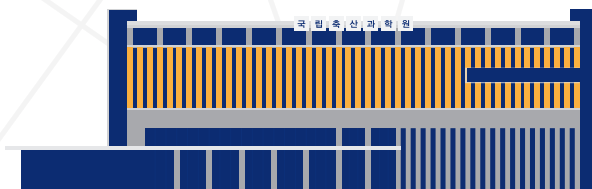




From the research of livestock products that the people are relieved to the realization of sustainable livestock industry



National Institute of Animal Science



Rural Development Administration
National Institute of
Animal Science

The livestock industry is a key growth industry in the future of Korean Agriculture.

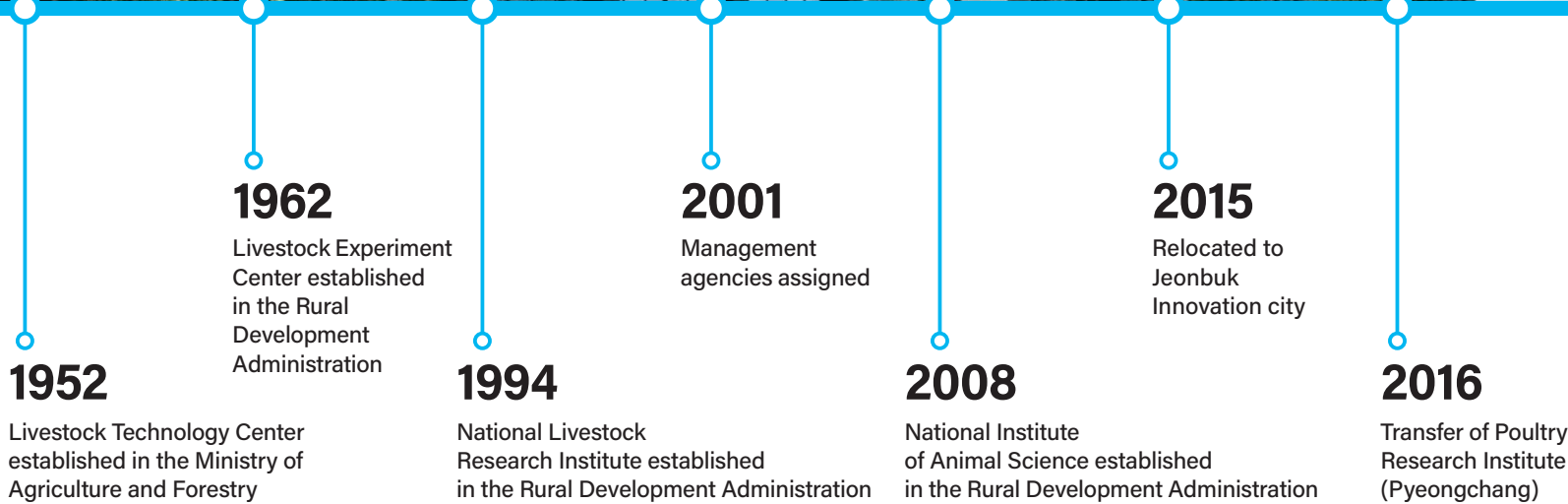
CONTENTS

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Vision & History



Achieve the best livestock technology in the world





The livestock industry
is **with** our reach.



Dissemination of livestock technology

To improve livestock sector by adoption in the field through effective technology dissemination with emphasis on customers, farms and policies.



Customized technical service of livestock farm

Promptly resolve bottleneck technologies and improve farmers' competencies and management skills.



Expansion of new livestock technology and diversify dissemination channels

- New technology demonstration project and field test research



- Perform projects with high field adaptability



- Customer-oriented communication and technology material publication and distribution



'Government innovation' field-centered technology service enhancement

- Customized field consultation and support services for livestock farmers
- 'Hanuri' system education
- Technology complaints call-center and field technology support operation



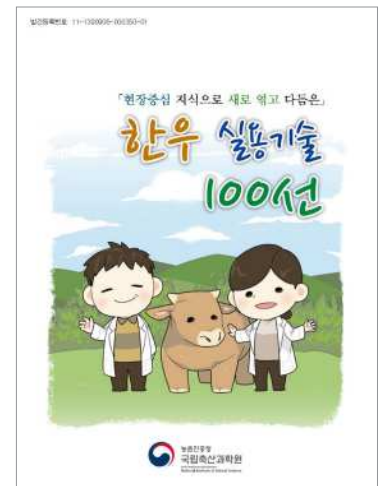
Animal sympathetic healing base build and diffusion

- Animal sympathetic healing model development and field adoption
- Domestic and overseas cooperation build and cultural diffusion



Livestock professional workforce positivity and a upbringing to the farm successor

- Reinforcement of livestock technology education and management skills
- Young livestock farmer upbringing and governance build





Control of domestic animal disease and **biosecurity** in NIAS

The Division of Animal Disease and Health prepared the improvement plan for the prevention of the livestock breeding, for the conservation of genetic resources, and carrying out of the research projects at the NIAS against FMD, HPAI.



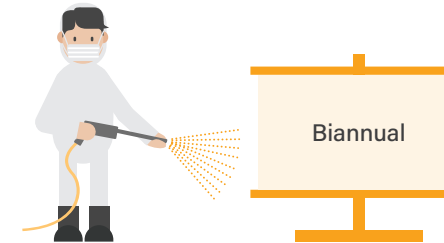
Research on technology for **disease control** in livestock

The Division of Animal Disease and Health conduct research on management of livestock diseases to contribute to the reduction of diseases and increase productivity in livestock industry.



⚙️ Biosecurity management for NIAS

- Biosecurity consulting for the FMD and HPAI prevention in NIAS

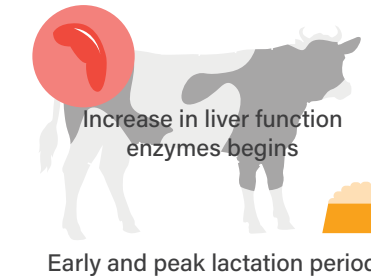
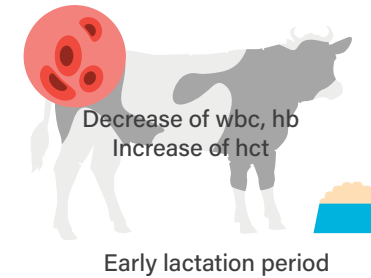


- Management of "Biosecurity guidelines for animal disease in NIAS"



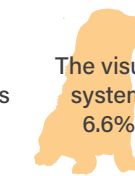
⚙️ Collection of biological indicators information on in dairy cows

- Variation of biological indicator depending on lactation stage



⚙️ Major medical cases of dogs

- A total of 15,531 medical records of dog patients were analyzed from 11 veterinary clinics (2016)





Develop high-value transgenic livestock

Develop bio-organs and animal models through the use of animal biotechnology for the study of human diseases.



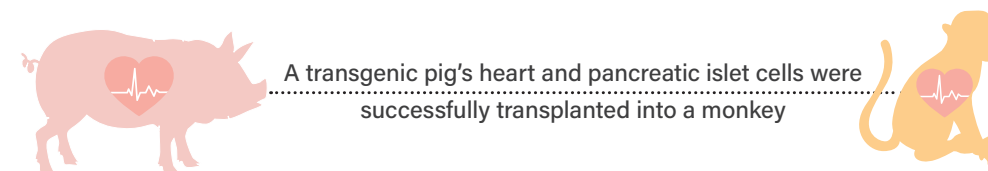
Select and supply cloned elite service dogs for the government

During the last few years, the NIAS have cloned and produced an elite breed of service dogs to aid in government operations.

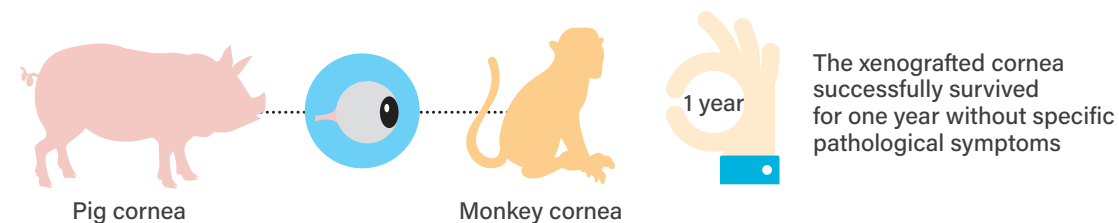


⚙️ Establishment of production systems of pigs for use in xenotransplantation

⚙️ Successful cardiac transplantation of pig to monkey for the first time in Korea



⚙️ Functional pig cornea xenografted to monkey



⚙️ Cloning and diffusion of elite service dogs

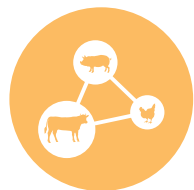
● Provide the cloned elite service dogs to government agencies

6 government ministries and agencies including the Ministry of National Defense, Korean National Police Agency, National Fire Agency, Animal and Plant Quarantine Agency

61 dogs

● Collect and preserve somatic cells of elite government service dogs





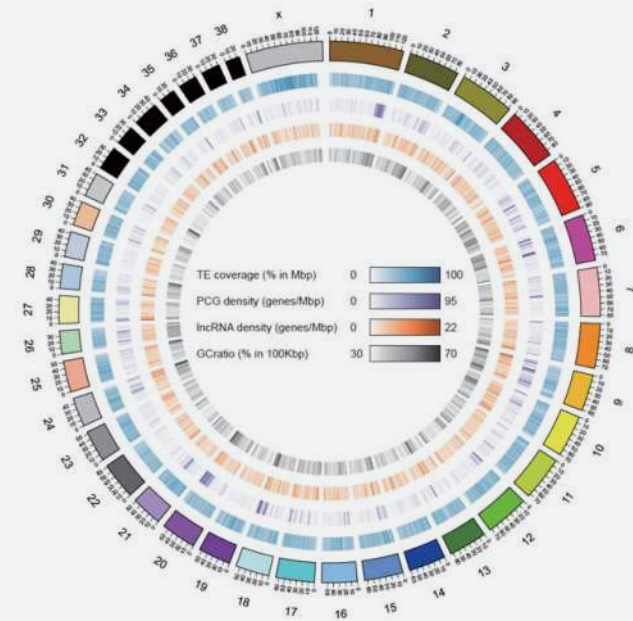
Livestock genome mapping identifying useful genetic markers

To obtain information on animal genetic resources and develop technology based on genomic selection.



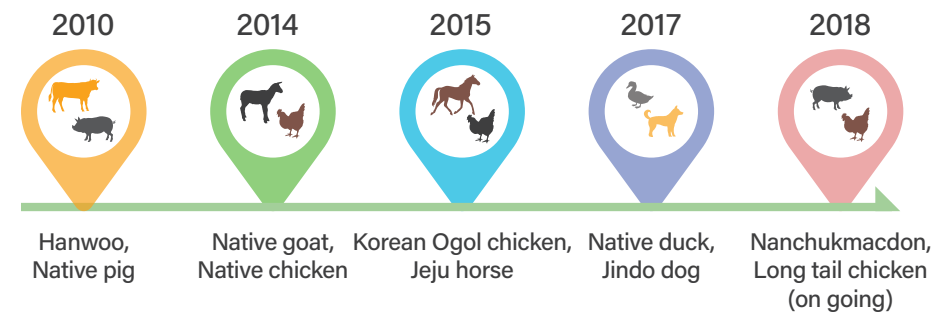
Developing practical technology for animal genomic & discovering new genetic materials

To develop technologies for new growth by exploring new demands in the livestock industry for the future.



Mapping of native livestock genome

- Mapping of native livestock genome (for 8 species)



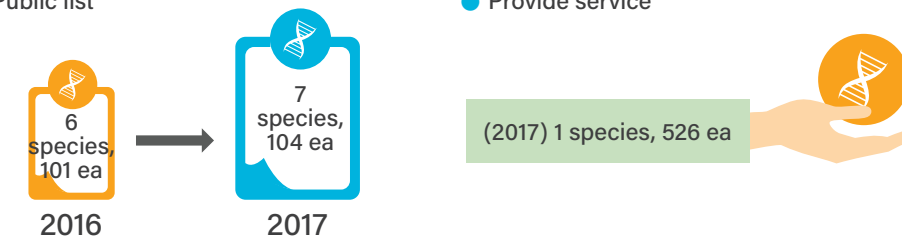
Development of Hanwoo SNP chip

- Genomic selection, Productive trait-related genes, Genetic disease markers, etc.
- Reduced production costs of growing of genetic information



Construction & public application of animal genomic big data

- Public list
- Provide service



Investigation of novel biological materials

- 18 parent of origin (9 each) imprinted genes identified in Hanwoo
- African cattle genome consortium (9 countries): Identified candidate genes associated with heat tolerance/stress
- Identified candidate genes associated with heat stress in Africa chicken



Increase the consumption of domestic livestock products with quality differentiation, distribution standards, and food safety management technology.



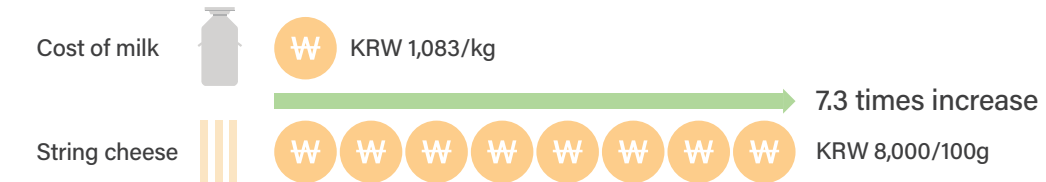
Promote the 6th industrialization by developing various meat and dairy products.



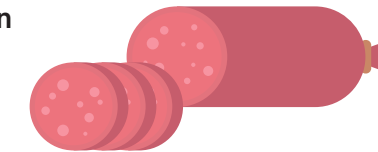
- Encourage the consumption of low-fat pork cuts



- Hands-on cheese making activities at cheese theme parks : String cheese, Halloumi, Queso Blanco, etc.
- Value addition



- Allergy alleviating *Bifidobacterium longum*
- Probiotic starter cultures for fermented sausages



- Nanobiotechnology-based diagnostics of food-borne pathogens and anti-bacterial packaging system





Develop eco-friendly livestock technology

Resolve livestock manure and odor problem with environmentally-friendly livestock technologies.



Develop cutting-edge livestock technology through ICT integration

Solve environmental issues associated with livestock production and modernize livestock facilities for better animal welfare by integrating information and communication technology (ICT) into the livestock industry.



Development of technology to improve energy production (Bio-gas, solid fuel) efficiency from livestock manure

- Development of direct processing and pellet compaction technologies for solid fuel (5~25mm)
- Development of dry device and operation technology using upper heating system for Hanwoo manure

Develop and disseminate odor reduction technology

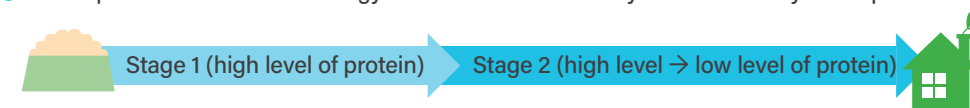
- Odor and dust reduction system provided



(2015) 890 systems



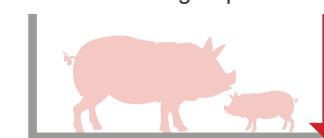
- Develop odor reduction technology that can be controlled by levels of dietary crude protein in animal feed



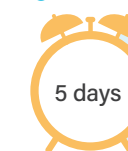
- Characterization of odor emission from hog barns and livestock manure composting plants

Develop alternative livestock facilities for improved animal welfare and establishment of animal welfare certification standards

- Electronic feeder for group-housed gestating sows
- Alternative farrowing accommodations



Decrease in re-estrus rate : below 5%



Faster return to estrus

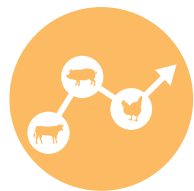


- Establishment of livestock welfare guideline for certificate
- Laying hens (2011) ▶ Pigs (2012) ▶ Broiler (2013) ▶ Cattles and Goats (2014) ▶ Ducks (2015)

Increased productivity and reduced labor cost through development of ICT-based livestock facilities

- Development of ICT devices and unified management system for smart livestock farming
- Stabilization of data communications for ICT devices (CCTV, fan, temperature and humidity sensor, automatic livestock feeder, etc.)
- Development of automatic milking robot system and its peripheral devices for commercialization
- 4 patents for milk meter and milk flow measuring device etc., 4 technology transfer, 2 farming techniques and guideline release





Regulation of nutritional metabolism in livestock

Develop optimal feeding models by regulating nutrition intakes and feed utilization.



Improvement of feed quality

Develop technologies to improve livestock productivity and produce safe livestock products.



⚙️ Korean Feeding Standard for Livestock

- Hanwoo : Revision of nutrient requirements of cows
- Dairy cattle : Verification of the lactation curves of domestic dairy cattle, and precise feed analysis
- Pigs : Proposal of feed intake models and the amount of nutrients excreted
- Poultry : Proposal of nutrient requirements of broilers
- Standard tables of feed composition : The data was collected and utilized through collaboration with domestic feed analysis agency. also, the new 15 analysis items were added

⚙️ Use of agrifood by-products in cattle feed

- Development and diffusion of computer program for self feed-formulating (2015)

5,384 downloads,
2016. 8 ~ 2018. 6

Program downloads

16 times, 505 people,
2015 ~ 2018. 6

Information class
for livestock farmers

- Conducting intensive education for next-generation farmers

Introduction of self feed-formulating technique
Promotion and dissemination of farmers' success stories using self-formulating technique



⚙️ Study on strategies for shortening fattening periods in Hanwoo

- Development of feeding schedule in Hanwoo
- Meat quality research with metabolite analysis

31
months

Shortening of
fattening period

28
months

Analysis of materials associated with taste and flavors
Analysis of meat quality during fattening period



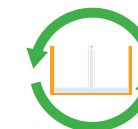
⚙️ Development of technologies to improve feed quality and safety management

- Establishment of toxicity test for monogastric animal
- Establishment of a simplified method for measuring koiganal, precursor of decomposition derived from microorganisms



⚙️ Climate change responses in the livestock sector

- Publishing a National Greenhouse Gas Inventory Report of Korea
- Study on prediction of the productivity change of livestock as affected by high temperature





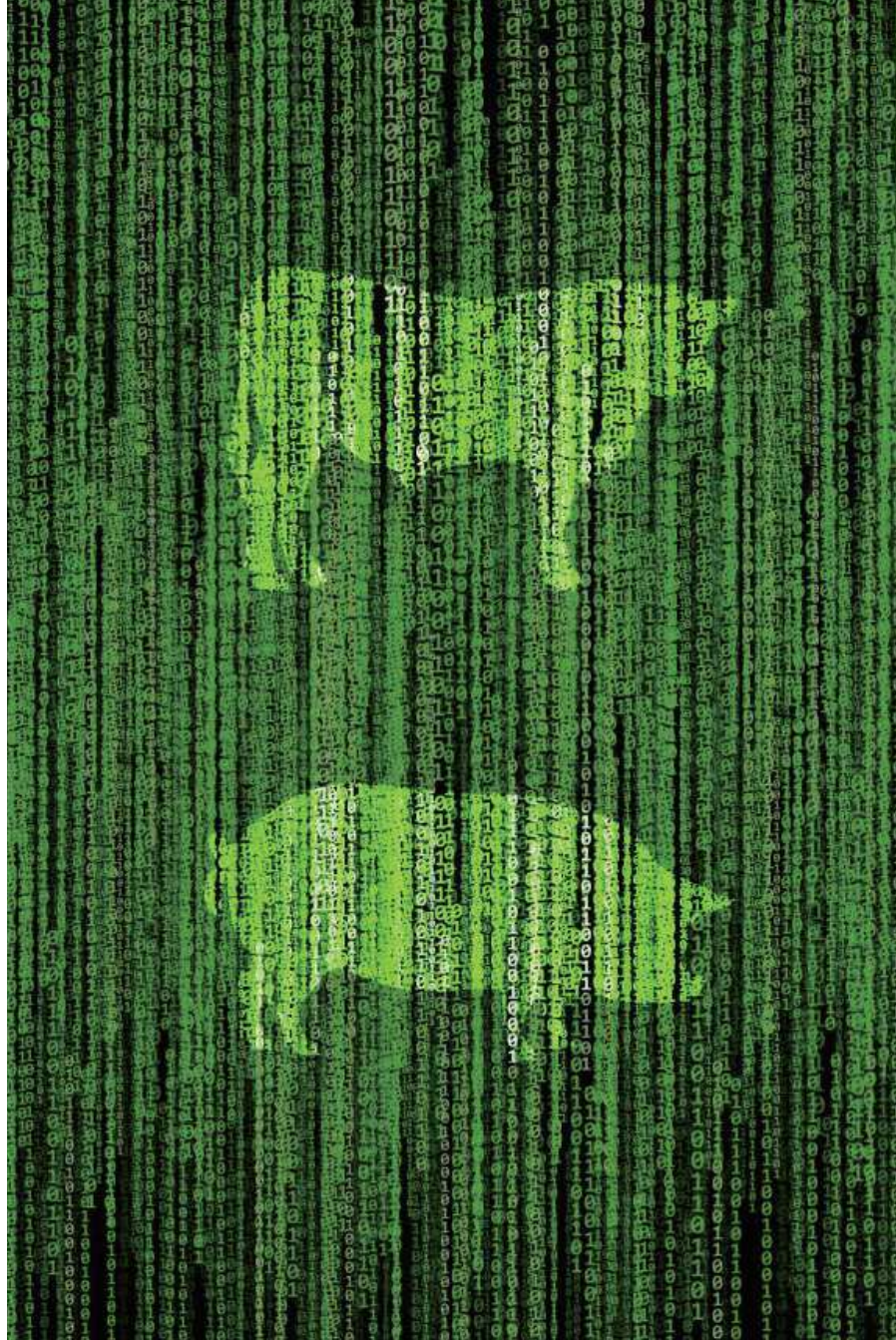
Select seedstock animals with superior genetic potentials

Select bulls and boars with desirable traits through reliable national genetic evaluation processes.



Provide farmers with guidelines for mate selection

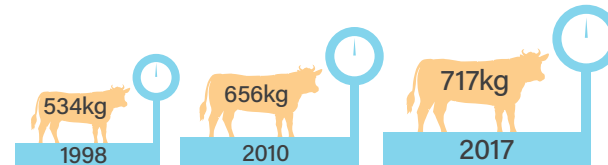
Promote farm-level genetic makeup through better choices of mates.



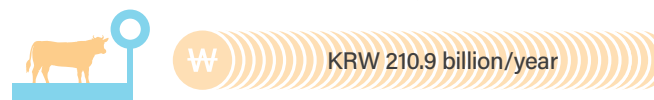
Establishment of Hanwoo bull system at national level

Provide Hanwoo cow mating program to farms

- Body weight increase at 24 months of age

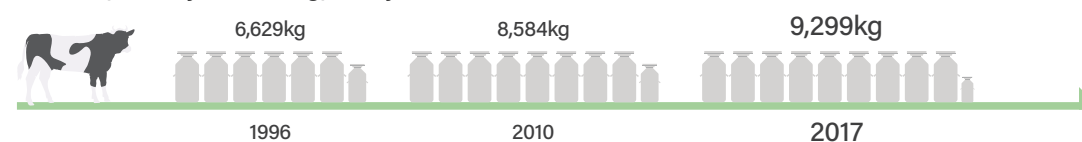


- Annual increase of national income by genetic progress in growth rate and final beef quality

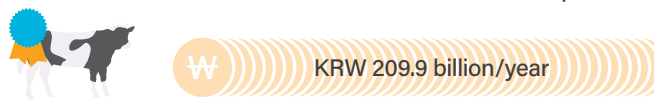


Establishment of dairy cow system at national level

- Annual (305-days of milking) milk yields

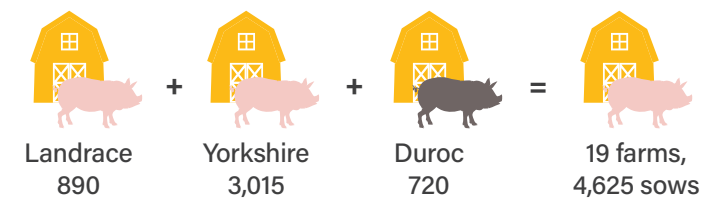


- Annual Increase of national income as annual milk production increase

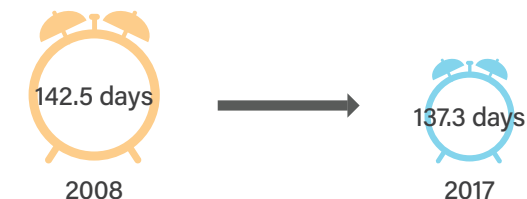


National genetic evaluation system through genetic networking among swine breeding farms

- Total size of participating breeding farms



- Pigs reach 90kg body weight earlier





Provision of technology to strengthen the productivity of dairy cows

We develop scientific dairy technology and dissemination it to dairy farmers.



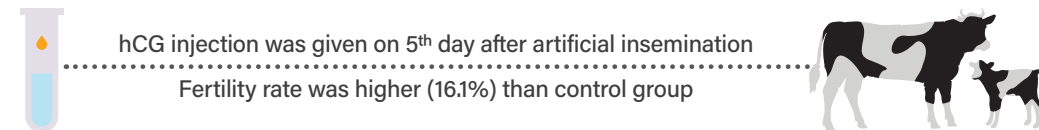
Promotion of technology for low cost milk production with high quality and safety milk

Provide technology to safely produce high-quality milk that consumers can trust and enjoy.



Improvement of embryo transplant efficiency on high yielding cows and reproductivity of repeat breeding dairy cows

- hCG-injected repeat breeding dairy cows showed improved fertility rate due to development of accessory corpora lutea and higher progesterone level



Selection of Korean superior breed cattle by embryo transplant project of disease-free dairy herd (continued since 2010)

- The first grade in 44th post-approval test (2017)
- HK-312, NIAS



Development of feed nutrition library according to Korean feeding standards for dairy cows (continued since 2012)

- Feeds were divided into 447 divisions based on nutrients, origin or production process

Development of ICT-based bio information utilization and automation technology for dairy cows

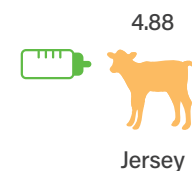
- Development of rumen-inserted activity measuring sensor and automatic feed supply robot

Development of nutrition management program for optimal heifer growth

- Analyzing the effects of feed energy level on heifer mammary gland development at endocrine-molecular level

Establishment of infrastructure for domestic adoption, growth and reproduction of Jersey cows

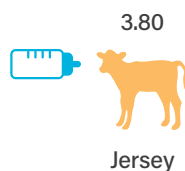
- Milk fat (%)



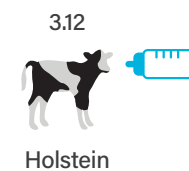
VS



- Milk protein (%)



VS





Develop Korean breeding pure lines and preserve genetic resources

Develop Korean breeding sires suitable for the nation's environment and preserve their genetic resources.

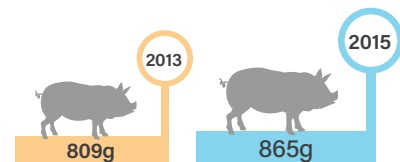


Develop and disseminate production technology for swine that are appropriate for the domestic environment

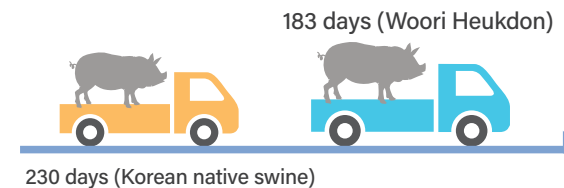
Develop and promote Korean swine production technology to improve farm competitiveness.

Develop and improve performance of Korean native swine, 'Woori Heukdon'

- Improvement of daily gain



- Reduction in rearing period



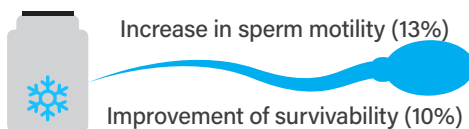
Supply superior breeding sires, 'Chukjin Duroc' to swine farms

- Superior pigs provided to artificial insemination centers

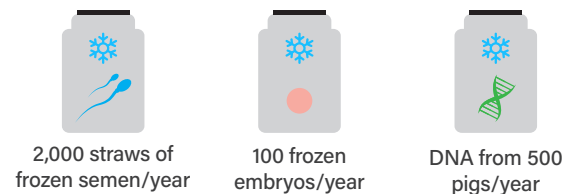


Ensure long-term storage of genetic resources (semen, fertilized eggs, and DNA) from superior breeding sires and create systems to utilize them

- Quality improvement of frozen semen

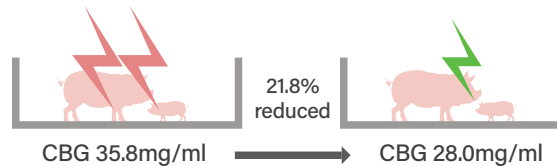


- Cryopreservation of superior breeding sires' genetic resources



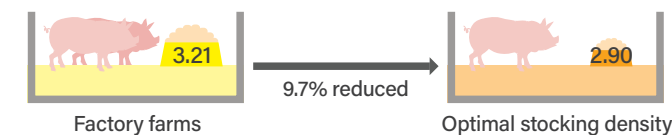
Develop technologies to improve productivity and reduce stress levels in pigs

- Feeding with other pigs before wearing reduces the stress of pigs



*CBG : Corticosteroid binding globulin

- Improvement of feed conversion ratio in growing pigs (40-85kg) in a sawdust pigpen





Widespread diffusion of superior forage varieties

Widespread diffusion of new forage varieties and commercialization of technology in the field.



Expansion of forage areas in paddy field in the central region and dissemination of cultivation technology

Spread the Italian ryegrass(IRG) seeding method before rice harvesting using cold tolerant and early maturing varieties.

Develop and disseminate cold-tolerant and early-heading IRG varieties

- Variety development

Development and adoption of 15 varieties including "Kowinearly" etc.



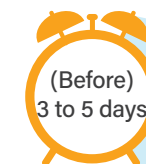
- Safe cultivation in the central region, and completion of forage harvest before rice transplantation (early to mid-May)
- Self-sufficiency rate of seeds

1,560 tons/year supply (28.8% self-sufficiency rate)



Enhance and standardize the quality of forage in the market with efficient forage quality assessment technology

- Reduction in analysis time



(Before)
3 to 5 days

80% decrease
in analysis cost

(After)
Within
5 minutes

- Establishment and use of quality assessment calibration curve

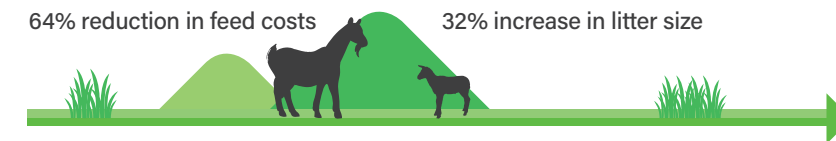
Expansion of quality
assessment forage from
winter forage to summer forage

A goat is most suitable for hilly pasture

- Goats are raised and allowed to graze on hilly pasture

64% reduction in feed costs

32% increase in litter size



- Improvement of grassland botanical composition by gradual establishment of goats



Low productive grassland
(dominated by weeds and shrubs)



High productive grassland
(94% of grassland vegetation rate)





Secure diversity of animal genetic resources

Collect and evaluate rare and endangered animal species .

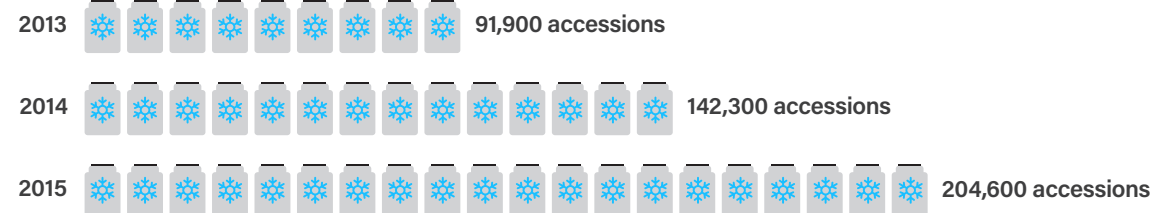


Conserve major breeding stocks and rare livestock breeds

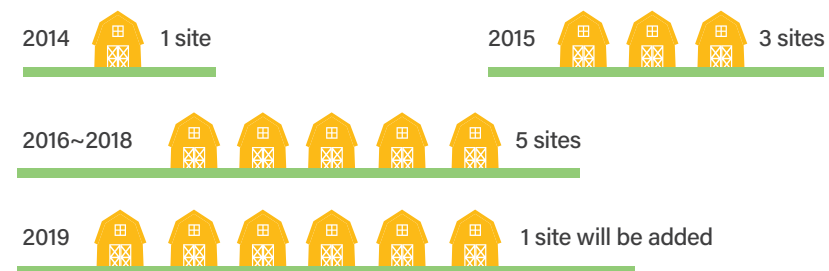
Develop technology to cryopreserve and restore animal germplasms.

Collect, conserve, evaluate and manage animal genetic resources

- The number of collected animal accessions (live animals, germ cells, etc.)

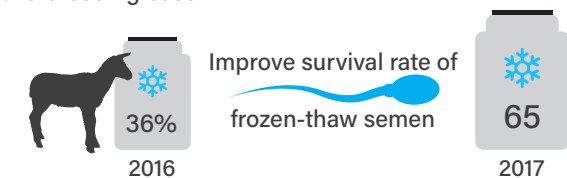


- Expansion of dispersion facilities for breeding stocks



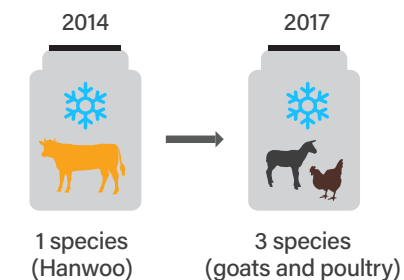
Establish goat improvement base and develop industrialization technology

- Establish strains of Korean black goats and build breeding base
- Development of goat artificial insemination technology
- Set goat nutrient requirements by growth stage
 - Publish goat feeding and management handbook (2018)



Develop the animal genetic resources management technology

- Standardize animal semen freezing methods





Development of Hanwoo productivity improving technology

Through the development of breeding, reproduction, and feed management technologies for Hanwoo, it provides productivity improvement and sustainable production of livestock farm.



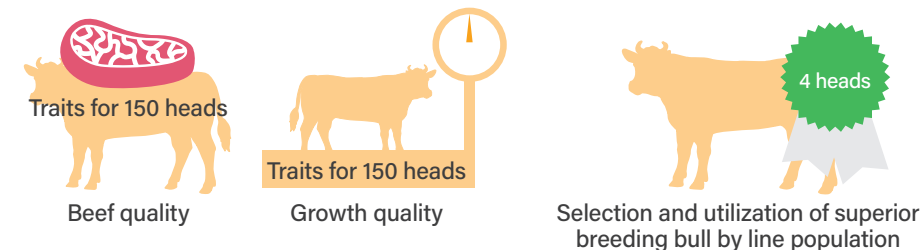
Supply of productivity technology of Hanwoo beef

We develop and supply competitive Hanwoo beef productivity technology adaptable to changing economic situation such as increase or decrease in consumer demands.



⚙️ Line breeding of differentiated group preparing for the future demand of Hanwoo

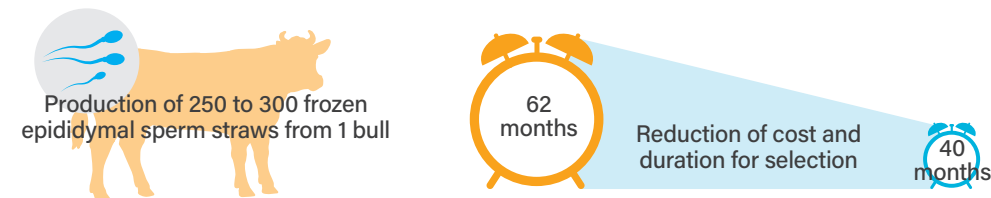
- Line breeding for growth and beef quality traits by using self-selected breeding bull



- Dissemination of line population genetic resources through participation in national improvement project (2018)

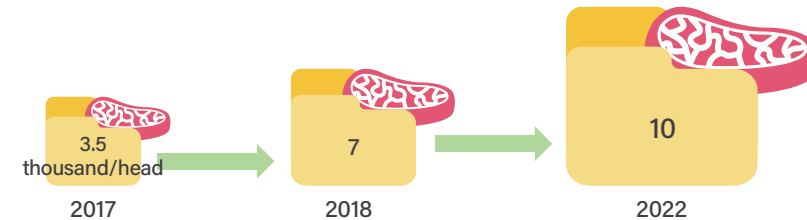
⚙️ Development of reproductive technique for small Hanwoo herds

- Development of cryopreservation of epididymal sperm
- Evaluation of carcass traits after castration and production of epididymal frozen sperm

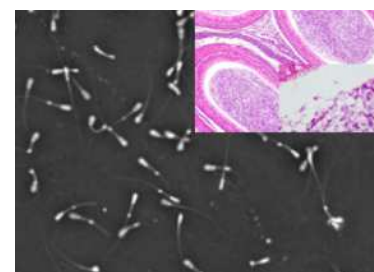


⚙️ Development of improving fine marbling fat of Hanwoo steer

- Setting up database of Korean type fine marbling index



- Application of Hanwoo steer feeding system at weaning periods (1, 3month) or castration periods (4, 7month)





Preserve and disseminate poultry genetic resources

Distribute and disseminate superior poultry breeding stocks and management techniques to poultry farms.



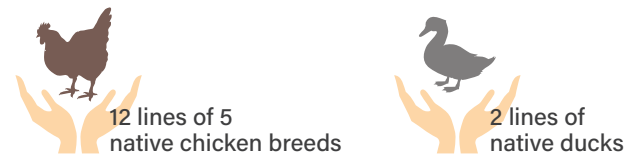
Develop and disseminate rearing technology for high-quality poultry products

Make an effort to produce high-quality poultry products considering animal welfare, responses to climate change, ICT research, etc.

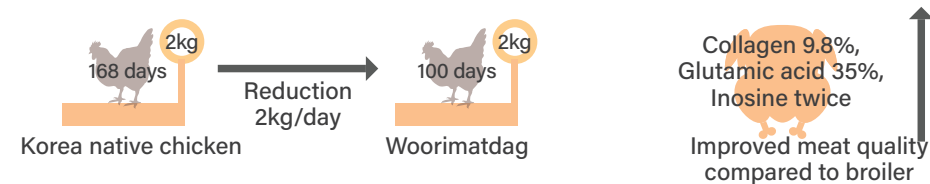


☀ Preserve and disseminate genetic resources of Korean native chickens and ducks

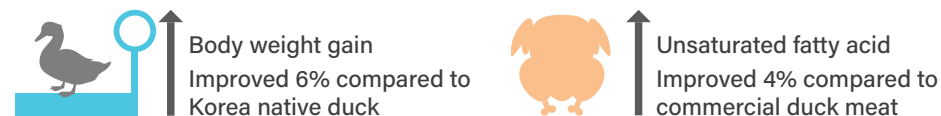
- Preservation and duplicate distribution



- Disseminate 'Woorimatdag' hybrid and management technology

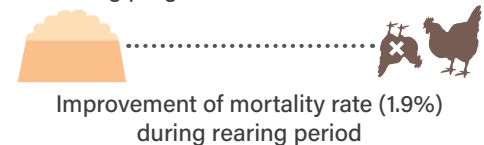


- Disseminate 'Woorimatori' hybrid and management technology

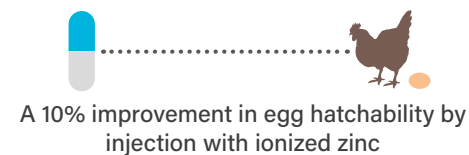


☀ Improve productivity of poultry and develop technology to produce stronger chicks

- Effect of changing broiler breeder feeding program

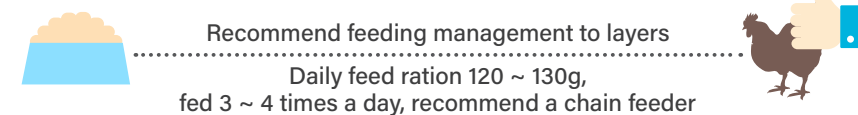


- Effect of material injected into broiler breeder eggs



☀ Development of management technology for laying welfare

- Management Technology for laying hens welfare



- Management of pullet welfare in aviary system

- Adaptability in the early growing stage is important, and the perch height needs to be increased up to the perch height level used for adult chicken house





Development of Korean horses and black pigs with high meat quality

Develop new breeds for consumers.



Development of technologies to industrialize Korean native livestock

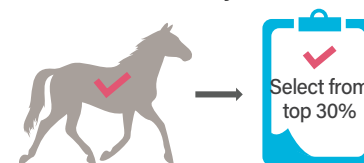
Secure intellectual property rights of breeding stocks develop new breeds that highlight desirable traits of native livestock.



⚙️ Breeding for Korean riding horses

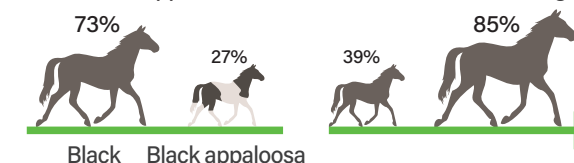
- Improvement of body conditions

Evaluation of body conditions



- Enhance coat color by analyzing coat color genes

Coat color appearance rate Fixation of coat color genes



- Utilize studs considering the body characteristics, coat color, and temperament

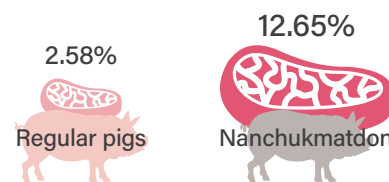
⚙️ Contribute to the revitalization of horseback riding (for sports or for leisure)

Supply beautiful riding horses with mild temperament
(2017) 85 horses

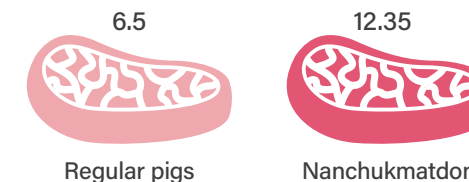


⚙️ Develop an improved black pig breed, 'Nanchukmatdon' which retains superior flavor of Korean native pigs

- Intramuscular fat content



- Red meat color intensity

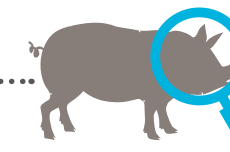


⚙️ Patent registration of key technologies required to develop new breeds, and service delivery for farmers

- Discover key genes that determine meat quality and black coat color (first registered patent in the world)



Black coat color identified with 100% accuracy
(Used to screen for black coat trait)



The National Institute of Animal Science will strive to enhance the livestock industry's competitiveness and contribute to building prosperous lives of the people.



Organization

Headquarters (Jeonbuk Innovation City)

- Planning and Coordination Division
- General Services Division
- Technology Services Division
- Animal Disease and Biosecurity Division

Department of Animal Biotechnology and Environment

- Animal Biotechnology Division
- Animal Genomics and Bioinformatics Division
- Animal Products Research and Development Division
- Animal Environment Division
- Animal Nutrition and Physiology Team

Animal Genetic Resources Research Center (Namwon)

Subtropical Livestock Research Institute (Jeju)



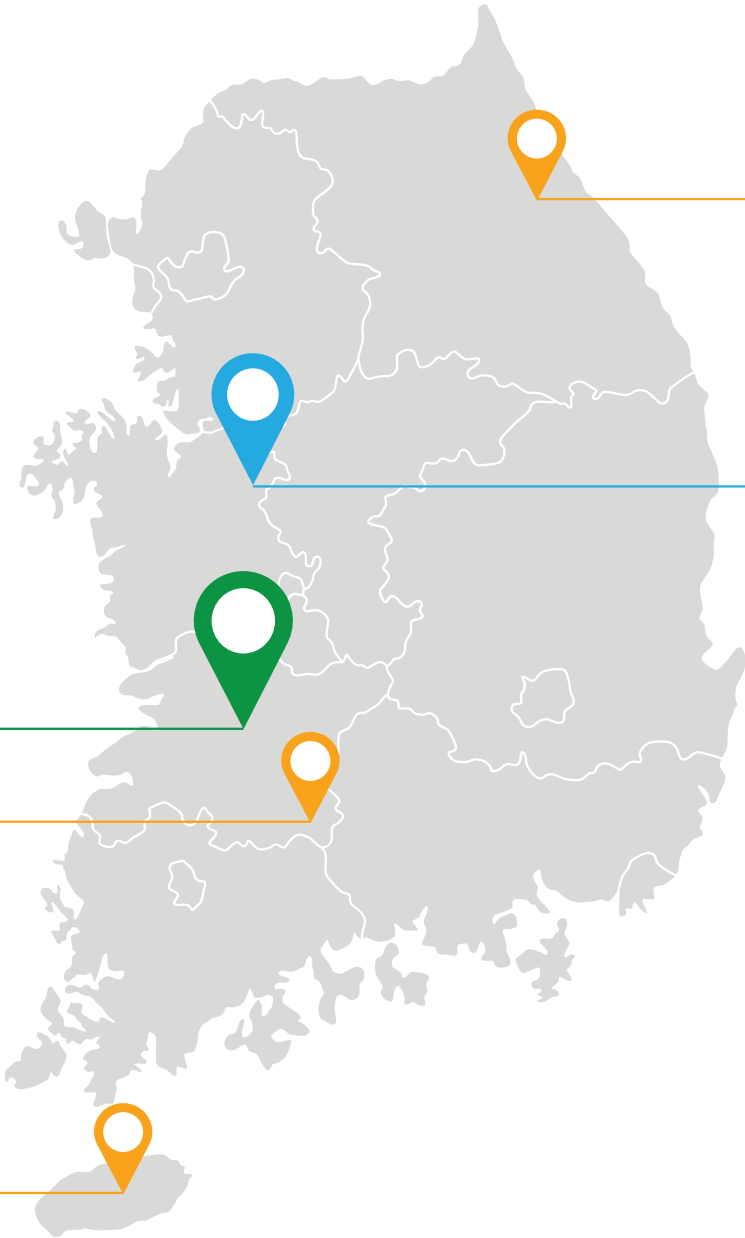
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Poultry Research Institute (Pyeongchang)

Department of Animal Resources Development (Cheonan)

- Animal Breeding and Genetics Division
- Dairy Science Division
- Swine Science division
- Grassland and Forages Division



Rural Development Administration

**National Institute of
Animal Science**

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