



Cofund ERA-NET “Sustainable Animal Production Systems” (SusAn)

COMMON STRATEGIC RESEARCH AND INNOVATION AGENDA

- Finding a new balance -

Executive Summary



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1. Aim of this agenda

SusAn's Common Strategic Research and Innovation (R&I) Agenda has the aim to contribute to the transformation of livestock production within the European agri-food system. The term "transformation" here means change that is fundamental, i.e. more radical than that brought about by "business as usual". For the livestock sector, this means that, despite the zootechnical progress made during the past decades, continued progress in agricultural sciences alone will most likely not be sufficient. In addition, political and socio-economic considerations can be expected to provide significant contributions to more sustainable production and consumption.

Livestock production is a highly political issue and the scientific community does not have any political mandate. However, the field of agricultural sciences can be used to inform and to support political decision making.

The agenda described in this summary uses the UN Sustainable Development Goals (SDGs) and the COP21 Paris Agreement as a common reference for all partners of the ERA-NET SusAn. Food and agriculture play a pivotal role in the UN SDGs and livestock production is linked to several of them.

The SusAn strategic research and innovation agenda shall contribute to the aims of the Farm to Fork Strategy of the European Commission.

2. Status of European livestock production

SusAn's view on the present status of European livestock production is as follows:

» Achieving global food and nutrition security has become a more complex and multifaceted challenge than in the first decades after World War II. The complexity of the European agri-food system means that livestock production is seen as a sub-system in a larger context.

» A significant part of present European livestock production systems compete for land and resources that can alternatively be used for e.g. growing plant based food or for nature conservation. Strategies for sustainable livestock farming must take existing trade-offs into account, for instance, food versus feed.

» Current overconsumption and food waste in Europe considerably contribute to excessive resource use, public health costs and environmental costs. These costs could alternatively be used to support sustainable practices, and as long as they are unaccounted for, they distort prices and interfere with market mechanisms. Sustainable production can only be achieved in a framework of sustainable consumption.

» Excessive intensification beyond nature's capacity leads to an unbalanced concentration and specialisation of livestock production, and to overconsumption of animal-source food. This has detrimental effects on farms, the environment and society. There is no universal solution that fits all livestock production systems in Europe. Diversity of production and adaptation to local conditions should be increased rather than decreased, also to benefit resilience.

» Societal expectations about agriculture and food systems are high in Europe. The consumption of animal based food is high per capita and currently has a decreasing trend while consumption is increasing in other parts of the world (e.g. China, South East Asia). From this point of view, the European livestock sector may start development processes that could later also take place in other regions of the world.

» A shared vision of European livestock production is lacking, including its role for global health, and food and nutrition security. Furthermore, there is a need for concrete targets and corresponding evaluation methods (indicators, metrics).

Strategies for future global food and nutrition security should not only look at increasing crop and livestock production in Europe. They should also take other aspects into account, for instance consumer behaviour, food loss and waste, inequalities in global food distribution, and the food sovereignty of developing economies.

» The European agri-food system as a whole, including livestock production, is currently not sustainable. Therefore, a fundamental change of the system is required. The next ten years are decisive for this necessary development.

3. Challenges for European livestock production

The challenges presented in this agenda were selected on the basis of the UN Sustainable Development Goals. Priority was given to the relevance for European livestock production systems. However, any effects outside Europe must be considered as well. This includes, for instance, GHG emissions, deforestation in countries exporting animal feed to Europe, as well as the effect of European exports on local markets of developing economies.

Detailed descriptions of the challenges are given in the full version of this agenda.

Major challenges for European livestock production systems are:

- » To achieve food and nutrition security
- » To restrict emissions and nutrient losses
- » To keep resource use within planetary boundaries
- » To preserve and enhance biodiversity
- » To support rural livelihoods
- » To provide high standards of animal health and welfare

Key messages regarding challenges:

- *All challenges must be met simultaneously and in accordance with set targets. Therefore, the above named challenges are not ranked.*
 - *The challenges are interdependent and need to be tackled within a systems based approach in order to account for potential synergies and trade-offs.*
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4. Strategic approach

The strategic approach to R&I on livestock production systems is at the heart of this agenda. Because a system is more than the sum of its components, in this chapter the thinking and acting in systems is dealt with as an entity. Moreover, the effect of changing system components needs to be assessed at system level. Most importantly, the changing of system components requires a vision towards which the system should be developed, and it requires measurable targets.

The strategic approach comprises five areas that can be used together as a strategy for R&I on livestock production systems (see Figure 1):

Area 1: Develop a shared vision of European livestock production

Area 2: Design livestock production systems

Area 3: Support implementation of sustainable systems

Area 4: Evaluate system performance

Area 5: Facilitate collective action

The areas can be regarded as steps that need to be followed in chronological order, as well as areas that are dependent on mutual feedback. The circular design also enables choices to be reconsidered for this strategy and allows it to be adapted over time.

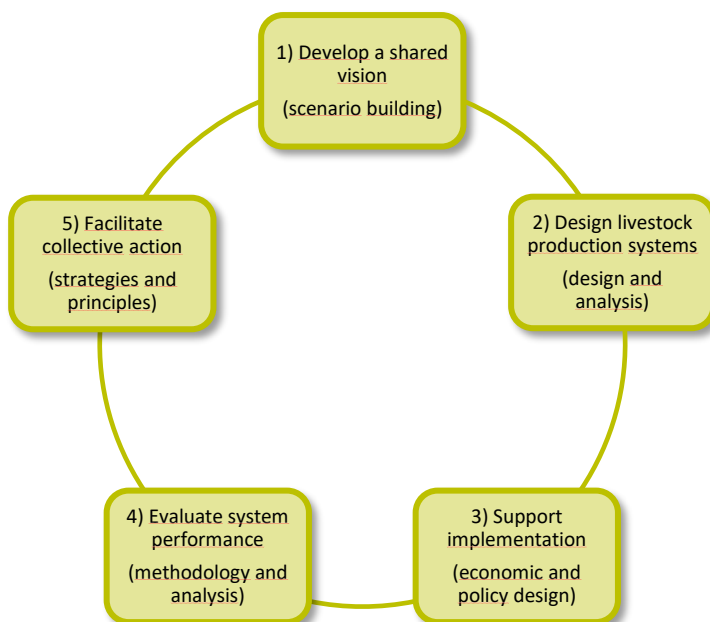


Figure 1: Strategic approach to research and innovation in livestock production

All five areas are essential to a successful systems based approach to R&I in the field of livestock production. However, they may have different impacts on any change.

A prerequisite to successfully change a system is a vision of another, alternative system. According to Donella Meadows, the power to transcend paradigms and to change the goal of a system are the most effective leverage points to intervene in a system. However, the least effective leverage points often are “Constants, parameters, numbers”, even though much attention has been paid to those. In this agenda, they would correspond to the single components of livestock production systems, for instance, zootechnical parameters related to nutrition, housing or genetics. This does not mean that the components are generally of little importance. Undoubtedly, they are critical parts of running and optimizing livestock production systems. However, changing single components rarely changes system behavior.

4.1. Area 1: Develop a shared vision

A shared vision of a future agri-food system, and the role of European livestock within it, is a prerequisite for the efficient (re-)design of livestock production systems (Area 2), development of a socio-economic framework to support them (Area 3) and for the evaluation of the system's performance (Area 4).

One or more future scenarios may be developed. A discussion of scenarios also facilitates the opportunity to explicitly state and examine assumptions, expectations and ethics. The visions and development paths will have to balance demands (e.g. food and nutrition security) and limitations (e.g. GHG mitigation). They must also leave sufficient room for farmers', scientists' and others' initiatives and creativity, with regard to the development of locally adapted solutions.

4.2. Area 2: Design livestock production systems (agricultural/technical)

The design of livestock production systems involves combinations of its basic components like animal health, animal nutrition, genetics, housing and manure management ("single components", see below), in order to tackle the challenges for European livestock production: Food security, emissions, resource use, biodiversity, livelihoods, and animal health and welfare.

Following the conclusions delivered in the 5th SCAR Foresight Exercise report (2020), within this agricultural/technical area, this agenda will be focused on two features characterizing the design of the system, namely circularity and diversity (including biodiversity).

4.3. Area 3: Support implementation (political/socio-economic)

Without societal facilitation, sustainable livestock production cannot be viable in practice. In order to enable Europe's agri-food system to become sustainable, the existing political and socio-economic framework needs to be developed further, in line with the European Green Deal. The principal rules of an (eco-) social market economy, public support (subsidies) and specific regulations must be coherent with regard to this goal. The economic and financial system is a major driver for how businesses, including farm operations, work.

4.4. Area 4: Evaluate system performance

If a system is more than the sum of its components, the evaluation of a system must take an approach that is able to catch the system's essential properties beyond just its components.

In the suggested agenda the following properties are to be considered:

- » Productivity and profitability, including ecosystem services
- » Efficiency of production, including reduction of emissions and waste
- » Stability of yields and resilience of the production system
- » Equitability and moral integrity, also regarding livestock and nature

4.5. Area 5: Facilitate collective action

The complex nature of livestock production systems implies that a diversity of knowledge and values are involved. It seems obvious that policy and research approaches will benefit from the consideration of the input of different stakeholders. This will assure the societal relevance of their output and their transfer to practice. However, stakeholder participation may not guarantee success. Opening a decision process to many participants means it will be a long and often complicated process and there is the risk of reducing the focus. Nevertheless, there seems to be agreement that a fundamental change of the European agri-food system will require concerted action of all stakeholders, in different fields and at different levels.

Key messages regarding the strategic approach:

- *The most effective leverage point to transform a system is the power to transcend paradigms and change the goal of a system.*
 - *Changing single system components (see next page) has a relatively low potential to transform a system. However, they are critical parts of running and optimizing livestock production systems.*
 - *Highest priority should be given to the development of a shared vision of future European livestock production systems.*
 - *Priority should also be given to establish methods to evaluate the performance of livestock production systems with regard to their sustainability.*
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5. Complementary research needs: single components

The components of livestock production systems are divided here into two parts:

- 1) political and socio-economic system components, and
- 2) agricultural and technical system components.

They are further divided as listed below. All components are seen as tools or means, *i.e.* “adjusting screws” to optimize system performance, and, consequently, to meet the challenges of European livestock production.

5.1. Political and socio-economic system components

- » Governance and public policy
- » Market and prices
- » Consumption patterns and food waste
- » Working conditions

5.2. Agricultural and technical system components

- » Animal nutrition
- » Breeding / genetics
- » Animal housing
- » Manure management incl. biogas
- » Animal health and welfare management
- » ICT, robotics and Big Data

The research topics for each component are described in detail in the full version of this agenda.

Key messages regarding single system components:

- *To achieve major changes, a systems approach is required and more than one system component needs to be changed.*
 - *Political/socio-economic components are at least as important for a transformation of the livestock sector as agricultural/technical components.*
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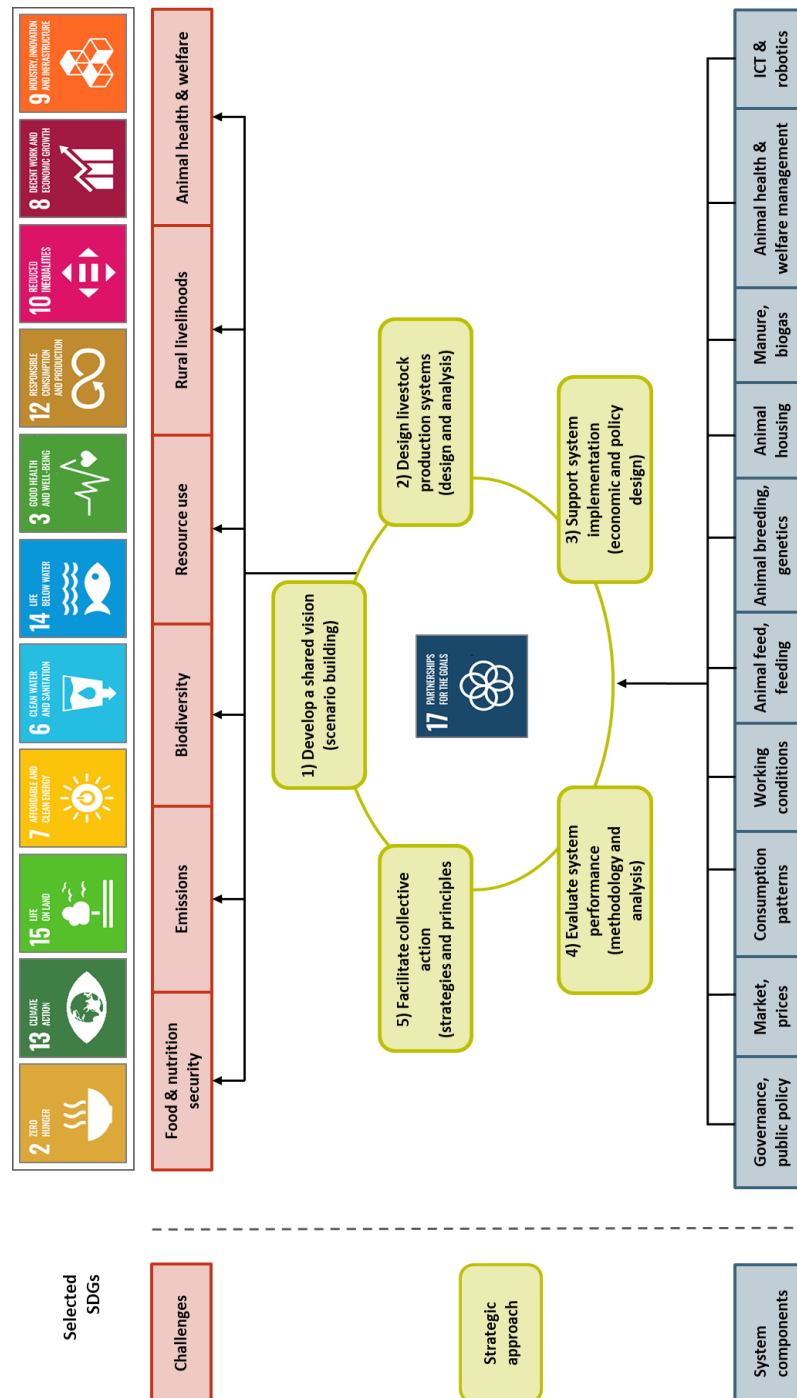


Figure 2: : Relationship between the chapters on single system components, strategic approach, challenges, and related SDGs

The 39 partners in the Cofund ERA-NET SusAn consortium:



Federal Office for Agriculture and Food (BLE), **Germany** (*Coordinator*); Spanish National Research Council (INIA), **Spain** (*Deputy coordinator*); Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW), **Austria**; Flanders Innovation and Entrepreneurship (VLAIO), **Belgium**; Institute for Agricultural and Fisheries Research (EV-ILVO), **Belgium**; Public Service of Wallonia (SPW), **Belgium**; Hermesfonds, **Belgium**; The Ministry of Environment and Food (DAFA), **Denmark**; Aarhus University, **Denmark**; Ministry of Rural Affairs (MEM), **Estonia**; Ministry of Agriculture and Forestry (MMM), **Finland**; French National Research Agency (ANR), **France**; National Research Institute for Agriculture, Food and the Environment (INRAE), **France**; Federal Ministry of Food and Agriculture (BMEL), **Germany**; Forschungszentrum Jülich GmbH (JUELICH), **Germany**; Hellenic Agricultural Organization, Veterinary Research Institute (DIMITRA), **Greece**; Teagasc – Agriculture and Food Development Authority, **Ireland**; Department of Agriculture, Food the Marine (DAFM), **Ireland**; Ministry of Agricultural, Food and Forestry Policies (MIPAAF), **Italy**; Ministry of Health (MH-DGSAFV), **Italy**; State Education Development Agency (VIAA), **Latvia**; Ministry of Agriculture of the Republic of Lithuania (MoA), **Lithuania**; Lithuanian University of Health Sciences (LUHS), **Lithuania**; Ministry of Agriculture, Nature and Food Quality (MINLNV), **The Netherlands**; Netherlands Organisation for Scientific Research (NWO), **The Netherlands**; Research Council of Norway (RCN), **Norway**; National Centre for Research and Development (NCBR), **Poland**; Foundation for Science and Technology (FCT), **Portugal**; Ministry of Agriculture and Rural Development (MPRV SR), **Slovakia**; Slovak Academy of Science (SAS), **Slovakia**; Ministry of Agriculture and the Environment (MKGP), **Slovenia**; Basque Food Safety Foundation (ELIKA), **Spain**; Centre for the Development of Industrial Technology (CDTI), **Spain**; State Research Agency (AEI), **Spain**; The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), **Sweden**; Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policies (MFAL – GDAR), **Turkey**; The Scientific and Technological Research Council of Turkey (TUBITAK), **Turkey**; United Kingdom Research and Innovation (BBSRC), **United Kingdom**; The Secretary of State for Environment, Food and Rural Affairs (DEFRA), **United Kingdom**.

<https://www.era-susan.eu>

See also: <https://scar-europe.org/index.php/animal-production>