



# European Research Area on Sustainable Animal Production Systems SusAn

## Projects selected for funding



This ERA-NET receives funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n° 696231.



## Overview

14 projects selected with 102 research teams from 20 European countries with a total of 15.905.000 € funding requested.

Country	Funder	call contribution	#applicants	#projects	requested funding
Austria	BMLFUW	200.000 €	3	3	592.000 €
Belgium	Hermesfonds	1.000.000 €	1	1	249.000 €
Belgium	SPW	300.000 €	2	1	200.000 €
Denmark	DAFA	1.000.000 €	5	5	1.143.000 €
Estonia	MEM	100.000 €	no projects selected		
Finland	MMM	200.000 €	1	1	200.000 €
France	ANR	2.000.000 €	14	7	1.349.000 €
Germany	BMEL	2.000.000 €	14	10	2.813.000 €
Ireland	DAFM	736.000 €	4	2	406.000 €
Ireland	Teagasc	264.000 €			176.000 €
Italy	MIPAAF	150.000 €	6	6	678.000 €
Italy	MoH	500.000 €	2	1	257.000 €
Latvia	VIAA	200.000 €	1	1	198.000 €
Lithuania	MoA ZUM	100.000 €	1	1	100.000 €
Netherlands	NWO	750.000 €	6	6	1.494.000 €
Norway	RCN	1.050.000 €	5	5	1.090.000 €
Poland	NCBR	500.000 €	4	4	763.000 €
Portugal	FCT	400.000 €	2	2	255.000 €
Slovakia	MPRV-SR	100.000 €	1	1	20.000 €
Slovakia	SAS	120.000 €	no projects selected		
Slovenia	MKGP	150.000 €	5	4	294.000 €
Spain	CDTI	500.000 €	no projects selected		
Spain	ELIKA	100.000 €	no projects selected		
Spain	INIA	300.000 €	7	4	586.000 €
Sweden	Formas	1.500.000 €	7	6	1.793.000 €
Turkey	MFAL-GDAR	200.000 €	no projects selected		
Turkey	TUBITAK	1.500.000 €	2	2	177.000 €
United Kingdom	DEFRA	680.000 €	9	8	1.072.000 €
<b>total:</b>		<b>16.600.000 €</b>	<b>102</b>	<b>14</b>	<b>15.905.000 €</b>

## 19SuSI

### Sustainability in pork production with immunocastration

**Total funding requested:** 1.293.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Germany - University of Hohenheim; UHOH**

Prof Volker Stefanski (volker.stefanski@uni-hohenheim.de)

##### Project Partners:

Belgium - Institute for Agricultural and Fisheries Research; ILVO

Denmark - SEGES Pig Research Centre; SEGES

France - French National Institute for Agricultural Research; INRA

Netherlands - Wageningen University; WU

Poland - Warsaw University of Life Sciences; WULS

Slovenia - Kmetijski institut SLOvenije = Agricultural Institute of Slovenia; KIS

Slovenia - University of Ljubljana-Veterinary Faculty; UL-VF

#### Keywords

*Pig production; Immunocastration; Entire male; Precision feeding; Animal welfare and health; Meat quality; Consumer acceptance; Pork supply chain; Nutrient excretion; Economic competitiveness*

#### Project summary:

European pig production faces a big challenge in the near future as stakeholders voluntarily agreed to end surgical castration without anesthesia and pain relief after 2018. Despite public disapproval in a number of EU countries, the majority of male piglets in the EU are still surgically castrated (SC). Two alternatives to SC currently exist. Raising entire males (EM) has been the preferred choice, but meat quality and welfare problems (i.e. boar taint, injuries) remain unsolved. Immunocastration (IC) may be an alternative, but its wider application in the EU is hampered by technological issues and social acceptability. Thus, the aim of our project is to critically evaluate and optimize pork production with IC as an environmental, economic and socially sustainable alternative to systems with SC or EM. This goal will be addressed by a multidisciplinary consortium of 8 partners with wide expertise covering the overall pork supply chain. The project will analyse the consequences of IC for production and production systems with respect to regional circumstances and societal atmosphere. Key issues regarding farm management and related consequences for animals and product quality are covered together with consumer perspectives in four work packages (WP). Three additional WP will integrate the results with respect to societal acceptance and environmental, economic and social sustainability. A further WP involves dissemination of the results and bidirectional exchange of information and experience with stakeholders along the value chain. The project will provide support for pork industry and farmers, but also for the decision-making and improving processes of governmental authorities towards an animal-friendly and consumer-accepted pork production across the EU. Our transnational collaboration avoids redundancies in research, allows rapid knowledge transfer and the development of knowledge-based communication strategies as a prerequisite for the acceptance of IC in Europe.

## 29 ReDiverse

### Biodiversity within and between European Red dairy breeds - conservation through utilization

**Total funding requested:** 1.720.000 €

**Number of partners:** 13

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Germany - Kiel University (CAU)**

Prof Georg Thaller (dhinrichs@tierzucht.uni-kiel.de)

##### Project Partners:

Denmark - Aarhus University (AU)

Germany - Rinderzucht Schleswig-Holstein eG (RSH)

Germany - University Hohenheim (UH)

Latvia - Animal Breeders Association of Latvia (ABAL)

Lithuania - Lithuanian University of Health Sciences (LUHS)

Lithuania - The Lithuanian Red Cattle Improvement Association (LRCIA)

Netherlands - CRV BV

Netherlands - Wageningen UR Livestock Research (DLO)

Norway - Norwegian University of Life Sciences (NMBU)

Poland - Wroclaw University of Environmental and Life Sciences (WUELS)

Sweden - VikingGenetics (VG)

Sweden - Swedish University of Agricultural Sciences (SLU)

#### Keywords

*Sustainable breeding schemes, Discrete Choice Experiments, DNA chip design, Genomic Prediction, Genomic Selection, Conservation strategies, milk protein variants.*

#### Project summary:

*Red dairy breeds across Europe represent a unique source of genetic diversity and are partly organized in trans-national breeding programs but are also well adapted to local conditions providing regional identity of products for consumers. The objective of REDIVERSE is to develop and to set in place collaborative and integrated novel breeding and management concepts to achieve a resilient and competitive use of these resources. A further goal is to strengthen best practices for small farmholders for improving product quality and to supply ecosystem services according to their specific circumstances. The challenge of establishing appropriate breeding and maintenance strategies for diverse farm systems and regional markets is met by multi-actor operations also considering economic, structural and social diversity in participating countries to offer tailored solutions. The holistic approach relies on integrative research of scientists in the fields of animal genetics, proteomics, economy and social sciences. Cutting edge technology such as large scale genomic and proteomic tools will be implemented to enhance genetic progress and to characterize specific properties. Innovative survey approaches will assess the impact of the sector on social acceptance and the needs of farmers. The project will generate novel knowledge and concepts that will be timely disseminated to lead-users such as the breeding and dairy industry, food sector, farmer cooperatives and farmers. A consistent monitoring of the consequences on the different levels when applying new tools or concepts is the key to balance the additional benefit to the sector on the various actors. The trade-off between economic, environmental and social interests will ensure sustainable dairy production, improve animal welfare and help to develop rural landscape.*

## 30SusCatt

### Increasing productivity, resource efficiency and product quality to increase the economic competitiveness of forage and grazing based cattle production systems

**Total funding requested:** 1.190.000 €

**Number of partners:** 7

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Norway - The Norwegian Institute of Bioeconomy Research (NIBIO)**

Prof Håvard Steinshamn (havard.steinshamn@nibio.no)

##### Project Partners:

Germany - Institute of Crop Science and Plant Breeding, Kiel University (CAU)

Italy - University of Padova (UP)

Poland - Instytut Genetyki i Hodowli Zwierząt PAN Jastrzebiec (IGAB)

Sweden - Swedish University of Agricultural sciences (SLU)

Sweden - SP Technical Research Institute of Sweden (SP)

United Kingdom - Newcastle University (NU)

#### Keywords

##### Project summary:

*The productivity of milk and meat production from European cattle has increased considerably in recent decades. However, the sustainability of this intensification is questioned due to environmental and animal welfare trade-offs and growing reliance on edible food and imported soy as feed. The proposed project aims to evaluate the productivity, resource-use efficiency and consumers' acceptability of a transition to high forage and pasture diets for European cattle. The project will focus on dairy, integrated dairy/beef and specialized beef production systems, addressing the call's three research areas: Productivity (including milk yield and growth rate), product quality (including nutritional and sensory quality) animal health and welfare (including production diseases), and economic performance. Resource use efficiency (including use of non-edible food as feed, nitrogen and phosphorous use efficiency and enteric methane emission) and environmental impacts, both assessed experimentally, by modelling and life cycle analysis. Consumers' appreciation. The main hypotheses are that transition to high forage and non-food diets will enhance product quality, animal health and welfare, resource-use efficiency and consumer acceptability, by matching appropriate diets, breeds and production systems and by rearing all dairybred calves. The project involves modelling, experimental and participatory R&D activities and covers contribution from SMEs (farmers, advisory service) and pools expertise from seven academic centres of excellence in six European countries. The work will be organised in 4 work packages; two focusing on beef and milk production, feeding into one on overall assessment of economic, resource-use efficiency and societal acceptance and the fourth is dedicated to disseminating our findings.*

## 34SusPigSys

### Sustainable pig production systems

**Total funding requested:** 1.411.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Germany - Friedrich-Loeffler-Institut (FLI)**

Dr Sabine Dippel (sabine.dippel@fli.bund.de)

##### Project Partners:

Austria - University of Natural Resources and Life Sciences (BOKU)

Finland - University of Helsinki (HU)

Germany - FiBL Deutschland e.V. (FiBL)

Italy - Fondazione CRPA Studi e Ricerche (FCSR)

Netherlands - Wageningen University & Research (WUR)

Poland - Warsaw University of Life Sciences (SGGW)

United Kingdom - Newcastle University (NU)

##### Keywords

*pigs; production systems; farmer decision support tool; integrative sustainability analysis; knowledge exchange; on-farm*

##### Project summary:

*Despite pig farmers' needs for recommendations on how to optimise the balance between apparently conflicting pillars of sustainability (economy, environment, society), there is very little on-farm data to support informed holistic decisions. SusPigSys therefore aims at collecting, summarising and disseminating evidence-based information on successful strategies for improving sustainability in various pig production systems across the EU. Project outcomes include an integrative on-farm assessment and feedback tool to help pig farmers to improve their economic, environmental, and societal sustainability (e.g. animal health and welfare), as well as their job satisfaction. Farmers in all partner countries will be actively involved throughout the project to ensure that outcomes meet farmers' needs. After researchers and stakeholders have identified points to be addressed, a detailed sustainability assessment protocol will be developed based on existing protocols and including the guidelines provided by the Food and Agriculture Organization of the United Nations. The protocol will be applied on a total of 70 farms in 7 European countries (AT, DE, FI, IT, PL, NL, UK) to generate a database from which a valid, condensed protocol can be developed using multivariate statistics. The condensed protocol will then be applied on 175 farms with various production systems in 7 countries. Data from farm visits will be used for developing an integrative analysis toolbox for summarising farm data, and the protocol and toolbox will be linked with an existing international pig production database to allow enhanced benchmarking. The integrative analysis toolbox will include information on possible trade-offs between the three pillars of sustainability and be integrated in a software to form a farmer decision support tool with farm-individual feedback. In addition, descriptions of best practices will be published in various formats to help farmers learn from each other across borders.*

## 35SusPig

### Sustainability of pig production through improved feed efficiency

**Total funding requested:** 956.000 €

**Number of partners:** 9

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Spain - Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)**

Dr Wendy Rauw (rauw.wendy@inia.es)

##### Project Partners:

Australia - University of New England (UNE)

France - Institut du Porc (IFIP)

France - Institut national de la recherche agronomique (INRA)

Norway - Norges miljø- og biovitenskapelige universitet (NMBU)

Spain - Instituto Tecnológico Agrario (ITACYL)

Sweden - Swedish University of Agricultural Sciences (SLU)

United Kingdom - Newcastle University (UNEW)

USA - Iowa State University (ISU)

#### Keywords

*Sustainable pig production; Feed efficiency; Genetic improvement; Robustness; Biomarkers; Animal welfare; Local feed; Feedstuff co-products; Life Cycle Assessment; Farm System modelling;*

#### Project summary:

*Sustainable pig production is characterized by economic profitability through improved productive output, while maintaining animal health and welfare, and without compromising environmental resources. This study aims to enhance sustainability of European pig production through improved feed efficiency (FE) at different scales. The supporting objectives are to 1) Evaluate the consequence of improved FE for fitness, to improve animal robustness; 2) Evaluate if improved FE can be sustained with more reliance on local feed resources and feedstuff co-products; 3) Evaluate the environmental, social and economic impact of improved FE on local feed resources and feedstuff co-products; and 4) To develop future sustainable pig production systems. We approach this by: 1) Evaluation of robustness traits in experimental and commercial pigs; 2) Evaluation of FE and robustness in response to feedstuff co-products and local pig diets; 3) Assessment of the environmental and social impact of pig production as enhanced by transforming low quality feed, through Life Cycle Assessment (LCA) analysis; and 4) Modelling of future sustainable production systems. This project combines the expertise of European research groups in cooperation with those from the USA and Australia through a multidisciplinary approach. The work is relevant to Research Area 1: FE affects profitability of animal production through reduced feed costs, but economic benefits are also directly influenced by animal robustness. Efficient use of local resources may improve the productivity, resilience and competitiveness of European pig production; Research Area 2: Improving FE of pigs in transforming low quality feed may improve local resource use and enhance the environmental sustainability of European pig production; Research Area 3: Understanding the implications of improving FE on animal robustness may improve animal welfare, breeding strategies and consumer acceptance of pig production and breeding practices.*



## 48EcoLamb

### Holistic Production to Reduce the Ecological Footprint of Meat

**Total funding requested:** 1.041.000 €

**Number of partners:** 8

**Project duration (months):** 30

#### Research Consortium:

##### Project Coordinator:

**Turkey - Red Rock Agricultural Pastoral Research and Development (RRAPRD)**

Dr Sinan Ogun (sinansotheremail@gmail.com)

##### Project Partners:

Germany - University of Stuttgart

Italy - Turin University

Portugal - Mountain Research Centre

Slovenia - Univerza V Novi Gorici

Spain - Meat Technology Centre of Galicia

Spain - Servicio Regional de Investigación y Desarrollo Agroalimentario (SERIDA)

Spain - Instituto Tecnológico Agrario de Castilla y León

##### Keywords

*Productivity, Resilient Rural Communities, LCA, LCC, Low Ecologic Footprint Sheep Production, Healthy Meat, Animal Welfare, grazing, intensive vs. extensive production, farmer capacity building.*

##### Project summary:

*The project will assess the sustainability of diverse European sheep production systems focusing on the ecological footprint, animal welfare aspects and nutrition value of lamb meat. The outcomes of these assessments will be used to understand the potential future barriers that limit the innovative capacity and development of the sector and the opportunities that may provide a future market niche against competitive products from other global markets. The project will engage trans-national research and industry stakeholders from 6 countries made up of Germany, Italy, Portugal, Slovenia, Spain and Turkey to analyse on numerous case study farms; resource-efficient, competitive and low-carbon lamb production models. Termed "EcoLamb", the ecologically sound and nutritionally superior lamb meat identified by the consortium will be branded and marketed through out Europe as state-of-the-art meat production technology. Direct linkage between animal welfare, meat quality and pharmaceutical use will also be determined using innovative Precision Farming techniques. Farm solutions that incorporate consumer expectations for animal welfare and meat quality will enhance the competitiveness of Europe's lamb meat sector. The project will produce a tool box of recommendations for productive sheep farm management, supply chain and marketing on how to improve the acceptability of lamb meat by consumers. The multidisciplinary approach and the multi-actor involvement of the EU sheep sector will assist in re-designing critical aspects to increase society acceptance and the place of lamb meat in future diets. The outcomes of the project will be used by stakeholders to promote changes in farm management, marketing and processing of meat from sheep. Additionally, results will be used by farm consultants, farmer groups and policy officers to re-design consulting approaches and plan new initiatives to make all aspects of the European sheep industry more sustainable.*

## 53SusSheP

### Sustainable Sheep Production

**Total funding requested:** 878.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Ireland - University of Limerick**

Dr Sean Fair (sean.fair@ul.ie)

##### Project Partners:

France - Institut National de Recherche Agronomique

Ireland - Teagasc

Ireland - Sheep Ireland

Norway - The Norwegian Association of Sheep and Goat Breeders

Norway - Norwegian University of Life Science

United Kingdom - Scotland's Rural College (SRUC)

United Kingdom - Maternal Sheep Group

#### Keywords

*ewe fertility, artificial insemination, genetic improvement, carbon footprint, sheep production*

#### Project summary:

*The overall aim of SusSheP is to increase the sustainability and profitability of European Sheep Production by addressing key industry focused problems. Sheep are unproductive (but carbon productive) until they produce their first lamb crop, normally at 2 years of age and, on average, ewes only produce 4 crops of lambs in their lifetime. Despite its importance both from an economic and environmental perspective ewe longevity is not included in sheep breeding indexes across Europe. SusSheP will establish the genetic factors controlling ewe longevity, under different Sheep Production Systems (SPSs) and assess if early life predictors (eg reared as single, twin etc) can be used to predict longevity. Parallel to this, SusSheP will identify the most carbon and labour efficient SPSs under different management systems (eg prolific vs non-prolific sheep breeds) in order to enable the development of strategies to reduce the labour input and carbon hoof print per kg of output. The breeding of more efficient sheep has been hampered internationally by the lack of sheep artificial insemination, as the only effective method for use with frozen-thawed semen is a laparoscopic procedure, whereby, semen is injected directly into the uterus but this requires veterinary expertise, is welfare unfriendly and socially unacceptable. The only exception to this is in Norway, in which vaginal deposition of frozen-thawed semen yields good pregnancy rates. Research in Ireland has demonstrated this is due to the breed of the ewe used in Norway, whereby sperm can transverse the cervix in greater numbers than in other breeds, leading to higher pregnancy rates. SusSheP will interrogate the differences across breeds in cervical physiology and its secretions (genes, proteins and glycans) with a view of developing a more socially acceptable AI method. Finally, through the participation of strategically chosen SME's, SusSheP will maximise knowledge transfer to industry, farmers and the scientific communities.*

## 79PigSys

### Improving pig system performance through a whole system approach

**Total funding requested:** 1.327.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Germany - University of Kassel (UniKassel)**

Prof Oliver Hensel (agrartechnik@uni-kassel.de)

##### Project Partners:

Denmark - SEGES

France - INRA

France - IFIP-Institut du Porc

Germany - Thuringian State Institute for Agriculture (TLL)

Latvia - Latvia University of Agriculture (LLU)

Sweden - Swedish University of Agricultural Sciences (SLU)

United Kingdom - Newcastle University (UNEW)

#### Keywords

*integrated pig production systems whole system model decision support system image based climate control and early warning systems environmental performance animal performance and welfare*

#### Project summary:

*Current EU pig production has suboptimal resource utilisation, resulting in unnecessarily high emissions and wastes. This has much to do with outdated building standards, control systems and barn management approaches. At the same time animal welfare is of increasing concern, farmers are struggling to maintain economic competitiveness and the public image of the sector is poor. Whilst there are many approaches for the improvement of individual aspects of the system, none provide effective whole system consideration. PigSys will address these issues by the adoption of a multi-disciplinary, system level approach to pig production systems. A system model of mass and energy flows and Decision Support System, as well as novel building climate control systems, will be developed to underpin a sustainable improvement in system performance. By taking a cross-scale, multi-disciplinary approach, the project will ensure that all aspects relevant for the development of sustainable, socially acceptable and economically viable pig production systems are adequately addressed. The geographical and climatic balance, with partners from different European regions, and including France, Germany and Denmark as three of the five biggest European pig producers, will ensure the relevance of the project across the EU and beyond. PigSys will provide the sector with (a) a whole system model of energy and mass flows and decision support system (DSS); (b) measurement and control devices for improved barn climate control and animal welfare; (c) 'big data' to support barn and control system design; (d) sound LCA and LCCA; (e) increased animal welfare and performance; (f) increased sustainability of production through increased resource efficiency; (g) reduced emissions, waste and carbon footprint; (h) improved public perception of the sector and decreased product prices; (i) increased competitiveness of the sector*

## 83BPRACTICES

### NEW INDICATORS AND ON-FARM PRACTICES TO IMPROVE HONEYBEE HEALTH IN THE AETHINA TUMIDA ERA IN EUROPE

**Total funding requested:** 693.000 €

**Number of partners:** 7

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Italy - Istituto Zooprofilattico Sperimentale del Lazio e della Toscana 'M.Aleandri'**

Dr Giovanni Formato (giovanni.formato@izslt.it)

##### Project Partners:

Austria - Austrian Agency for Health & Food Safety

Italy - Istituto Zooprofilattico Sperimentale delle Venezie (IZSVE)

Slovenia - Agricultural Institute of Slovenia

Spain - Centro de Investigación Apícola y Agroambiental de Marchamalo (CIAPA)

Turkey - University of Namik Kemal

USA - Mississippi State University

#### Keywords

*bio-sensor, QR-code/Rfid, new diagnostic tools, honeybee health increase, on-farm bee-friendly management, sustainable production, pollination service, zero environmental impact treatments*

#### Project summary:

*The estimated value of pollination service is between 13.5 and 21.5 billion dollars (FAO, 2006). European beekeeping suffers significant regional differences in colony losses due to external impacts on beekeeping, including climate and prevalence of diseases (EPILOBEE, 2014). This situation is likely to worsen with the spread of Aethina tumida (Small Hive Beetle – SHB), a new parasite affecting honeybee, found for the first time in the EU in Italy in 2014. Together with other bee diseases (American Foulbrood - AFB, European Foulbrood – EFB and Nosemosis), SHB may play an important role in colony losses and to beekeeping economy. The BPRACTICES project aims to develop new management practices (Good Beekeeping Practices - GBPs) adopting new clinical methods, biomechanical and innovative biomolecular techniques respecting the natural behaviour of bees. The research activities will focus on developing new biosensors from honey to monitor SHB presence and PCR techniques to diagnose in advance honeybee diseases (AFB, EFB, SHB) from debris. Another goal will be to accelerate and to raise efficiency of the clinical inspection of the hives to detect SHB. At the apiary level we will indicate a proper bee-friendly management (e.g. traps for SHB, honeybee queen-cages for varroa control, powder sugar method to assess varroa infestation level) to monitor and control the honeybee diseases, protecting their health and avoiding the application of chemical treatments guaranteeing quality and safety of hive products. The innovations will be validated in the daily apiary activities and disseminated internationally in collaboration with the International Federation of Beekeepers' Associations (Apimondia). Economical impact on beekeeping industry will be quantified. Consumers will be aware of the positive environmental impact of beekeeping and the ecosystem services provided, thanks to a cutting-edge traceability system using the QR-code/Rfid technology.*

## 93SusTradeOff

### Understanding trade-offs between health and efficiency to improve competitiveness and sustainability of animal production by breeding and management

**Total funding requested:** 835.000 €

**Number of partners:** 11

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**France - INRA-GABI**

Dr Marie-Hélène Pinard-van der Laan (marie-helene.pinard@jouy.inra.fr)

##### Project Partners:

Denmark - Aarhus University

Denmark - Okologisk landsforening

France - INRA-GENPHYSE

France - Institut de l'Elevage The French Livestock Technical Institute

France - ITAVI The French Poultry Technical Institute

Netherlands - Wageningen University

Netherlands - Hendrix Genetics

Netherlands - Cobb-vantress

United Kingdom - University of Edinburgh

United Kingdom - Moredun Research Institute

#### Keywords

Resource allocation Trade-off Immune response Health Production Sustainability Proteins Proteomics Genomics Breeding

#### Project summary:

*It is hypothesised that intense selection for traits such as liveweight gain and egg/milk yield in production animals has resulted in resources being allocated within the animal to production, at the expense of other physiological processes such as immune function. The SusTradeOff project aims to develop cutting edge technologies to study these trade-offs in two production systems (sheep and poultry): SusTradeOff aims to understand how different dietary protein sources are allocated by animals of different genetic backgrounds between production and immune function and how this allocation is affected by stage of production, disease or vaccination. To achieve these aims, biological materials and proteomics technologies will first be developed to study these trade-offs at the individual animal level, which will facilitate the identification of protein sources and/or targeted protein supplementation to enhance or maintain immune function in the face of high production demands. Population studies in experimental and commercial lines will investigate trade-offs between resilience, immunocompetence and production, providing additional genotypes and phenotypes to select in balanced breeding programmes. Data integration and modelling will provide prediction models for trade-offs and decision making tools that will then be validated at the production level with breeding industry partners under commercial conditions using industry standard operational scenarios. By developing integrated animal health and production management strategies to improve competitiveness and sustainability of animal production, especially by delivering more efficient use of proteins, the SusTradeOff project maps to the 3 Research Areas of the call "SusAn".*

## 99SUSTAINBEEF

### Co-definition and evaluation of SUSTAINable BEEF farming systems based on resources non edible by humans

**Total funding requested:** 934.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Belgium - Walloon Agricultural Research Center**

Dr Didier Stilman (d.stilman@cra.wallonie.be)

##### Project Partners:

Belgium - Walloon Livestock association

France - INRA

France - Institut de l'Elevage (IDELE)

Germany - University of Bonn

Ireland - Teagasc

Ireland - University College Dublin

Italy - Council for Agriculture Research and Economics (CREA)

#### Keywords

*Livestock systems, Efficiency, Circular economy, Non-edible product, Multi-actors approach, Socital challenge, Modeling*

#### Project summary:

*Due to a growing world population and changing consumption patterns, demand for animal products is expected to increase. Ruminant-based systems have the potential advantage of using resources non edible by humans and converting these into high quality human food. However, the emergence of intensive ruminant production systems, relying on increasing use of concentrate feeds, with food value, and the related increase in land abandonment in traditional grassland regions, has increased scrutiny in respect of the sustainability of EU livestock productions. Moreover the consumers' point of view, the social acceptability of cattle products is being questioned with regards to food quality and safety, animal welfare and the competition between feed and food. To face these drawbacks, we hypothesize that cattle farming systems which rely mainly on grasslands and agro-industrial resources non-edible by humans are more or can be designed to be more sustainable than specialized systems which use feedstuffs that could also be directly used as food or that was produced at the detriment of food production. In addition such systems would greatly contribute to circular economy. Our measure of sustainability includes, environmental and social dimensions as well as economic perspectives taking into account the services delivered by these systems. Our proposal focuses on beef production systems as they are increasingly questioned by society. To test this, actual and potential performances of systems representative of Europe will be compared, mobilizing multidisciplinary and multi-actors approaches to co-define 1-beef system types, 2-the set of sustainability indicators to be mobilized, 3-potential scenarios of evolution for more sustainable systems. These scenarios will be evaluated and, furthermore, suitable incentive measures to enhance their implementation will be tested and, when relevant, proposed. The dissemination of results will be facilitated throughout this bottom-up approach.*



## 103PEGaSus

### PEGaSus (Phosphorus efficiency in Gallus gallus and Sus scrofa): Bridging the gaps in the phosphorus value chain

**Total funding requested:** 1.091.000 €

**Number of partners:** 5

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**Germany - Leibniz Institute for Farm Animal Biology (FBN)**

Prof Klaus Wimmers (wimmers@fbn-dummerstorf.de)

##### Project Partners:

Denmark - Aarhus University

Italy - Università Cattolica del Sacro Cuore

Sweden - Stockholm Environment Institute

United Kingdom - Agri-Food and Biosciences Institute

#### Keywords

Phosphate cycle; Monogastric animals; Ecological resilience; Bio-economic assessment; Sustainable phosphorus governance; Rural development; Policy instruments; Feeding strategies; Osteoimmunology

#### Project summary:

Phosphorus (P) is an irreplaceable component of life and used in all agricultural production systems. PEGaSus focusses on P because it is a finite but recyclable resource which is not efficiently used and reused in agricultural production leading to serious concerns for soil and water ecosystems. PEGaSus is emphasising on monogastrics since pigs and chicken contribute to achieve global food security but are major P excretors and sources of P losses. Balancing the P cycle is crucial towards a P resilient livestock production, comprising P efficiency in animals and plants, P storage in soils, P utilisation of microorganisms, and their interactions. The strategic aim of PEGaSus is to provide solutions to secure sufficient supplies of high quality animal products from resource-efficient and economically competitive agro-systems that are valued by society and preserve soil and water ecosystems. To reach this overall aim, five complementary partners from across Europe with expertise in animal biology, social ecology, and economy collaborate in three work packages, aiming at tracking the fate of P on its ways in fodder, animals, microbiota, slurry, soil, and water. PEGaSus generates improved understanding of the biodiversity of monogastric P utilisation towards both an optimised P supply and highest standards of animal health and welfare in European livestock production. PEGaSus addresses the genotype-phenotype map, i.e. genomic, epigenetic, and transcriptomic variation, and nutritional strategies to reduce P losses which will simultaneously reduce greenhouse gas, and nitrogen emissions. PEGaSus delivers cost-benefit estimations in various farm-, production-, process-, and ecosystems and novel approaches of P management to balance economic and environmental sustainability of the dense but uneven distributed European animal production. By integrating the results, PEGaSus provides knowledge products with far-reaching impact on research and policy communities within the EU.

## 117FreeWalk

**Develop economic sound free walk farming systems elevating animal welfare, health and manure quality, while being appreciated by society**

**Total funding requested: 1.293.000 €**

**Number of partners: 11**

**Project duration (months): 36**

### Research Consortium:

#### Project Coordinator:

**Slovenia - University of Ljubljana (UL)**

Dr Marija Klopčič (Marija.Klopcic@bf.uni-lj.si)

#### Project Partners:

Austria - HBLFA Raumberg-Gumpenstein

Germany - Technical University of Munich (TUM)

Germany - University of Kassel (UNI-KS)

Israel - Agricultural Research Organization (ARO)

Italy - Università degli Studi di Firenze (UniFi)

Netherlands - WageningenUR (WUR/DLO)

Norway - Norwegian Institute of Bioeconomy Research (NIBIO)

Slovakia - National Agricultural and Food Centre (NPPC)

Sweden - Swedish University of Agricultural Sciences (SU)

USA - University of Kentucky (UK)

### Keywords

*housing systems economics animal welfare waste products environment society cattle sectors*

### Project summary:

*Aim of this project is to further develop economic sound free walk cattle farming systems, which improve animal welfare and soil structure, utilize waste products and have public support. As innovative housing systems, the compost bedded pack barn and the cow garden are applied with a completely free walking and lying area and are compared with cubicle barns for reference. The bedded pack barn uses organic waste materials as bedding. It has the potential to elevate the welfare and longevity of animals and improve soil quality. The highly innovative cow garden has an artificial floor of several layers and is self-cleaning while separating manure and urine. Both housing systems are combined with grazing during the summer season. Our approach will deliver an integrated assessment of case farms spread over Europe, using experimental and modelling methods to evaluate systems performance. Housing as part of intensive and extensive farming will be examined in a holistic context, encompassing the whole farm: bedding, artificial floor, animal welfare, health, manure quality, soil structure, CPN-balances, and product quality. Greater insight in the composting process plays a crucial role in the success of the system. Societal appreciation of the Free Walk farming system and products is assessed at regional level. To integrate the results of the various research activities, a systems analysis and economic evaluation will be performed at farm, national and European level. The project consortium includes 8 leading research institutes plus 4 SME stakeholders all over Europe, providing a wide coverage of disciplines. This project targets the three call topics 'improve productivity, resilience and competitiveness', 'reduce waste and enhance environment', and 'improve on-farm practices enhancing consumer acceptability and societal appreciation associated with animal welfare and product quality'.*



## 124 AnimalFuture

### Steering Animal Production Systems towards Sustainable Future

**Total funding requested:** 1.243.000 €

**Number of partners:** 8

**Project duration (months):** 36

#### Research Consortium:

##### Project Coordinator:

**France - Institut national de la recherche agronomique (INRA)**

Dr TICHIT MURIEL (muriel.tichit@agroparistech.fr)

##### Project Partners:

Austria - UNIVERSITAET KLAGENFURT (UNIKLU)

France - Institut de l'Elevage (IDELE)

Germany - BAYERISCHE LANDESANSTALT FUR LANDWIRTSCHAFT [Bavarian State Research Centre] (LfL)

Netherlands - WAGENINGEN UNIVERSITY (WU)

Portugal - Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (IST-ID)

Spain - CENTRO DE INVESTIGACION Y TECNOLOGIA AGROALIMENTARIA DE ARAGON (CITA-IA2)

United Kingdom - Scotland's Rural College (SRUC)

#### Keywords

cattle, sheep, pig, poultry, sustainability assessment, trade-off, synergy, ecosystem service, biodiversity, material flow accounting, multi-level modelling

#### Project summary:

*Animal-Future will design strategies for assessing and enhancing the sustainability of animal production systems (APS). Main objectives are (i) Assess the multi-dimensional consequences of innovations on benefits (cash flow, income, jobs, product quality and safety, ecosystem services etc.) and costs (use of scarce natural resources, health and welfare) of APS. (ii) Improve the capacity of European animal sector actors to facilitate sound changes based on a thorough understanding of mechanisms underlying trade-offs between benefits and costs. (iii) Provide guidance co-designed by scientists and animal production actors through which the latter can reinforce their innovation capacity. To achieve these, the project will (i) Develop a indicator-based decision support tool that will be used for assessing and benchmarking European APS according to benefits and costs induced by innovations (from farm to region, nation and EU27). (ii) Bring together multi-disciplinary research teams and animal production actors (farmers, processors, breeders etc.) using a multi-actor approach and starting from a farm network of intensive/extensive APS across Europe. Relevance to research area includes (RA1) Developing and assessing innovations that move farm management closer to the production frontier, while considering fundamental trade-offs with respect to social and environmental dimensions. (RA2) Insights into how animal production sector (from the farm to EU scale) can increase the efficiency of feed utilization, recycle waste and exploit potentials to convert biomass resources not directly edible for humans into high-quality protein sources for human nutrition. (RA3) Transparent and comprehensive accounting for on-farm practices that makes explicit a whole set of benefits and costs, at farm and larger spatial scales, thus raising the awareness of animal sector actors, citizens and policy makers about the often-neglected benefits that animal systems provide to society.*