Labex Korea

Rural Development Administration

National Institute of Animal Science

Structure and Research Results

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The National Institute of Animal Science (NIAS) is a branch of the “Rural Development Administration” – RDA, which has a National Agenda Programs for Agriculture Research and Development, including: Future High-Technology, On-Farm Technology and Agro-Food Technology.

The researches carried out by the Institute are as based on the RDA priority agenda. In 2010, it was carried out a total of 321 research projects, which resulted in 105 Political Proposals and 183 On-farm applications adopted and applied to national organizations and industrial fields. In addition, the Institute has presented various achievements of a total of 178 cases of industrial patents and technology transfers for industrialization, a total of 172 research article publications (including 69 articles in SCI level), and a total of 321 research presentations.

The Labex Korea, with the objective of facilitating the search for the specific information, prepared a summary of the categories organization in terms of Research and Development, and Technology Transfer, which can be better explored through on the website of NIAS, or just by clicking the desired item on this summary report.

The Institute is organized in three branches, Department of Biotechnology & Environmental, Department of Animal Researches Development and Experimental areas including: Hanwoo Experiment Station, Animal Genetic Resources Station and Subtropical Animal Experiment Station. The researchers are concentrated on three categories, being: Livestock Biotechnology & Environment, Livestock Resources Development and Experiment Stations and Technology Application.

1. **Livestock Biotechnology & Environment Category**

The Department of Biotechnology & Environment has developed projects in the areas of genomics, including the transgenic and cloning, identification of genetic markers for the interesting economic traits. In the area of food safe and high-quality, has been developing techniques for detecting of animal protein in animal feed, processing techniques to safe food products, developing bioactive natural substances, and studies on the HACCP system and traceability. Research on treatment of utilization of manure, air-cleaning systems and animal welfare are being conducted.
The Livestock Biotechnology & Environment Category includes the following areas:

1.1. **Animal Genomics & Bioinformatics Research**

Animal Genomics & Bioinformatics Division is accomplishing research of regarding gene structure, genetic mapping, development of favorable genes, functional genomics, proteonics and Bioinformatics with animal DB construction and systematic algorithms.

1.2. **Animal Biotechnology Research**

The Mission of the Animal Biotechnology Division is development of techniques for transgenic animals producing valuable materials such as therapeutic proteins, and the production of cloned high performance animals using cloning technology.

1.3. **Animal Nutrition & Physiology Research**

The goals of the Animal Nutrition and Physiology Division are to carry out research on feed production and animal nutritional physiological for the improvement of animal productivity and qualified and functional livestock production e.g. nutrients utilization by animals, endocrine manipulation related with body metabolism, biological and molecular biological metabolism, feed safety and quality control, and utilization of useful microorganism in digestive tracts.

1.4. **Animal Products & Processing Research**

The Animal Products & Processing Division is carrying out research on the improvement of marketing system, safety, quality control and processing techniques of livestock products, and the development of functional livestock products.

1.5. **Livestock Environment Research**

The Livestock Environment Division has worked to supply technologies for the management of organic wastes and greenhouse gases from animal production, in order to improve the welfare of the producers and animal, reducing the impact on the environment. The treatment and use of the wastes is one of great focus of the research team.

2. **Livestock Resources Development Category**

The Department of Livestock Resources Development has working on animal genetics, reproduction, nutrition, and production, and utilization techniques of roughage and forage crops. The animal improvement and genetic evaluation research aims to select and supply high performance livestock through national-scale evaluation of genetic ability. The Dairy cattle research is on the development of high quality and functional milk production techniques. Swine research aims to establish nucleus herds through line breeding and to develop high-quality on pork production technique. Poultry
research aims to conserve the pure line of Korean native chicken and to develop techniques for high-quality and functional poultry products. Grassland and forage research focuses on the development of stress-tolerant and high yielding forages, techniques for forage utilization and storage, and potential forages resources.

The Livestock Resources Development Category includes the following areas:

2.1. Animal Genetic Improvement Research
Animal Genetic Improvement Division is responsible for the planning, supervising and conducting research on national livestock improvement. Major areas of task include supervising performance and progeny testing programs, national genetic evaluation by species and livestock improvement systems, managing livestock genetic information service system, operation of five genetic improvement boards by species, and planning and/or appraising projects for national livestock improvement.

2.2. Dairy Cattle Research
The Dairy Cattle Division staff is engaged in both basic and applied researches to achieve the desirable results according to the aim. They are working to enhance the production and quality of the milk and its derivates, including functional milk production. In addition, several researches are carried out to improve animal welfare and to production cost reduction, increasing income for producers. To achieve these goals the researches are concentrated on breeding and reproduction, process development, nutritional management and feed additives, animal health, automatic dairy management and feeding facilities. To achieve these goals the researches are concentrated on breeding and reproduction, general management of the production system, nutritional management and feed additives, animal health, environment control and automatic dairy management and feeding facilities.

2.3. Swine Research
Swine Division is carrying out studies on the establishment of nucleus herds via line breeding, the development of breeding technology for improving swine performance and the restoration and industrialization of Korean native pigs. Research aims are also focused on the development of new technology and management system for improving reproduction efficiencies, the development of feeding strategies for producing consumer-oriented quality pork and the establishment of environment-friendly and organic swine farming system.

2.4. Poultry Research
Poultry Division aims to develop techniques for genetic improvement, reproductive physiology, feeding & nutrition of poultry and high-quality poultry production. Recently, the division focuses on the development of natural bioactive substances to replace antibiotics, the establishment of organic poultry production system, and the utilization technique of spent layers. Using restored breeds of Korean native chicken, the division supplies commercial native chicken to domestic farms. The division also
aims to develop techniques for a large-type broiler production system for export, use of probiotics for poultry production, and functional poultry products using agricultural by-products.

2.5. Grassland & Forages Research
Grassland & Forages Division is carrying out research on the development of stress tolerant and high yielding forages, new varieties of Italian ryegrass (IRG), orchard grass (OG), tall fescue (TF) and turf grass, and the distribution of new varieties to farms. The division has also research tasks on the establishment of cultivation methods, the selections of varieties, the utilization of legume germplasm, the development of new varieties, the stable production of forage on paddy field through a year, the effective use of livestock waste to grassland, the production system of organic forages, the use of whole crop barley for feed and the conservation and silage production system of whole crop rice.

3. Experiment Stations and Technology Application Category
Hanwoo Experiment Station conducts research on the breeding, the efficient reproduction management, the high quality Hanwoo beef production techniques and the establishment of Hanwoo industry system in North Korea. The research developed a feeding management system for high quality and safe Hanwoo beef production and an individually designed management system for quality and yield improvement of Hanwoo beef. To meet the demands of future beef consumers, we also conduct research on cattle farm amenity - farm landscaping or trailing.

Animal Genetic Resources Station conducts research on the development of national animal genetic resource management system, the collection and the management of genetic resources, and the evaluation of characteristics and diversity of domestic animal species.

The station also develops techniques for production, cryopreservation, and transfer of embryos along with artificial insemination.

Technology Application Division has an area of Technology Transfer, responsible for technical and economic efficiency improves for the producers. However, also manages the team called “Animal Technology Application 119” to construct the networks among livestock research Institutes and all Station in Korea for providing new Technologies and innovations to the producers.

The Experiment Stations and Technology Application Category includes the following areas:

3.1. Hanwoo Research
Hanwoo Experiment Station has tasks on the breeding, the improvement of reproduction efficiency, the development of low cost Hanwoo beef production techniques for persistent development of Hanwoo industry, and the establishment of Hanwoo industry system in North Korea. For nation-wide Hanwoo breeding it have
provided 90 bull calves with excellent performance for national bull testing. They are currently developing divergent lines with the most efficient genetic potentials in terms of growth and body fat deposition. To improve reproductive efficiency of cattle in farms, we propagate fixed time insemination techniques and developed a simple inseminator to aid artificial insemination. Our feeding programs emphasize on the development of designed and high quality beef production system for the demands of beef consumers’ well-being, including organic beef farming as well as cattle farm amenity- farm landscaping or trailing.

3.2. Animal Genetic Resources Research

The missions of Animal Genetic Resources Station are secure conservation and effective utilization of animal genetic resources. To achieve these goals, we are conducting many researches and activities, such as, national management, collection, characterization and evaluation of animal genetic resources, cryopreservation and restoration of germplasm, artificial insemination and embryo transfer. We are also developing breeding, reproduction and management techniques in goats and deer.

3.3. Technology Application Division

Technology Application Division has been organized since 2004 to apply applicability of outcomes from research works to commercial farms. The division transfers technologies developed to farmers, and evaluates efficacy of applied techniques to minimize economic losses by the techniques with adverse effects. Currently we are responsible for technical education, institutional communication, and advertisement of our institute. We manage communication with public media, publication and an advertisement hall. Another mission is to administrate various petitions and questions from livestock industries. In addition our veterinary team is responsible for animal Medicare system at the institute.

Labex Korea, for easier access to the major results achieved by NIAS in 2010, presented on Annual Research Report, established a system of links which allows users to access the information by theme or by the specific area. For this purpose by clicking on the theme or area to download the PDF file.
Access by theme

Livestock Biotechnology & Environment Category

- Animal Genomics & Bioinformatics Research
- Animal Biotechnology Research
- Animal Nutrition & Physiology Research
- Animal Products & Processing Research
- Livestock & Environment Research

Livestock Resources Development Category

- Animal & Genetics Improvement Research
- Dairy Cattle Research
- Swine Research
- Poultry Research
- Grassland & Forages Research

Experiment Stations and Technology Application Category

- Hanwoo Research
- Animal Genetics & Resources Research
- Technology Application Division (Subtropical livestock research)

Access by species area

Bovine

- Research for Hanwoo on-farm technologies (Pg 01)
- Biosimilar protein purification from transgenic milk (Pg 03)
- Development of Transgenic cattle producing functional proteins (Pg 04)
- Construction of Standard Reference Genome Map in Hanwoo (Pg 01)
- Identification of genes related to Hanwoo marbling using protein-protein interaction network (Pg 05)
- Prediction of GEBV with SNP tagging using RJMCMC approach in Hanwoo (Pg 06)
- Development of milk products using Lactobacillus isolated from Korean traditional food (Pg 04)
- Development of supplemental feed for inhibiting CH4 production from gastrointestinal fermentation in Hanwoo (Pg 01)
- Nation Wide Genetic Improvement Program (Pg 01)
- A Survey on Satisfaction Measurement of Automatic Milking System in Domestic Dairy Farm (Pg 01)
- Effects of Agricultural by-product on Growth Performance and Carcass Characteristics of TRM in Holstein Steer (Pp 02)
- Built of non-human estrous detection system (Pg 03)
- The Evaluation on the prevention and treatment of herbal medicine against calf diarrhea (Pg 04)
- Improvement of Growth Performance and Meat Quality in Hanwoo Steers Disqualified from Performance Test (Pg 01)
- Develop the computer program for mating plan (Pg 03)
- Hanwoo nutrition research for field application of Korean feeding standard for Hanwoo Cow (Pg 03)
- Study on bovine embryos cryopreservation (Pg 03)
- Standardization of Embryo transfer technology in Korean cattle (Pg 04)
- Study on Freezing of Male Germ Cell (pg 04)

Grassland and Forage
- Development of very early maturing Italian ryegrass, the new variety, ‘Green farm’ (Pg 01)
- Development of ‘Purumi’ a New Variety of Tall Fescue (Pg 02)
- Feeding effects of Italian ryegrass (Kowinearly) on Hanwoo Steers (Pg 03)
- Apparatus for measuring moisture for silage (Pg 04)
- The investigation of 4 Sorghum x Sudan grass Hybrid Varieties Characteristics for Suitable for Organic (Pg 05)
- Yield and quality of Miscanthus sinensis as a native grass according to harvest time (Pg 06)
- Optimum Harvest Stage of Italian Ryegrass ‘Kowinearly’ in spring season (Pg 07)

Swine
- G-CSF transgenic animal production (Pg 01)
- Transgenic line establishment and enhancement (Pg 02)
- Production of transgenic cloned pigs for xenotransplantation (Pg 08)
- Establishment of mass production system on transgenic pigs (Pg 09)
- Studies on the increase of implantation efficiency in cloned embryos (Pg 10)
- Expression pattern and function of genes associated with pregnancy (Pg 10)
- Porcine 384 SNP chip development for diagnosis of meat quality (Pg 02)
Genome research of immunity and fat through nutrigenomics and gene network in Pigs (Pg 03)

Research on the differentiate in the quality of domestic pork (Pg 01)

Molecular genetic characteristics of Korean native pig (KNP) (Pg 01)

Detection methods of heterozygote with black-spots in white pig breed (Pg 01)

Identify genetic variation of paternal lineage in Jejun native black pigs (KNP) (Pg 01)

Study of estimating growth curve and correction factor about performance test in pigs (Pg 01)

Effects of estrus synchronization regime on reproduction performance and estrus in gilts (Pg 02)

Effects of outdoor feeding on feces composition and productivity in sows (Pg 04)

**Poultry**

Antioxidant and Immunomodulatory Effects of Ulva pertusa kjellman on Broiler chickens (Pg 02)

Investigation for maternal origin of Korean native chicken (Pg 01)

Development of Transgenic animal bioreactor producing therapeutic proteins (Pg 08)

Development of geothermal heat pumps (GHPS) for poultry house (Pg 01)

To develop a feeding technology using essential oil originated from Korean pine tree for production performance and meat quality of broilers (Pg 02)

Development of rearing technology for reduction of abnormal chicken (Pg 04)

**Environment**

The study on cattle manure compost applications for organic grazing pasture in southern region of Korea (Pg 04)

Demonstration of slurry composting and biofiltration with methane production(SCB-M) system (Pg 01)

Development of pelletizing technique for livestock manure compost (Pg 02)

A study on livestock odor reduction using water washing system (Pg 02)

Research on greenhouse gas (GHG) emissions from swine manure treatment process (Pg 03)

Development of a measurement technique to quantify greenhouse gas emissions from livestock (Pg 04)
Effects of tapioca levels in the pig diet on the fecal excretion of odor causing compounds in pigs (Pg 05)

Discovery of cellulase genes from ruminal microbial metagenome in Korean Black Goat (Pg 04)

Goat

Improvement of goat milk quality and Development of functional fermented goat milk for reducing blood (Pg 03)

Duck

Current state of live and carcass weight distribution from domestic product duck (Pg 02)

Dog

Genetic markers development for genetic disease in dogs (Pg 04)

Elk Deer

Studies on the optimal energy level in young elk deer (Pg 05)

Horse

Relationship between MC1R and ASIP Genotypes and Basic Coat Colors in Jeju Horses (Pg 03)