



Report of the joint workshop

„Smart Mitigation of GHG in livestock production“

29th and 30th November 2016,

in Potsdam, Germany

This document summarises the outcome of the joint workshop carried out by the three different EU funding networks, ERA-NET SusAn; ERA-GAS and ICT AGRI 2. The aim of the joint workshop was to discuss, identify and explore research priorities, -topics and tools for further additional activities in the three Era-Net Initiatives.

Publishable summary

FACCE ERA-GAS (ERA-NET Cofund for Monitoring & Mitigation of Greenhouse gases from Agri- and Silvi-culture), together with the ERA-NET SusAn, (Sustainable Animal Production Systems) and ERA-NET ICT-AGRI 2 (Information and Communication Technologies and Robotics for Sustainable Agriculture) organized a joint workshop on 29-30 November in Potsdam to identify promising approaches to reduce GHG emissions in livestock production. The joint workshop, the first of its kind involving three ERA-NETs, had close to 70 participants from 22 different countries. The three ERA-NETs have already identified a number of potential areas of synergy. This workshop explored one of those areas in detail: Comparison of animal production systems with respect to GHGs. Particular attention was paid to the following two sub-topics:

- Production technology and management (e.g. housing systems; optimal field and grazing management)
- Breeding, physiology, feed & nutrition

The outputs of the workshop will help to set the research priorities for future joint calls and other activities between the three ERA-NETs.

Summary of discussions

The workshop was opened by the chair of the CWG-SAP, Bernhard Polten, who gave a brief introduction to the complexity of the topic and the variety of views on livestock production. Reiner Brunsch, director of ATB, presented the research conducted at the Leibniz Institute for Agricultural Engineering and Bioeconomy, also with regard to research on GHGs. In the following keynote speeches, Jean Francois Soussana, scientific director (Environment), INRA, FR, and Harry Clark, director of NZAGRC, NZ, set the scene for the working groups by



introducing to the topic of GHGs and livestock from global to animal level. Finally, the three ERA-NETs involved in this workshop were briefly presented by Elke Saggau (SusAn), Raymond Kelly (ERA-GAS) and Niels Gøtke (ICT-AGRI 2). After the presentations, four breakout groups, each lead by a moderator, discussed the following four areas:

- I. Production technology and management
 - a: Ruminants (including housing, manure- and range management) - Moderator: Gary Lanigan, TEAGASC, IR, co-moderator: Orlaith Ní Choncubhair, TEAGASC, IR
 - b: Monogastrics (including housing, manure- and grazing management) - Moderator: Jürgen Vangeyte, ILVO, BE_VLG, co-moderator: Kees Lokhorst, WUR, NL
- II. Breeding, physiology, feed & nutrition
 - a: Ruminants - Moderator: Illan Halachmi, ARO, IL, co-moderator: Johannes Bender, BLE, DE
 - b: Monogastrics - Moderator: Vivi Hunnicke Nielsen, AU, DK, co-moderator: Boris Vashnev, FNR, DE

Three key questions were addressed in the breakout groups:

- a. What are the challenges?

What are the most urgent challenges that need to be met in order to mitigate GHG emissions within the given area of livestock production systems (1a – 2b)?
- b. What are the Strategies?

What are the most promising strategies within the given area of livestock production to meet the challenges? Can the expected effects of these strategies be quantified (estimated reduction of emissions by x pct = estimated impact)?
- c. What are the burning research questions:

Which thematic research areas and what type of research and research questions will most likely contribute to meet the challenges?

The aim of the discussions was to identify possible research topics for further additional activities and/or potential (joint) calls in SusAn, ERA-GAS and ICT-AGRI. Additionally the Era-Nets intended to come up with a first list of priority topics areas that will be relevant for future development and alignment of research. The results were presented and discussed in the plenum at the end of day 1 and in the morning of day 2. Finally, the lists from the four groups were merged into one list (see [Annex 1](#)).



The second part of the workshop started with an exercise in which all participants were asked to select five topics of high research priority from the list provided by the breakout groups of part I. The data were compiled directly (see [Annex 2](#)).

Christine Bunthof, coordinator of PLATFORM of bioeconomy ERA-NET Actions, presented funding instruments and mechanisms for European initiatives to support research and innovation. The participants then split into ERA-NET specific working groups in order to brainstorm on collection and definition of funding instruments and mechanisms for further additional activities in SusAn, ERA-GAS and ICT-Agri.

The outcome of the ERA-NET related discussions was, that the ranked list of research topics in combination with the instruments presented are a useful basis for the planning of future activities within the ERA-NETs. A follow-up workshop would be welcomed, possibly in order to discuss selected research topics in more depth and again in combination with specific funding instruments and mechanisms.



Annex 1: List of topics identified during the workshop

- 1) Role of livestock production in EU? related to world food challenges)
- 2) Cascading to add value (bio economy)
- 3) Methanotrophic microorganisms
- 4) Developing, testing and validating : Measurement techniques (low cost, IOT based, big data analytics, ...) for creating awareness for farmers ; High throughput low-cost technologies
- 5) Practical uptake through large scale deployment, use in management systems, large scale monitoring for policy makers (adoption is integrated), adoption of PLF concepts. (license to produce is embedded)
- 6) What are sustainable business model? (technology, economically, socially?)
- 7) Can we develop housing systems that are good for the environment and animal welfare – what AW requirements do we want? Re)design of production systems?
- 8) Housing systems: indoor climate, ventilation strategies, flooring systems, innovative materials Housing – better EFs and mitigation
- 9) What potential is in manure treatments ? micro digesters, (local /central) or drying and upgrade of manure, Application of manure via injectors
- 10) Precision livestock feeding, (real time, individual, group feeding)/ **Precision livestock farming including *precision livestock feeding* – for optimal utilization of nutrients**
- 11) Feed chain strategies: Feed chain – impact of feed quality across whole chain
- 12) **Better understanding knowledge of rumen microbiome, soil microbiome, manure microbiome/ Microbiome (improvement of nutrient utilization and health and reduced emission)**
- 13) **Thematic area: Strategies to improve inventories**
 - How to best share experience
 - Methodologies
- 14) **Optimisation of whole farm/sector “sustainability” and validation**
- 15) Validation of sensing as proxies for losses, efficiency, SOC sequestration
- 16) Can we develop farm level MRV?
- 17) Pasture management? Improving pasture sustainability (use of sensing)

- 18) Inhibitors (soil/feed)
- 19) Quantifying fate of N
- 20) Characterising soil characteristics/ Drainage – impacts on nutrient cycling
- 21) ***New feedstuffs: New European protein sources (European/locally produced)(legumes, grass based proteins, products from biorefineries of biomass, aquatic/marine resources, insects, annelids, former foodstuff)***
- 22) ***Breeding (traditional, genomic selection, NBT) for animals adapted to new feedstuff ensuring low FCR – (identification of new traits)***
- 23) ***Breeding and management for improved health and welfare (20% productivity loss due to diseases)***
- 24) **Improved reproduction and survival of piglets and chickens**
Developing efficient animal production systems:
 - a) Accurate measurements in livestock on individuals and on group levels, data interpretation, big data, machine learning, PLF, sensors, signal processing, caring the smallest production unit.
 - b) Feed efficiency and diet design towards lower GHG while elevating production, health, reproduction, sustainability and economics measures of performances.
 - c) Manipulating the rumen microbiome, including early life intervention, (e.g. **Feeding strategy for chickens in the first days of life**)
- 25) **Developing new, ambitious, mitigation techniques, affordable and implementable by the livestock farmers.**
- 26) **How to raise awareness of farmers and society for the need to decrease GHG's ?. And how new technique should be better communicate with farmers, public and all stakeholders ?. Thematic area – farmer uptake and wider societal impacts**

Long-term studies, per species (comparing systems within a species), addressing several synergetic aspects at once. ex combined breeding and feeding strategies. Holistic research approach, and modular 'tailor-made' to national/regional specificities, considering the diversity of livestock sector in Europe

Annex 1: List of top ranked topics identified during the workshop

