RE-LIVESTOCK - Resilient livestock farming systems under climate change

Duration: From 1 September 2022 to 31 August 2027

Project summary

The overall objective of Re-Livestock is to evaluate and mobilize the adoption of innovative practices applied cross-scale (animal, herd, farm, sector and region) to reduce GHG emissions from livestock farming systems and increase their capacity to deal with potential climate change impacts. To reach our aim, Re-Livestock have brought together scientific expertise in Europe and Australia and across disciplines, including co-innovation, animal feeding, breeding, welfare, farm management, environmental and socioeconomic assessment and policy analysis, to develop novel and scientifically supported integrated approaches specific for different dairy, beef and pig systems and geographic regions in the context of climate change. Strong collaboration with industry stakeholders to identify the innovations and to co-design the validation will ensure relevance and maximize the adoption of best practices. National groups of farmers (case studies) and 'stakeholder forums' together with a 'European multi-actor platform' will allow for an engaged co-design of transition pathways whilst 'learning from innovation networks' will allow for the testing and sharing of latest innovative solutions. A 'community of practice' will extend the multi-actor approach to a broad range of stakeholders.

Objectives

Re-Livestock is a 37-partner consortium whose main objectives are to improve the sustainability of feeding resources for livestock across European regions, to accelerate the development and application of new breeding tools and strategies to achieve permanent and timely reductions in GHG emissions and adaptation to climate change, to evaluate system specific farm-level husbandry practices to reduce net GHG emissions and increase adaptation to different scenarios, to refine and apply innovative holistic farm-scale environmental and socioeconomic assessment tools to enhance the adoption of the practices, to enable the resilience of livestock production systems today and in the future under different climatic scenarios from regional to global scale by adopting innovations based on circularity principles, to design action-based pathways for the transition towards resilient livestock farming systems and to understand the factors influencing the adoption and efficacy of mitigation and adaptation practices with multi-actor engagement.

Activities

The following activities are developed:

- Re-Livestock will identify alternative feeds with reduced carbon footprints and greater resilience in the face of heat events, drought and flood, for which the nutritional value is properly quantified, and emissions can be saved without any negative effect on animal performance or farmer income.
- In Re-Livestock by collating detailed measures of CH4 emissions and heat tolerance on animals with wider production and fitness (i.e. health, fertility, longevity) data and across breeds, a major knowledge gap on the true relationships between CH4 emissions and production, efficiency, heat tolerance and fitness traits will be filled.
- Re-Livestock will also identify husbandry practices that improve system efficiency, reduce nutrient losses and promote C sequestration.
- Re-Livestock will address the risks to animal welfare related to climate change, identifying potential hazards and associated risks for different production systems and regions.
- Re-Livestock will place a strong emphasis in facilitating the adoption of a range of innovations and practices.
- We will develop and use improved and adapted emissions factors for different systems and will place particular emphasis on C sequestration.
- Re-Livestock will take a portfolio approach to enable the development of a range of tools (Re-Toolbox), that are relevant for assessing climate change and mitigation strategies, and aimed at differing levels (farmers through to scientists).
- The project will integrate several models the LPJmL model - the state of the art Dynamic Global Vegetation Model (DGVM) including crop and grass production in a consistent framework, simulating the global terrestrial carbon and nitrogen cycle and the response of carbon and vegetation patterns under climate change - to the Circular Food Systems (CiFoS)-model, a biophysical food optimization model that accounts for circularity in livestock production.
- Re-Livestock will place a strong emphasis on assessing the C footprint of conventional and novel alternative feed resources for a wide range of cattle and pigs production systems together with a deep analysis of the potential of multispecies grasslands in multiple locations.
- Re-Livestock will contribute to advanced knowledge of heat tolerance traits in cattle and pigs across a range of regions and breeds (cosmopolitan and local) that will be defined based on existing variability in the slope of (re)productive efficiency in relation to meteorological records, and will be eventually incorporated into practical breeding programmes.
- Re-Livestock will expand the use of existing tools through developing: i) a data collection framework that builds on current models and sustainability assessment tools, ii) improved LCA-based indicators, including the assessment of natural carbon sinks in livestock production systems, iii) specific animal welfare assessments in relation to climate change, iv) a model suite (CiFoS, LPJmL, LSAM, RothC) linking and expanding existing state of the art models to assess circularity in terms of biomass, land use, soil carbon, nitrogen, phosphorus, water, and biodiversity, v) an improved modeling of grassland productivity.
- Re-Livestock will evaluate and enhance adoption of techniques aimed to reduce manure emissions during the whole management chain, promoting nutrient recycling and C sequestration. Agroforestry systems will be redesigned to optimize production efficiency while promoting C sequestration.

Results, Project impact

- Enhanced adoption by farmers and other relevant actors of innovations that increase the mitigation and adaptation capacity of livestock farming systems to climate change, at animal, population and farm level, therefore improving the resilience of production systems as well as animal health and welfare.
- Improved capacity to assess the environmental and socio-economic impact of mitigation and adaptation practices and options at different scales, alone and in combination.
- Consolidated transition towards a resilient livestock production with novel integrated approaches (management, breeding, feeding, local resources use,) defined for different climate change scenarios.
- Consolidated knowledge of the mitigation and adaptation potential of feeding practices.
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- Consolidated knowledge of the mitigation and adaptation potential of husbandry practices.
- Identification of adoption pathways for already proven effective practices.
- Improved LCA based indicators including the assessment of natural carbon sinks in livestock systems.
- On-farm tools (portfolio) assessments.
- Integration of models to increase capacity to redesign systems at different scales with stakeholders.
- Better understanding and enhancing the mitigation potential of ecosystems and sectors based on the sustainable management of natural resources.
- Advanced understanding and science to support adaptation and resilience in the context of changing climate.
- Efficient monitoring, assessment and projections related to climate change impacts, mitigation and adaptation potential in order to bring out solutions for tackling emerging threats and support decision-making in climate change mitigation and adaptation policies at European and global levels.
- Fostered climate change mitigation in the primary sector, including by the reduction of GHG emissions, maintenance of natural carbon sinks and enhancement of sequestration and storage of carbon in ecosystems

Webpage:

Contact:

Role of CIHEAM Zaragoza in the project: communication and outreach activities.

Coordinator: Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC), Spain.

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Partners:

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- Wageningen Research (WR), the Netherlands
- ALMA MATER STUDIORUM University of Bologna (UNIBO), Italy
- Universitat Politecnica de Valencia (UPV), Spain
- The University of Reading (UREAD), UK
- Wageningen University (WU), the Netherlands
- Scotland's Rural College (SRUC), UK
- Forschungsinstitut für biologische Landbau (FIBL), Switzerland
- Swedish University of Agricultural Sciences (SLU), Sweden
- Aarhus University (AU), Denmark
- Mediterranean Agronomic Institute of Zaragoza/International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM-IAMZ), Spain
- University College Dublin (UCD), Ireland
- Università di Pisa (UNIPI), Italy
- Consulai - Consultadoria Agro-Industrial, Lda (CONSULAI), Portugal
- MV Agroecology Research Centre (MVARC), Portugal
- Queen's University Belfast (QUB), UK
- Potsdam-Institut für Klimafolgenforschung (PIK), Germany
- Progressive Farming Trust Limited - The Organic Research Centre (ORC), UK
- Aeres University of Applied Sciences (AERES), the Netherlands
- CRV B.V. (CRV), the Netherlands
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- Agribusiness Service B.V. (ABS), the Netherlands
- DSM Nutritional Products Ltd (DSM), Switzerland