td>(GF-AAS)</td>
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<tr>
<td>Determination of phosphorus content</td>
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<td>GC cholesterol</td>
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<td>cholesterol</td>
<td>– AOAC 994.10 and ISO 12228 - 1999</td>
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<tr>
<td>Determination of protein, fat and lactose</td>
<td>infrared spectrometry –</td>
</tr>
<tr>
<td>(MILKO SCAN 605)</td>
<td>AOAC 972.16; International</td>
</tr>
<tr>
<td></td>
<td>IDF Standard 141C - 2000</td>
</tr>
</tbody>
</table>
Fat quality

- Analysis
- Free acidity
- Kreiss reaction
- Fat acidity indicator
- Peroxide indicator

Contaminants

- Lead (Pb), Cb (cadmium) - graphite furnace atomic absorption spectrometry (GF-AAS)

Egg quality

- Weight of egg components (egg white/yolk/shell)
- Egg shell thickness
- Egg shell breaking strength
- Egg freshness
- Egg yolk colour intensity
- Haugh unit

Nutrition physiology

- Analysis
- NDF
- ADF
- Amino acids profile (15 amino acids)
- Fatty acids profile (21 fatty acids)
- Cholesterol
- Calcium
- Phosphorus
- Minerals (sodium, potassium, magnesium)
- Trace minerals (iron, copper, manganese, zinc)
- Urease activity
- pH of watery solutions
- Starch
- Total chlorides
- HCl insoluble

- Van Soest method
- Van Soest method
- High Performance Liquid Chromatography (HPLC)
- 1. Preparation of methyl esters; 2. Gas chromatography
- Atomic absorption spectrometry
- Photometry
- Flame emission spectrometry
- Atomic absorption spectrometry
- Volumetric method
- Electrometric method
- Polarimetric method
- Volumetric method
- Gravimetric method
Laboratory of animal nutrition and biotechnologies (LAN)
Head of laboratory: Dr. Eng. Mihaela Habeanu

LAN INFRASTRUCTURE

EXPERIMENTAL ANIMAL FARM
- arable land for experimental crops
- pilot station for experimental compound feeds
- housing facilities for cattle / sheep / pigs / poultry adapted for feeding trials
- forage stock (silages, hays)
- probiotics from lactic acid bacteria and yeasts tailored for the main species of farm animals (Avilact, Suinlact, Bovilact, Ovilact)

- ensiling additives from lactic acid bacteria (Biocons)

These products can be fed directly to the animals or for ensiling, thus contributing to the efficiency of feed utilization, to their sanitation, etc.
PILOT STATION FOR COMPOUND FEEDS

Composed of:
- Section for the manufacture of vitamin-mineral premixes, vitamin-protein-mineral concentrates, technical assistance
- Section for compound feeds manufacture
- Laboratory for quality check
- Functional annexes: storing facilities, fuel tanks, boiler room, mechanic shop, water tank

Manufactures the variants of compound feeds used by the research projects run by the research laboratories

Contributes to the technological transfer by selling a wide range of specific products developed through research on animals

These products are intended for all the species and categories of farm animals
The number and structure of the formulations developed by the institute vary very much, depending on the outcomes of the scientific research, market demands, etc. However, each year there is a basic number of formulations as follows:

- **28** standard formulations of vitamin-protein-mineral concentrates (CPVM) (17 for poultry, 6 for pigs and 5 for ruminants)
- **37** standard formulations of compound feeds (23 for poultry, 6 for pigs and 8 for ruminants)
- **20** standard structures of vitamin-mineral premixes (zoofort) (12 for poultry, 3 for pigs and 5 for ruminants)

- medicated premixes
- biopreservatives, probiotics (Biocons, Avilact, Bovilact, Suinlact)

The formulations can be tailored according to the requirement of customers (research laboratories, other research institutes, economic enterprises, farmers)

 Provides support for the research projects conducted on all species and categories of farm animals

Facilities:

237 ha of irrigable arable land used for experimental crops

Housing facilities for pigs, cattle, sheep and poultry adapted for experimental activities:

- **cattle**: tie-stall cows, free-stall cows, fattening steers, profilactorium, glass fibre pens for calves, summer paddock
- **sheep**: pregnant sheep, lactating sheep and lambs, fattening lambs
- **pigs**: maternity hall, growing pigs, pregnancy – boar hall, fattening pigs
- **poultry** (various species): battery or deep litter systems

Platform for forage processing and ensiling

Functional annexes: sanitary filter, headquarters, boiler room, mechanic shop