

# NEIKER

MEMBER OF  
BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE



# 2019 REPORT

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Research and innovative solutions  
for the agricultural and forestry sector

NEIKER.EUS



# INDEX

1

INTRODUCTION

**P.04**

2

ABOUT  
NEIKER

**P.08**

3

NOTEWORTHY  
RESEARCH  
PROJECTS

**P.24**

4

PROJECTS TO  
TRANSFER TO  
THE INDUSTRY  
AND **TO SOCIETY**

**P.34**

5

PEOPLE  
AND THE  
**ORGANISATION**

**P.46**

6

WITH **OUR**  
**COMMUNITY**

**P.51**

# INTRO- DUCTION

A gloved hand holding a petri dish with bacterial streaks. The background is a blurred laboratory setting with yellow-tinted lighting.

# 1



## **PRESIDENT**

### **Bittor Oroz Izagirre**

Deputy Minister for Agriculture, Fisheries and Food Policy with the Basque Government.

## Great challenges lie ahead for the agricultural and forestry sector and in 2019 at NEIKER have worked to cop with them.

Competitiveness, differentiation, quality, anticipation of market trends, generational change and the sustainability of our farms are some of these challenges and from NEIKER we wanted to respond to them in 2019 through various actions.

NEIKER's day-to-day work also responds to the policies that the Basque Government has designed to promote the development of the agricultural and forestry sector and to respond to our society's concern for health and environmental sustainability, food safety and the consumption of local products and innovation.

Among these policies that guide our actions, we can highlight the Strategic Plan for Gastronomy and Food (PEGA), whose health and food section seeks to rationalise the use of medicines and phytosanitary products, or the Strategic Plan for Wood (PEMA), which determines our lines of action in the wood sector.

In addition to the actions around health and food, the commitment to the bio-economy has taken an important step in 2019 and the Basque Alliance for the Bio-economy has been created, promoted by the Department of Economic Development and Infrastructures. NEIKER has taken part in the launch and is a member of this entity that will promote the transition to this new economic model.

Finally, in 2019 a relevant milestone has taken place for NEIKER: its incorporation to the Basque Research and Technology Alliance (BRTA), a Basque Government consortium that brings together various technology agents in the Basque Country. This alliance places NEIKER among the main technological entities in our country and with its synergies and positioning it will help us to compete with large international research corporations.



## CEO

**Leire Barañano**

In 2019 we have continued to create innovative and transferable solutions to help the agricultural and forestry sector and our customers adapt to consumer demands, new regulations, social requirements and the challenges brought about by the climate emergency.

**For this reason, at NEIKER we have worked to achieve a more sustainable and competitive sector with the capacity to incorporate new technologies.**

The sustainability of agricultural, livestock and forestry operations has been one of our focal points in 2019. We have developed various projects based on the use of BIGDATA for decision making that contribute to optimizing the use of fertilizers, phytosanitary products or medicines through the design of APPs or other tools that collect and analyze data that have come to stay.

The growing concern of the sector and society for animal welfare has also been reflected in our day to day with the launch of the WELFAIRTM certificate in collaboration with the Institute of Agrifood Research and Technology (IRTA), for which we have contributed with our extensive experience in the field. Unlike others, this certification includes ethical and sustainable development aspects.

Once again, forestry research had a great presence in our activity to respond to the needs of the sector, which requires solutions for red-band and brown-band diseases. At NEIKER we have worked on experimental treatments and on the search for special alternatives that will allow the wood-forestry chain to face the future with optimism.

In addition, we have continued to deepen our knowledge in fields that will allow us to face the demands of new European regulations with guarantees. Among them, we highlight the GREEN DEAL, which will demand that we transform the climatic and environmental challenges into opportunities for the agro-livestock and forestry sector and that we achieve a fair and integrating transition for all.

I would like to end by highlighting the transfer of our knowledge to the sector, which we materialize with the organization of conferences, congresses and other events. 2019 has been a very special year in this area: we have hosted and coordinated GENVCE2019, which was attended by 3,300 professionals from the agricultural sector. In total, around 4,000 people took part in the twenty or so conferences that we held last year in order to remain close to the sector.



# NEIKER BOARD OF ADMINISTRATORS, INSTITUTO VASCO DE INVESTIGACIÓN Y DESARROLLO AGRARIO, S. A.

## PRESIDENT

### **Bittor Oroz Izagirre**

Deputy Minister for Agriculture, Fisheries and Food Policy with the Basque Government.

## CEO

### **Leire Barañano**

## GENERAL SERVICES

### **Joaquín Salazar**

## SECRETARY, NON-BOARD MEMBER

### **Sonia Masip Moriarty**

Legal Manager at NEIKER.

## MEMBER

### **M<sup>a</sup> Teresa Amezketa**

Services Director of the Basque Government Department of Economic Development and Infrastructure.

## MEMBER

### **Peli Manterola Arteta**

Director of Quality and Food Industries with the Basque Government Department of Economic Development and Infrastructure.

## MEMBER

### **Jorge Garbisu Buesa**

Director of Agriculture and Livestock of the Basque Government Department of Economic Development and Infrastructure.

## MEMBER

### **Xabier Patxi Arrieta**

Director of IT and Telecommunications of the Department of Public Government and Self-Government of the Basque Government.

## MEMBER

### **Federico Saiz Alonso**

President of Baskegur.

## MEMBER

### **Unai Ibarzabal Goikoetxea**

Director of Harakai-Urkaiko.

## MEMBER

### **Salvador Gorostola Arrieta**

Aberekin, S.A.

## MEMBER

### **Jose Luis Fresno Santamaría**

Director of Garlan S. Cooperativa.

## MEMBER

### **Begoña Angulo Alonso**

Representative of the workers at NEIKER.

# ABOUT NEIKER

# 2





## ABOUT US

We are a technological centre specialised in creating innovative solutions for the agro-food and forestry sectors. As an entity dependent on the Ministry of Economic Development and Infrastructure of the Basque Government, we work to provide knowledge and value to these sectors.

We are part of the Basque Research and Technology Alliance (BRTA), a Basque Government consortium that brings together different technological agents in the Basque Country to tackle industrial challenges in the Basque Country and compete with large leading international research and technology-development corporations.

Moreover, we are part of the Basque Network of Science, Technology and Innovation, which groups scientific and technological bodies and entities. Working as a network enables us to develop a balanced R&D&i activity, aimed at improving the productivity and competitiveness of the Basque Country's agricultural production systems.

## WHAT WE DO

We develop new technologies aimed at improving the productivity and management of farms, in order to meet the quality and safety requirements of the agri-livestock industry and the end consumer.

We create scientific knowledge and transferable solutions that contribute wealth and well-being to our society and surroundings.

We contribute to the development of an agro-livestock and forestry sector in the Basque Country, the preservation and sustainability of our natural environment, and developing policies that drive the circular bioeconomy in the Basque Country.

# SCOPE OF ACTION

Our actions are guided by different external inputs to which we must pay heed to appropriately steer our work and be one step ahead of sectorial needs and contextual demands.

## STRATEGIC PLAN AND TECHNOLOGY PLAN 2018-2023



- Sectorial plans

## CONSUMER



- More natural products
- Safer products
- Healthier products
- Local products
- New consumer types
- Solutions to lack of time
- Ageing
- Ecological

## SECTOR



- Differentiation
- Prevention
- Cost competitiveness
- Value-added alternatives
- New production systems
- Better yields

## MARKET



- Increased cost of foodstuffs
- Competition
- Difficulty in differentiating value-added alternatives

## LEGISLATION



- Environment
- Quality
- Food security
- Labour

## ECONOMIC BUSINESS ENVIRONMENT



- International uncertainty
- Scarce resources
- Tangible values R&D&I
- Displacement of the economic focus and innovation

## 2020 HORIZON



- Food security
- Sustainable agriculture and forestry
- Climate action
- Green Deal
- Farm to Fork
- Biodiversity

## SPANISH SCIENCE, TECHNOLOGY AND INNOVATION STRATEGY 2013-2020



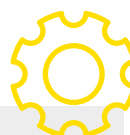
- R2 - Food security and quality
- R5 - Climate change, natural resources and raw materials

## BASQUE COUNTRY SCIENCE, TECHNOLOGY AND INNOVATION PLAN 2020



- R153 - Food niche
- R153 - Ecosystem niche

## BASQUE GOVERNMENT STRATEGIC PLANS



- Strategic gastronomy and food plan
- Strategic wood plan

# OUR CHALLENGES

We improve the competitiveness and sustainability of the primary sector through research and applied science. We worked on the following strategic lines:

## 1 New molecular techniques for genetic improvement.

Molecular techniques provide for more precise results in a much faster manner than traditional techniques. By applying them, we seek to obtain more competitive, higher-quality products that are more focused on industry and consumer needs, better-adapted to climate change and with a reduced environmental impact.

## 2 Improving competitiveness of agricultural-livestock and forestry activities:

By introducing cutting-edge technologies and new production systems, we can increase profitability, competitiveness and sustainability for farms, guaranteeing their continuity with production systems that encourage passing from one generation to the next.

## 3 Promoting sustainable and environmentally respectful production processes:

Society is demanding production processes that are sustainable and respectful towards the environment. At NEIKER, we study and share the positive aspects of farming activity: biodiversity conservation, their contribution to mitigating climate change and maintaining the landscape, economic activity and the rural population.

## 4 One Health.

Increased antibiotic resistance is one of the huge issues facing humanity. For this reason, we are researching how to reduce the use of antibiotics with livestock and ration the application of plant protection products in agriculture. We look for alternatives that allow us to control diseases without the use of antibiotics or phytosanitary and, therefore, allow for safer food.

## 5 Fostering ecological production.

The demand for ecological products in our environment is growing every year, and at great speed. However, there is still a great lack of knowledge in the sector and in society. At NEIKER, we research and generate objective and scientific knowledge that helps to foment and strengthen this type of agriculture, making it compatible with the sector's competitiveness.

## 6 Response to climate change in agro-ecosystems: impact, mitigation and adaptation:

We must prepare for the consequences of climate change. At NEIKER, we work to predict future scenarios and to seek out possible ways to mitigate and adapt. We analyse and suggest alternatives to current production systems, applying technology and our knowledge.

## 7 Circular bioeconomy.

Production processes should not generate waste. Reducing and converting this waste into materials for new products is a way to fight climate change, reduce dependency on raw materials and create new economic activities. At NEIKER, we focus on production processes related to the primary sector, and especially the forestry sector.

# CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

The United Nations' Sustainable Development Goals (SDGs) are a set of global measures launched in 2015 to eradicate poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific objectives that must be reached over the next 15 years. Each and every one of us must play our own role in reaching these goals.

NEIKER's contribution is related to SDG objectives 2, 3, 11, 12, and 13: we work to ensure that the food chain produces food with sufficient quality and in sufficient quantity that is healthy and in a sustainable way, promoting responsible consumption and mitigating the effects of the climate crisis.

2

ZERO  
HUNGER

3

GOOD HEALTH  
& WELL-BEING

11

SUSTAINABLE  
CITIES AND  
COMMUNITIES

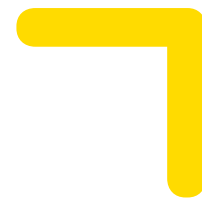
12

RESPONSIBLE  
CONSUMPTION  
& PRODUCTION

13

CLIMATE  
ACTION

# EXPERTISE



## PLANT RESEARCH



- > Production systems and good agricultural practices.
- > Improved plant genetics.
- > Alternative crops and biomolecules of agri-food interest.
- > Epidemiology and control of plant and forestry diseases.
- > Diagnosis and detection of plagues and plant diseases.

## FORESTRY RESEARCH



- > Plant physiology and tissue culture.
- > Genomics.
- > Forestry pathology.
- > Sustainability.
- > Genetic improvement.
- > Forestry bioeconomy.

## ANIMAL RESEARCH



- > Genetic improvement.
- > Animal feed and nutrition.
- > Animal production systems.
- > Applied ethology and well-being.
- > Epidemiological diagnoses, control and observance of animal diseases.
- > Zoonosis and food safety.
- > Environmental biosafety, wildlife and vectors as sources of infection for production livestock and people.

## ENVIRONMENTAL RESEARCH



- > Conservation and sustainable use of agricultural and natural resources.
- > Recovery of degraded soils.
- > Environmental monitoring.
- > Impact, mitigation and adaptation to climate change.
- > Gas emissions in agricultural-livestock systems.
- > Circular bioeconomy



## NEIKER AT A GLANCE



# PROFESSIONALS

We are a team of motivated and committed people, working to:

**1** Create opportunities for development.

**2** Achieve scientific excellence.

**3** Constantly improve.

**4** Obtain the satisfaction of customers and society.

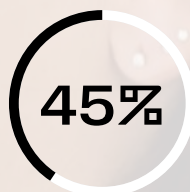
**5** Contribute to a 100% sustainable environment.

# 183

## PROFESSIONALS



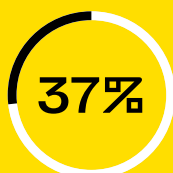
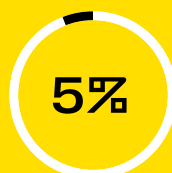
WOMEN



MEN



DOCTORS

DOCTORS  
(OUT OF ADVANCED  
DEGREES)ADVANCED  
DEGREESMID-EDUCATION  
DEGREESOTHER TECHNICAL  
COLLABORATORS

32

INTERNS

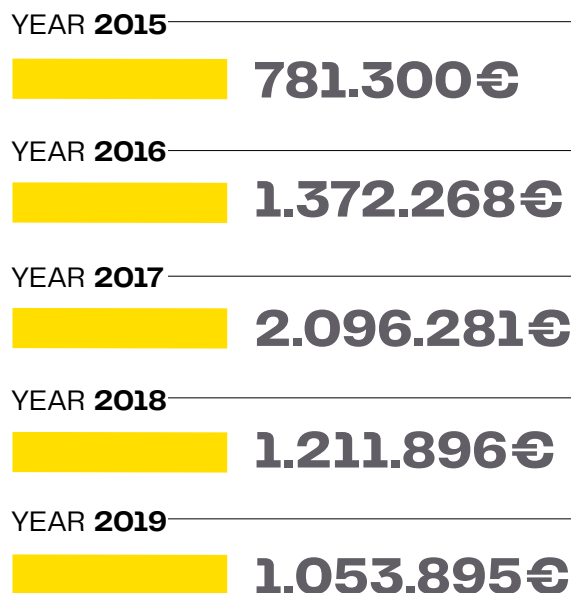
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YEARS  
AVERAGE AGE

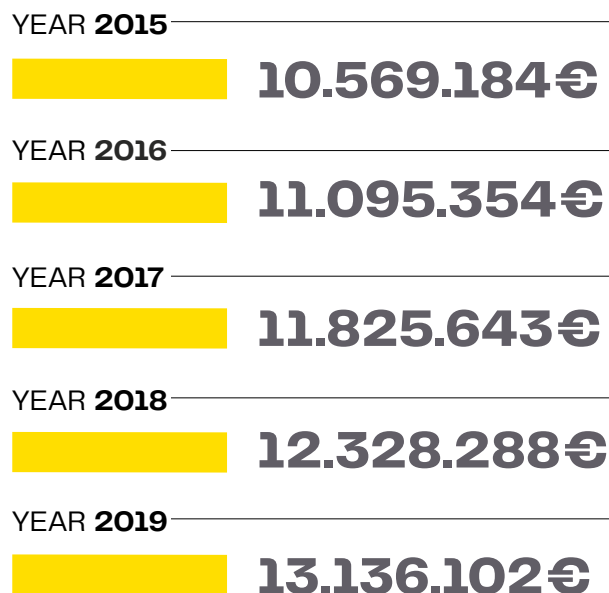


## FINANCIAL-ECONOMIC INDICATORS

### INVESTMENTS

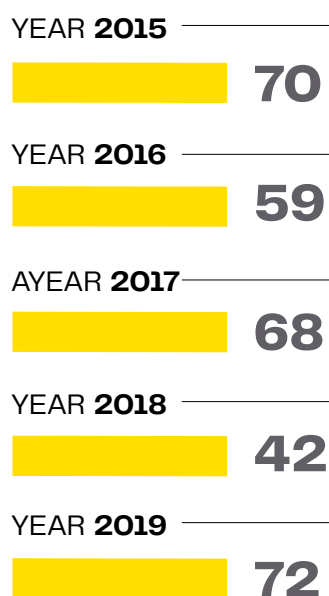


### INCOME



## SCIENTIFIC-TECHNOLOGICAL EXCELLENCE

### PUBLICATIONS





# 80.000

## ANALYTICAL SERVICES

In addition to creating scientific knowledge and transferable solutions, for the last 25 years, NEIKER has been offering specialised analytical and advisory services to the agri-food sector in order to guarantee the health of livestock farms, the safety and quality of food and greater returns in the Basque agricultural and forestry sector.



## 1 ANIMAL HEALTH LABORATORY

- > Diagnosis of animal and zoonotic diseases
  - > Ruminant reproductive diseases
  - > Mycobacterium (tuberculosis and paratuberculosis)
  - > Viral ruminant diseases (IBR, BVD, Border-disease, Maedi-Visna...)
  - > Leptospirosis
- > Health testing of bulls
- > Microbiology of feed and its raw materials
- > Detection of pathogens in milk

## 2 LABORATORY FOR THE CONSERVATION OF NATURAL RESOURCES

- > CNutritional composition of feed and raw materials, silage, etc.
- > Waste detection (Clenbuterol, antibiotics)
- > Quality of honey and other bee products
- > Soil studies and fertiliser recommendations
- > Spill characterisation
- > Characterisation of dung and slurry
- > Water quality control

## 3 PLANT HEALTH LABORATORY

- > Seed and food potato certification
- > Tests on botanical seed purity, count, germination and viability
- > Quarantine organism detection
- > Diagnosis of diseases caused by fungi, bacteria, viruses and nematodes in plant material
- > Identification of varieties of plant species (potato, pepper, tomato, etc.)

## 18 ACCREDITED TECHNIQUES\*

- > Microbiology-immunology departments
- > Molecular department
- > Physical-chemical testing department

\* At Derio laboratories, according to the scope of the Accreditation ENAC UNE-EN ISO/IEC 17025:2017.

## INFRASTRUCTURES

- > Microbiology and immunology laboratory (NCB-2)
- > Level-3 biocontainment laboratory (NCB-3)
- > Facilities for animal experimentation with levels 2 and 3 of biocontainment
- > Greenhouse for plant testing with level 2 biocontainment
- > Chromatography department
- > Molecular biology departments
- > Analytical chemistry department
- > Plant analysis laboratory



**300**  
clients from all  
links on the chain  
of value

MEMBER OF THE NET-  
WORK OF BIOLOGICAL  
ALERT LABORATORIES  
(RE-LAB)

## NEIKER IS MEMBER OF



Basque Research  
& Technology Alliance



Elhuyar



European Forest  
Institute



Lekunberri Dairy  
Institute



Basque Foundation  
for Food Safety



Basque Innovation  
Agency



Center for cooperative  
research in biosciences

## CERTIFICATIONS



ISO 9001 Certification for the management of R&D projects and technology transfer since 2005 – ER-1201-2005..



Accreditation no. 615/LE 1321 from ENAC for the carrying out of physical and chemical, microbiological, immunological and molecular tests on agri-food products at the Derio centre.



NEIKER has an R&D&I management system in compliance with Standard UNE 166002:2014 for research, development and innovation activities in the field of agri-food (agricultural, livestock and forestry sectors) and in the natural environment. Number: IDI-0009/2019.

# MAIN CLIENTS





## FACILITIES

**1.520 m<sup>2</sup>**

HIGH-SECURITY  
FACILITIES

**3.305 m<sup>2</sup>**

LABORATORIES

**7.138 m<sup>2</sup>**

GREENHOUSES  
AND TUNNELS

**1.810 m<sup>2</sup>**

OTHER  
FACILITIES

**2.765 m<sup>2</sup>**

LIVESTOCK  
FACILITIES





BSL-3 level laboratory  
High-security greenhouses

**673 m<sup>2</sup>**

**845 m<sup>2</sup>**

Laboratories (Red building)  
Laboratories (Blue building)  
Arkaute Laboratories

**705 m<sup>2</sup>**

**1.100 m<sup>2</sup>**

**500 m<sup>2</sup>**

Glass, plastic and  
plate-covered (Derio)  
Test culture surface (Derio)  
Arkaute

**3.500 m<sup>2</sup>**

**2.000 m<sup>2</sup>**

**1.638 m<sup>2</sup>**

Warehouses, selection rooms and  
characterisation and services (Derio)  
Agricultural warehouse (Arkaute)  
Field workshop  
Refrigeration chambers s

**900 m<sup>2</sup>**

**500 m<sup>2</sup>**

**340 m<sup>2</sup>**

**70 m<sup>2</sup>**

**100 ha**  
EXPERIMENTAL  
FARMS



# NOTEWORTHY RESEARCH PROJECTS

# 3

# NEW TECHNIQUES IN GENETIC IMPROVEMENT PROGRAMMES

## **Genetic selection to speed improvement in Latxa and Carranzana sheep**

NEIKER is the leading genetic centre in the programme for genetic improvement of native Latxa and Carranzana sheep in the Basque Country and Navarre. Part of our job consists of optimising genetic assessment models to identify the animals that carry the genes of most interest to livestock operators, so that these animals can be used as progenitors. Thus, annual genetic progress of approximately 3% has been made. Until now, this genetic assessment was conducted based on production data from the Dairy Control and Genealogical Book. In 2019, we took a step forward, implementing genome selection by incorporating molecular information on the animals. This way, animals of interest can be identified more precisely, accelerating genetic progress.

## **Forestry improvement with the somatic embryogenesis technique**

Stockpiling plant material with interesting character for the forestry sector is the main objective of reactivating the Forestry Improvement Programme, carried out since 2018 in the Basque Country and led by NEIKER. We work on detecting, collecting and multiplying the best tree specimens to obtain a diverse, productive collection, adapted the best possible to our environment's characteristics (climate, amount of available water, soil type, disease resistance, etc.). Acclimation-fattening of plants previously multiplied with somatic embryogenesis and presumably a candidate to be resistant is a noteworthy achievement in 2019, which shall feed the genetic improvement programme for *pinus radiata*.

## **Traditional potato, improved with identified genetic markers**

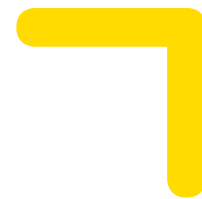
Over more than 50 years, we have carried out programmes to genetically improve potatoes to offer the sector improved varieties that meet new market demands, which are increasingly demanding and competitive. In 2019, we implemented the selection, assisted by new molecular markers, a genetic improvement technique that we used to

cross varieties resistant to viruses like PVY and nematodes. We also selected parents with characteristics to optimise processing quality.





# IMPROVED COMPETITIVENESS IN FARM OPERA- TIONS



## **BIGDATA to improve chicken well-being**

Broiler chickens are the most abundant farm animal in the world, and one of the most-present products in our diet. It is therefore fundamental that we have systems to improve their health and well-being. Within this context, BIGDATA can offer information to improve broiler chicken handling practises, based on guidelines for action generated after analysing large databases. Indeed, this is the objective of the European project IMBDATA, in which NEIKER participated. In 2019, a web server prototype was developed to collect and analyse data on the chicken meat production chain. IMBDATA consists of a central server and mobile apps to monitor animal well-being at the farm and the slaughterhouse. In the last instance, this system makes progress in improving the health and well-being of broiler chickens, and therefore toward de-medicalisation and more sustainable production models.

## **Vaccines and probiotics to halt paratuberculosis**

Paratuberculosis is a chronic disease caused by mycobacteria, posing a great health and economic problem in ruminant operations around the world. NEIKER seeks solutions to control this illness by developing vaccines and probiotics (immunogenic agents). Moreover, we study the possible non-specific beneficial effects from administration of these immunogenic agents. In this way, we seek to develop a unique product to stimulate the immune system and prepare animals to face several different pathogens. Throughout 2019, we characterised different prototypes with in vitro techniques with bovine cells we designed and studied how different immune system functions are boosted and could therefore discard those with the least-promising results.

## **Tools to improve wheat fertilisation**

Given the challenge of optimising fertilisation to improve yield of agricultural operations and avoid causing environmental problems, in 2019, we worked on tests, evaluating different nitrogen-application strategies, an essential nutrient in grain crops whose presence is essential to obtain profitable productions. Organic fertilisers are a source of nitrogen, which is why we attempt to make their use compatible with mineral nitrogen fertilisation. In this regard, we have studied how remote detection tools can help us to estimate the plant's nitrogen nutritional status and adjust mineral nitrogen amounts after applying organic fertilisation before sowing.





# SUSTAINABLE MANAGEMENT OF AGROSYSTEMS AND NATURAL ECOSYSTEMS

## Multiple benefits of rotating grazing

One of the great challenges for agri-livestock operations is sustainability. In order to respond to this issue, since 2012, regenerative practises have been used on our flock of sheep, including rotational grazing. In 2019, we monitored some of the ecosystemic services that grazing provides to society (carbon fixation, grass production, biodiversity, water regulation, nutrient, recycling, etc.). The mid-term results (6 years) show that plots with rotational grazing bear a significant increase in grass production (22% increase), greater carbon fixation in the soil (4% increase), greater plant biodiversity (4% improvement) and a trend toward greater water-retention capacity.

## Agronomic models to simulate extensive crops

Agronomic models are mathematical tools based on biophysical principles to evaluate a great number of agricultural strategies, facilitating agricultural decision-making: selection of sowing date, harvest date, fertiliser application, irrigation, selection of varieties, sowing dosage, etc. Moreover, they are essential to characterise the effects of climate change on crop production and to define possible adaptation strategies. At NEIKER, since 2016 we have been conducting this sort of study. The result of this work, in 2019, we obtained a series of agronomic models adapted to the Basque Country's conditions to simulate main extensive crops (wheat, rye, colza, potato, etc.).





# RATIONALISATION OF THE USE OF MEDICINE AND PLANT PROTECTION PRODUCTS

## Improving the health of animals in milk production

In 2019, we conducted an experimental test on Latxa sheep from our Arkaute herd (Álava) to boost passive immunity transfer to lambs through the colostrum. We have modified colostrum feeding, recommending intake of a greater amount of colostrum and studying the effect of multiple gestation on the colostrum's immunological quality, in addition to other aspects. Another beneficial measure we verified is that feeding during the last phase of gestation has an effect on colostrum production: on the diversity of immune cells and the proportion of fatty acids. This knowledge will help to improve the state of health of Latxa sheep herds and, long-term, to reduce the need to use medication in livestock production.

In addition to the studies conducted on our sheep herd, in 2019, we collaborated with dairy bovine farms, as well. With them, we implemented actions oriented toward reinforcing colostrum feeding to improve the immune status of their calves. The livestock operators followed guidelines that include administering colostrum during the first hours after birth and estimating the antibodies to discover their quality. In turn, at our laboratory, we characterised this colostrum to discover the composition in immune cells, and assessed the passive transfer of antibodies from the mother to the calf through

colostrum. These actions, taken all together, allowed us to verify that livestock operators at their farms can estimate the number of antibodies present in the colostrum and therefore decide how and how much colostrum to supply to guarantee the transfer of immunity from mother to descendent.

## Antibiotic resistance patterns

Throughout 2019, in order to learn the actual situation in our environment, we conducted cross-cutting studies on the prevalence of antibiotic-resistant bacteria at livestock operations in the Basque Country and characterised their resistance profiles. Moreover, we are conducting a pilot study on a reduced number of milk bovine livestock operations in order to promote implementation of handling and biosafety practises that help to reduce the rate of infectious diseases, and therefore the need to use antibiotics.

# LOCAL ADDED-VALUE PRODUCTION AND **ECOLOGICAL PRODUCTION**

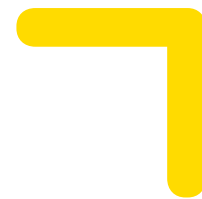
## **Guidelines to decrease pecking in hens**

Despite great efforts both in handling and in research, pecking (pecking or ripping out feathers) in laying hens continues to be a production and well-being problem. Controlling this by cutting a part of the beak is not acceptable from an ethical perspective, so alternative strategies to control this must be developed. In 2019, at NEIKER, we verified the effectiveness of alternative control systems, such as using specially-designed feeders and access to open-air parks to promote natural beak erosion, simulating what would happen in nature as the birds use their beaks on hard surfaces to hunt, handle and obtain food resources.

Studies and practical experience have proven that this is an objective that can be reached and that requires certain adjustments in feeder type and handling.



# CLIMATE CHANGE IN AGRO-ECOSYSTEMS: IMPACT, MITIGATION AND ADAPTATION



## Reducing ruminant methane emissions

Although ruminant contributions of methane to greenhouse gas emissions is less than 10% of the total, they must be reduced to fulfil the Paris Memorandum of Understanding, which shall soon enter into force. Within this framework, NEIKER is participating along with the National Institute for Agrarian and Food Research and Technology (INIA, in Spanish) and the Confederation of Spanish Friesian Associations (CONAFE, in Spanish) on a project to obtain a census on dairy bovine livestock methane emissions and relate this to each animals' genetic potential.

One of the steps to this end in 2019 was to measure individual methane emissions in a non-invasive way of 1,400 Holstein cows on 14 commercial farms in the Basque Country, Navarre, Gerona and Cantabria, which to date is the largest set of animals in the nation for which this information is available. The genetic study conducted reveals that methane production is inheritable and responsible for between 10% and 25% of differences between animals. This information will help to develop genetic selection strategies so that future generations of animals are more efficient in transforming food with lower methane emissions.

## Monitoring arthropods, possible disease spreaders

Diseases spread by ticks and mosquitos have become a worldwide public health issue. Trade and international travel, as well as moving animals can encourage the arrival of new pathogens. In addition to studying tick species in the Basque Country, since 2013, we have also been monitoring presence of the invading mosquito *Aedes albopictus* or the tiger mosquito, a spreader of important viruses. Its emergence in 2019 in new areas proves that it can be introduced and implemented where there is intense industrial and commercial activity, with plenty of road traffic and freight transport.

## Identifying best practises against climate change

Measures to mitigate and adapt to climate change are one of the keys to dealing with the risks arising from the extreme events that will occur place. Several European projects have worked on starting up and mitigating risks related to drought, flooding, fires, heatwaves, health issues, etc. The TRIPLE-C project is focused on analysing, assessing and capitalising successful EU projects to prevent and managed risks from climate change, in order to share and transfer best practises and results identified in drawing up policies. Over 500 European projects have been reviewed on this topic, and 240 were selected for a more in-depth analysis and to draw up a catalogue of these projects.





# CIRCULAR BIOECONOMY

## Micro algae-based biodiesel

In 2019, the Cyclalg project was concluded. Its objective was to develop a bio-refinement model based on micro-algae, converting agro-food waste into different products. Biodiesel was obtained by cultivating the *Chlorella* micro-algae. The project's new development revolves around using these micro-algae, which do not depend on light for growth, so they can be produced in any geographic location. *Chlorella* produces an oil that can be transformed into biodiesel that meets official standards at a cost of 3.3 euros per litre. Using these micro-algae may be an alternative for agrarian energy crops.





## FORESTRY SCIENCE

Once again in 2019, research on forestry had great importance in our activity, given that the sector still requires knowledge and solutions to tackle its challenges: diseases that are difficult to control or eradicate, the effects of climate change, etc.

Our activity falls under EUSKOBASOA 2050, the Basque Country's Plan for forestry improvement prepared by NEIKER. It consists of four lines of action: health, alternative species, wood quality and the reactivation of a genetic improvement plan (with another two cross-cutting lines: climate change and sustainability).

Along the line of health, in 2019, we continued our collaborations as consultants for the Forestry Health Group, comprised of BaskEgur, the Provincial Councils of Álava, Biscay and Gipuzkoa and HAZI. One of the most noteworthy lines of work in health took place within the European project LIFE HEALTHY FOREST, which allowed us to develop an innovative system for early detection and assessment of forest deterioration by combining different areas of specialisation, from molecular biology to remote-detection techniques. This system was implemented in the Basque Country on a large scale. The LIFE project Healthy Forest has been financed with LIFE funds.

In 2019, we also participated in the Innobandas project. Its aim is to verify the efficacy and sustainability of different innovative techniques on our mountains that are used in New Zealand, Chile and other techniques developed by the Basque Country's research centres to control needles. The initiative foresees 3 treatments throughout the project: in spring and autumn of 2019 and in spring of 2020. From NEIKER we have assumed the design experimental applications, data processing on its effectiveness and sustainability measurement efforts environmental of the tests.

In 2019, we also studied the Basque Country's soils' susceptibility to water erosion, given that healthy soil is growing increasingly scarce and is suffering important degradation processes. Sustainable forestry management can reduce erosion and help to preserve this non-renewable natural resource. From NEIKER we have assumed the design experimental applications, data processing on its effectiveness and sustainability measurement efforts environmental of the tests.



# PROJECTS TO TRANSFER TO THE INDUSTRY AND TO SOCIETY

# 4



# COLLABORATIONS WITH THE SECTOR

## Feasibility of rind fruit plants in Añana

The nut market is on an upward trend. Taking advantage of the fact that the Region of Añana (Álava) is one of the most ideal zones for production, in 2016 the first study was begun. It analysed the possibility of professionally introducing these crops. Beginning in 2018 and in order to provide a framework for sectorial interest, the Rural Development Association (ADR, in Spanish) of the Region of Añana launched the project "Training and entrepreneurship in the alternative primary sector in Añana." NEIKER participates in this project by studying the feasibility of three species: walnut, hazelnut and almond. In 2019, we strengthened operations of an experimental/display farm with walnut crops (4 varieties), hazelnuts (8 varieties) and almonds (3 varieties). In addition to ADR of Añana, NEIKER and UAGA as project promoters, the Administrative Board of Zambrana, as well as private companies linked to tree production and nut distributors (UTEGA Group, ECOLUMBER, Viveros Galbis, Viveros Vipesa and Agromillora) participate in the project.

## We launched the animal well-being seal WELFAIR™

The result of our collaboration with the Institute of Agro-Food Research and Technology (IRTA, in Spanish), in 2019, we conjointly introduced the Welfair™ seal. This certificate distinguishes food of animal origin that comes from farms subject to animal well-being monitoring based on Welfare Quality® or AWIN® protocols, and that were slaughtered at slaughterhouses that are also subject to this evaluation. This seal allows us to respond to consumers' interest in food of animal quality of greater quality, including ethical and sustainable-development aspects.

Moreover, in 2019, we trained over 30 people, including auditors (HAZI, AENOR, CERTICAR, KIWA, ACERTA) and technicians for companies, both in the ovine sector and in turkey production, so they can conducted audits based on AWIN protocols. The certifying entities we trained conducted 19 audits in the ovine sectors in different areas around Spain (Castilla-León, Castilla-La Mancha, Andalusia, Extremadura and Aragón).

## Improvements in applying plant-protection products

Traditionally, plant-protection product users and prescribers have faced difficulties in suitably adjusting the product dose. In order to obtain technical information to help make decisions when applying plant-protection products, in 2019, we analysed different doses and application methods for plant-protection products, adjusting them to the plot's plant state. Thus, in addition to great water savings, we managed to reduce the amount of product necessary by approximately 22% without significant harm to production.

To this end, the company ZERBINEK calculated the doses on four plots in Rioja Alavesa and another in the Bizkaiko Txakolina zone. NEIKER monitored and assessed consequences on disease. Also forming part of the project were the Association of Rioja Alavesa Wineries (ABRA, in Spanish), the Federation of Agro-Food Cooperatives of the Basque Country (AGA, in Spanish), the Agro-Livestock Union of Álava (UAGA, in Spanish), the Casa Primicia wineries (Laguardia) and Loli Casado (Lapuebla de Labarca) and wine growers from these associations (I. Franco and JL Ugarte). This cooperation project was funded with FEADER and Basque Government funds.

## Higher-quality meat through differentiated food

For some time, the restaurant and catering industry has shown interest in meat produced around the Basque Country, especially beef chop of higher quality and at a competitive price. In turn, the livestock sector needs to create value through a diversification and segmentation strategy. Within this context, in 2019, NEIKER collaborated with HAKAKAI, LEARTIKER and the Higher School of Catering of Bilbao (Escuela Superior de Hostelería de Bilbao) in producing differentiated local quality meat. NEIKER led the pilot feeding tests for the animals to obtain this kind of meat, selecting the breed, age and sex as most appropriate, prioritising the use of local raw materials. This cooperation project was funded with FEADER and Basque Government funds.

## Virtual fences to improve grazing

One of the results of decreased activity in extensive livestock operations is the emergence of scrub in grazing areas and increased firewood species, with the consequent risk of fire. For this reason, the Administration pours considerable amounts of money into mechanical de-brushing every year.

To facilitate extensive grazing and mitigate this situation, in 2019 we implemented an innovative virtual-fencing technology at two beef livestock operations in Álava's mountains in collaboration with ADR IZKI and the Asociación de Ganaderos de Montaña Alavesa (Association of Álava's Mountains' Livestock Operators). The tests show that the equipment work with precision under the Basque Country's mountain conditions and the animals quickly learn how they operate. This system provides for delimiting the plots of land from one's phone and monitoring the herd. This technology optimises livestock operation in grazeable areas and improves the quality of life of livestock operators. This cooperation project was funded with FEADER and Basque Government funds.

## Preservation and management of mountain pastures in protected areas

The Basque Country has large mountain pasture areas considered habitats of community interest in the Natura 2000 Network. Their preservation is planned, with planned actions related to suitable grazing. Since 2016 and until today, NEIKER has participated in a project (LIFEOREKAMENDIAN) to develop a decision-making system in preservation of mountain pastures located in Special Protection Zones (ZECs, in Spanish). Our role consists of assessing the environmental impact of the preservation actions proposed and executed. Of the most relevant results, of note are the plant monitoring protocols, effective treatments to control expansion of thistle and partial development of a viewer to interpret livestock behaviour. Participating in the project are HAZI (coordinator), the Provincial Councils of Álava, Biscay and Gipuzkoa, IHOBE, Euskal Herriko Laborantza Ganbara, CEN Aquitania and Euromontana. This project was funded with LIFE funds.







## Methodology to assess sustainability of local food products

We validated a methodology based on environmental, social and economic indicators to assess the sustainability of agro-food products and shine the spotlight on the use of local raw materials in designing menus in the collectivities sector. Specifically, we tested the environmental behaviour of the ingredients used in preparing a Spanish omelette dish with a lettuce and tomato garnish. Environmental indicators were validated in collaboration with AZTI, the company Auzolagun, leading the project, and indicators were validated on Avícola Arbaraitz' products (eggs), Bacalaos Giraldo (potato and onion preparation), Barrenetxe (tomato) and Garaia y Artandi (lettuce). This cooperation project was funded with FEADER and Basque Government funds.

## Material reuse of hen droppings generated at farms

Management of waste generated at agro-livestock operations is a true challenge. In 2019, in collaboration with COMPO GS, Larrabe Oilotegia and GARLAN, we attempted to provide a solution for excess hen droppings (hen excrement or manure). To this end, we tested a new fast-composting technology along with the bird farm Larrabe (Fika, Biscay), based on a composting unit supplied by the company Compo GS. The speed of the process, the need for maturity and the characteristics and attributes of the end compost were studied, along with the effect on farm soil in Álava (potato) belonging to GARLAN. The results show a great reduction in composting process times, which is highly interesting to reduce the space necessary to treat this kind of organic waste. Moreover, we observed a drastic decrease in smells emitted, and greater nitrogen conservation in comparison with conventional composting techniques. This cooperation project was funded with FEADER and Basque Government funds.

## Biodegradable slabs against weeds

The transition toward bioeconomy fully affects agrarian operations. In 2019, we worked with SmurfitKappa to seek out alternatives of forest origin to replace petroleum-based pads used to prevent weed growth and others. The objective was to obtain a biodegradable covering slab that helped to enrich and improve the quality of the land for future crops, effective as a thermal barrier and against weeds, with no risk of breakage. Our results show effective anti-weed activity, both inside and outside, and complete degradation. In the future, including fertilising material and other elements in these meshes will provide for creation of a new range of products.





## REGISTERS AND NEW VARIETIES

### New corn varieties

During recent years, we have conducted a programme to select local varieties of corn with good aptitude for production of fodder meal and talo. As a result of this work, we registered the MARURI, DONOSTIA, OSORO and DELIKA varieties in the Commercial Varieties Register. These varieties, called Conservation varieties since they are native corn populations derived from a selection, began multiplying in 2019. NEIKER has a seed of all of them, so it can distribute them to the sector.

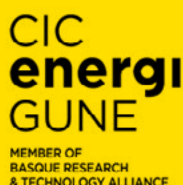
### New BELTZA potato

In recent years, we have worked on a potato selection programme to obtain varieties with high levels of bioactive compounds and antioxidants, adapted to our cultivation conditions. As a result of this work, in 2019 we sent to the Community Plant Variety Office (CPVO) the new purple variety, called BELTZA. It has high antioxidant content (which provides health benefits), and also has high quality for the restaurant industry (because of the colour of its pulp) and high IV range performance (vacuum sealed) and V food range (ready to eat).



# ALLIANCES

Our work is possible thanks to the collaboration of entities that contribute their knowledge in order to promote and share projects.





# MOST RELEVANT CONGRESSES, COURSES AND EVENTS

## **‘VII Jornadas Nacionales de innovación y Transferencia de Cultivos Extensivos (7th National Innovation and Transfer for Extensive Crop Events) (GENVCE 2019)’**

**Vitoria-Gasteiz and Gauna (Álava)**

Over 3,300 professionals from the agricultural sector from all autonomous communities participated the 28 and 29 May 2019 in the VII Jornadas Nacionales de Innovación y Transferencia de Cultivos Extensivos, GENVCE 2019, organised by NEIKER in Vitoria and Gauna with the Group for Evaluation of New Grain Varieties (GENVCE, in Spanish) and the Ministry of Agriculture, Fish and Food. Latest news and technologies applied to extensive winter cultivations and agronomic tests with the latest news in plant-protection products were presented. novedades y tecnologías aplicadas a los cultivos extensivos de invierno y ensayos agronómicos con las últimas novedades en fitosanitarios.



## **“Challenges in growing plant fabrics in the bioeconomy age” 13th Meeting of the Spanish Society of In-Vitro Cultivation of Plant Fabrics (SECIVTV, in Spanish)**

**Vitoria-Gasteiz**

In September 2019, the Villaso Palace of Vitoria-Gasteiz housed the 13th Meeting of the Spanish Society of In-Vitro Cultivation of Plant Fabrics (SECIVTV, in Spanish), a biennial co-organised by NEIKER and the SECIVTV. Over one hundred researchers from Spain, Portugal, Costa Rica, Colombia, Chile, France, the Netherlands and Peru debated the most current issues regarding in vitro cultivation of plant species, where NEIKER is a world leader, and their role in bioeconomy within the current context of climate change.



In line with our mission to transfer our knowledge and the results of our research to the sector, throughout 2019, we organised different kinds of transfer events, with a total of 4,030 people attending.

## **“The agrarian sector facing the challenge of climate change”**

**Arkaute (Álava)**

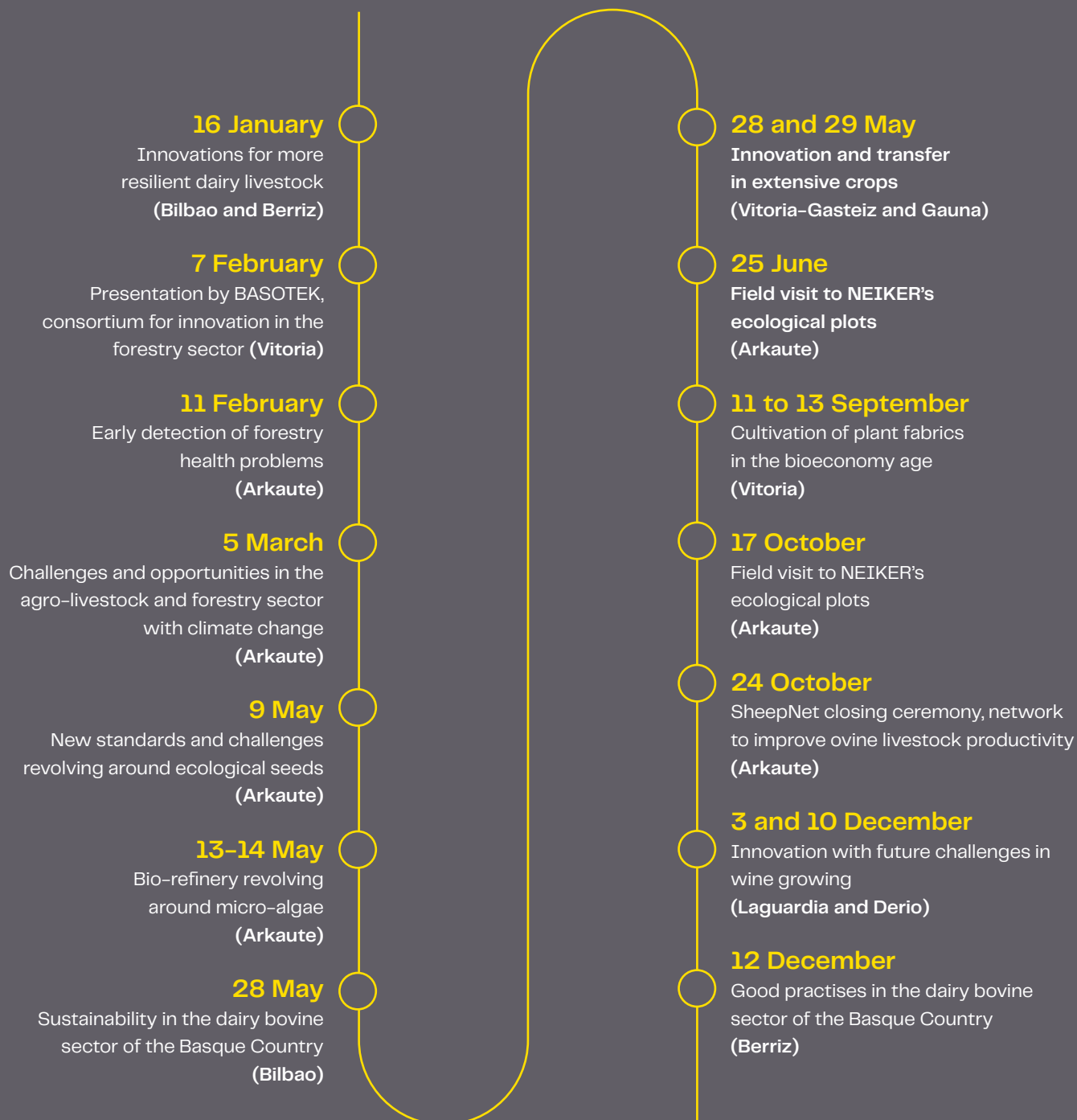
Which challenges is the agro-forestry sector facing with the climate emergency? Which new practises and methods must we adopt to mitigate its effects? These and other questions were responded during the informational event organised by NEIKER under ASTEKLIMA, the first week in the Basque Country on this phenomenon, led by IHOBE.





## OUR TRANSFER EVENTS

# 2019



TOTAL OF  
**4.030**  
ATTENDEES

# WE HAVE BEEN...

**16 DEC.  
2019**

In Brussels, presenting the end results of the **#SheepNet** project at the European Commission's consulting committee, whose members include, but are not limited to, COPA-CO-GECA, Euromontana, DG-Agri and European representatives from the **#ovine** sector

**27 NOV.  
2019**

During the second International Research Event at **#XylellaFastidiosa**, in Corsica, an event organised by the European **#FoodSafety** Authority to join efforts to control and reduce the severity of this disease

**26 NOV.  
2019**

At the **#REDBIO** meeting (Uruguay), helping to define this network's main objectives and the actions necessary to drive **#bioeconomy** in Latin America and the Caribbean

**25 OCT.  
2019**

In Portugal, speaking at the second International Congress on New Strategies in **#Bioremediation** Processes, **#Bioremid2019**

**23 JUL.  
2019**

At **#ISAG2019**, 37th Conference of the International **#AnimalGenetics** Society held in Lleida, exchanging knowledge with over 700 researchers from around the world

**3 JUN.  
2019**

In **#Bordeaux**, the annual assembly of the European Forest Institute (EFI), sharing our experience in preventing **#soil** **#erosion**

**3 JUN.  
2019**

At the 24th International Congress of the National Association of Specialists in Bovine Medicine, in Seville, with three speeches on tuberculosis and bovine paratuberculosis, rational use of **#antibiotics** in **#livestock** and decreased methane emissions in dairy **#cows**

# FEATURED NEWS

## We created a Joint Research Lab to research dissemination of antibiotic resistances in the environment

Along with the University of the Basque Country-UPV-EHU and the Basque Centre for Climate Change (BC3), we signed an agreement to add the research conducted in the Basque Country in this field, in order to guarantee efficiency and maximum impact for results.

## We attained one thousand scientific publications in prestigious magazines

Our work for over 30 years in research has borne fruit, and in 2019, we reached one thousand scientific publications in prestigious magazines according to Scopus, the database on bibliographical references and quotes by the company Elsevier.

## We participated in the first Gastronomic Sciences doctorate of the world

Along with the Basque Culinary Centre and the technological centre AZTI, we started up the Gastronomic Sciences Doctorate Programme, under the Basque Government's Strategic Gastronomy and Food Plan (PEGA, in Spanish).

## We joined the LIFE Urban Klima 2050 project

We are one of the 20 entities in the Basque Country who will form part of the LIFE URBAN KLIMA 2050 project, led by Ihobe, a Basque Government public company. Urban Klima 2050 will transform the Basque region with 40 projects and actions to adapt to climate change.

## New members of EITFood, consortium to develop the food sector in Europe

In 2019, we joined the EITFood initiative. One of this association's projects is EITFan, a driver to boost start-ups. NEIKER's director general, Leire Barañaño, has been a member of the jury on several occasions. In 2019, start-ups with agri-food projects visited our Arkaute facilities (Álava) to study conjoint collaborations.

## We are part of the Basque Alliance for Bioeconomy

In 2019, the Basque Government's Department for Economic Development and Infrastructure promoted establishment of the Basque Alliance for Bioeconomy, which will promote this economic model that is increasingly widespread in Europe, with clear potential in the Basque Country's economic diversification.



2019 Bioeconomy's external Basque alliance  
2019 Alianza Vasca por la Bioeconomía

EUSKALDUN





# AWARDS AND OTHER RECOGNITIONS

## Recognition for Eva Ugarte's career from the European Federation of Animal Science

Our Innovation and Technology, manager, Eva Ugarte won the Distinguished Service Award from the European Federation of Animal Science (EAAP) in recognition of her extraordinary work for livestock and her contributions to the federation itself.



Eva Ugarte



## Double recognition for Inma Estévez

Specialised in animal well-being, NEIKER's researcher Inma Estevez joined the Scientific Consulting Committee of the Basque Government in 2019, the consulting body that guides the Basque Country's scientific-technological policy. Moreover, the World Organisation for Animal Health (OIE) selected Estevez as one of the six international experts to draw up new regulations on animal well-being for laying hen operations.



Inma Estévez



## Jesse Barandika, new president of the Spanish Society of Sheep and Goat Technology (SEOC, in Spanish)

A member of SEOC's board since 2011, NEIKER's researcher Jesse Barandika will be providing knowledge regarding sheep health. Specifically, on surveillance, diagnosis and control over diseases that affect the small ruminants.




Jesse Barandika



# PEOPLE AND THE ORGANISATION

# 5



We strive to increase the satisfaction and well-being of the people who form **NEIKER**, and to continue improving their education and working conditions. We do all this without losing sight of our advanced management model, which grows stronger every year.



# PEOPLE

We have the duty to contribute to the satisfaction and well-being of people who form part of NEIKER. To this end, we are firmly invested in boosting their professional development, providing a healthy working environment and guaranteeing an equal-opportunity workplace.

## Professional development

In 2019, practically everyone working at NEIKER carried out some sort of training to improve their skills and abilities, which is proof of our commitment to our team's professional progress. Last year, we spent around 5,100 hours on training, 26% more than in 2018. The most noteworthy programmes were focused on going further in depth in the technological knowledge that the agro-livestock and forestry sector needs, such as the use of bio IT tools, genome innovations in agro-fish research, statistics and legislative regulations that sooner or later will entirely affect the sector.

## Commitment to Equality

In 2019, we focused on completing our second Plan for Equal Opportunity between Women and Men, in line with our commitment to equality and to improve our management as a public company. To this end, we conducted an exhaustive internal diagnosis, wherein every individual who forms a part of NEIKER could participate through surveys and workshops. Later, we designed the Equality Plan, which will be in force from 2020 until 2022, emphasising awareness and education. Moreover, we continue to participate in the Net-

work of Public Entities for the Equality of Women and Men promoted by EMAKUNDE, which until its dissolution organised activities and events aimed at introducing and consolidating the gender perspective in the organisation.

In 2019, we participated in different actions, such as the 15th Forum for Equality, with the event "Entrepreneurship of Women in the Primary Sector" held in November in Hernani (Gipuzkoa) to raise visibility for the role of women in the primary sector. We also supported noteworthy events such as the International Day of Women and Girls in Science (11 February) or the International Day for the Elimination of Violence against Women (25 November).

## Health and safety

We encourage a healthy and safe atmosphere, working to comply with safe work regulations and procedures and ongoing education for our staff.

In prevention, through our Health and Safety Committees and assessed by the External Prevention Service, we take care of three of the different prevention specialities: workplace safety, industrial hygiene and ergonomics and applied psychosociology. In 2019, we carried out actions to prevent occupational hazards for staff, highlighting review-

ing and updating the prevention plan and general risk assessments; safety improvements at facilities as a result of periodical inspections and education to encourage preventive culture. As far as health surveillance is concerned, in addition to customary medical check-ups, of note are our allergy tests and special tests carried out on NEIKER's team to ensure their health and safety.

## Promoting Basque

Continuing with the work begun in 2018, in 2019, the Basque committee conducted different activities with the participation and support of Management. We have carried out the internal survey to complete the Situation Diagnosis at NEIKER to draw up the 2020 Action Plan and to also keep working toward obtaining the BIKAIN certificate.

# MANAGEMENT MODEL

In 2019, we worked to re-inforce some of the actions begun years prior regarding the establishment of responsible and engaged government, and consolidation of an advanced management model.

## Strengthening a Responsible Government

After launching NEIKER's Code of Conduct in 2018 and starting up our Compliance Committee, in 2019, we strengthened said committee's operations. It continues its activity as a work group and periodically meets to analyse consultations regarding applicable regulations. Moreover, during the first quarter of 2019, the second Code of Conduct was internally shared with all NEIKER staff.

Regarding advanced management, in 2019, we obtained the UNE 166002:2014 R+D+i Management Certificate, accrediting our ability to effectively carry out research, development and innovation activities in agro-food (agricultural, livestock and forest sectors) and in the natural environment. This recognition is the result of NEIKER's belief in a job well-down and in satisfying its clients, two essential elements with the new challenges posed by the markets of today, with increasing levels of demand and competitiveness.



# WITH OUR COMMUNITY

# 6







In line with what we are, we encourage transferring knowledge and scientific dissemination within society, without forgetting initiatives that improve the living conditions of everyone, inside our borders and beyond them.

## Support for science in Basque

In 2016, we took on the commitment to encourage Basque along with the Elhuyar Foundation in primary sector research and in NEIKER's own activity. As part of this collaboration, since then we have participated in Zientzia Azoka, an initiative to promote the culture of science by presenting scientific projects designed by young people at the Zientzia Azoka Fair, with scientific workshops and prizes for the best projects. We are members of the jury that selects the winning projects, and we welcome two-day stays from participating schools whose students visit our facilities to learn about research work at a technological centre first-hand.

Moreover, in 2019, for the third time, we awarded the Special NEIKER Prize to the best work on the primary sector, in the framework of the CAF-Elhuyar Prizes, which recognise the quality of different research works in Basque. This time, the special NEIKER prize, for 2,000 euros, went to Izaro Zubiria Ibarguren, with the work entitled "Esnea ekoizteko, bertako ala kanpoko proteina erabili?".

## Food Bank

Since 2015, we have collaborated with the Federación de Euskadi de Banco de Alimentos (Basque Food Bank Federation) (FESBAL), an entity to whom we deliver surplus from our experimental farms' harvests every year. In 2019, we donated 20,000 kilos of potatoes to the Alava Food Bank, from research conducted at our Alimentos farm (Álava). Specifically, Kennebec, Jaerla, Baraka, Miren and Red Ponticac varieties of potatoes were donated, which were collected after completing the trial that occupied approximately one hectare's surface area at our facilities in Arkaute (Álava). In total, since the beginning of the convention in 2015, we have donated nearly 90,000 kilos of potatoes, which the Food Bank of Alava distributes to 4,500 beneficiaries spread throughout 1,200 families.







## Saluganda, sustainable schools in Uganda

Since its birth, we have supported the work of NGO Saluganda, which promotes sustainable schools in Uganda and provides coverage to six educational centres with 2,507 students. The initiative, which is now eight years old, continues improving the hygienic conditions, food and environmental education of the regions of Buikwe and Mukono. NEIKER collaborates in installing Ecosan dry latrines, water collection tanks, pig farms, chicken farms and ecological gardens, thus completing a sustainable production cycle adapted to each school's resources. This project has aid from different entities such as Ner Group, Lancor S. Coop, Ekin S. Coop, Steilas and World Rural Forum.

## Encouraging dissemination to society

We believe that, in addition to researching and transferring our knowledge to the agro-livestock and forest sector, we have a duty to disseminate to society. For this reason, we enjoy participating in initiatives that foment bringing science to society.

In 2019, we were at TEDx-Vitoria, explaining the concerning problem of increased resistance in bacteria, and at the Pint Of Science talks, speaking about the possibilities of having beer made with local hop. We also gave talks on food and sustainability at schools in Álava, under Agenda 21, and we formed a part of the First Lego League initiative.

## Awakening scientific calling in young girls

Inspira STEAM is a project driven by the University of Deusto to encourage a scientific-technological calling for young girls, since the number of students who choose technology education is shrinking every year, especially amongst women. At the heart of the project are women mentors, which include researchers from NEIKER. They volunteer to bring their day-to-day to girls and boys through work sessions during school hours.



# NEIKER

MEMBER OF  
BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE



**EUSKO JAURLARITZA**  
**GOBIERNO VASCO**

EKONOMIAREN GARAPEN  
ETA AZPIEGITURA SAILA

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