



Fitter LiveStock Farming



Fitter LiveStock projects help mitigate climate change

The World is facing a climate emergency with predicted global temperatures due to rise by over 2°C by 2050. This will have an immense impact on natural global systems and cycles and make it very difficult for an expected 9+ billion world population to live and be fed.

Reducing or mitigating major causes of climate change is essential. This includes moving away from fossil fuels to renewable energy, utilising industrial processes that pollute less, reducing the movement of goods and people over large distances, changing human diets and how we produce food.

Nations are arguing about what they can do

Livestock production plays a vital global role in supporting both livelihoods and food security but it is also responsible for some of the greenhouse gas (GHG) emissions. For example, ruminants like cattle and sheep are responsible for part of this problem because they produce methane and other gases (a consequence of the natural process of ruminating) that contribute to global warming. They are however also part of the solution. If we can get them to utilize more feed resources that humans cannot eat directly like grass, which grows in many parts of the world where cropping is difficult, then we use limited resources better. They will also have a key role

in closing nutrient cycles (e.g. carbon capture of grazed pastures, recycling of food processing by-products, etc).

Research shows that by optimising livestock systems and careful selection of animals within systems we can reduce their greenhouse gas intensities by 30%. Better pasture utilisation, optimising feed biodiversity and feeding strategies, selecting and breeding more efficient and more robust animals will allow us to reduce the environmental impact while meeting an increasing consumer demand. More robust animals will be better adapted to the consequences of changing climate (e.g., periods of very high temperature) and be able to support global food security. A number of livestock research projects funded by the European Commission address the issue of climate change issues. The impact of the projects can be greatly enhanced by clustering these to:

- **Improve researcher/stakeholder interaction**
- **Strengthen the impact of their research findings by co-creation**
- **Extend and coordinate the dissemination of results**

The cluster of 6 EU funded livestock projects (GplusE, SAPHIR, IMAGE, Feed-a-Gene, GenTORE, SmartCow) is called

Fitter Livestock Farming

Feed-a-Gene



Feed-a-Gene

focused on developing new feed resources for monogastric animals such as pigs and poultry that do not compete or compete less with food humans could eat. This includes the use of European-grown soya (to reduce the import) and the extraction of protein from green biomass that can be cultivated in Northern Europe. Traits for feed efficiency and robustness in animals were identified. These traits can be used to better appreciate diversity among animals in breeding and livestock management. Precision livestock feeding allows to better adjust the nutrient supply to the nutrient requirements of (individual) animals, resulting in a reduction in environmental impact of monogastric farming by up to 17% .



GenTORE

is developing on-farm management tools that will allow farmers to select animals for resilience and efficiency that best suit changing and different environments. These will combine precision phenotyping using on-farm technologies and genomic information. This will allow farmers to rank their animals on probability of reproductive and production cycle success and move to genomic management. For example, by using sexed semen farmers could reduce replacement dairy heifer numbers so reducing GHG emissions or use surplus females as beef producers so diversifying production and strengthening economic stability. This also offers opportunities for tailoring animals to local environments and balancing herds for resilience and efficiency in the local context.



GplusE

has identified biomarkers in the milk of dairy animals that makes it easier to identify metabolic in-balance. This helps breeders improve selection by identifying more resilient, robust, efficient and thus productive animals including those with lower GHG emissions and those able to manage heat stress conditions that may come with climate change.





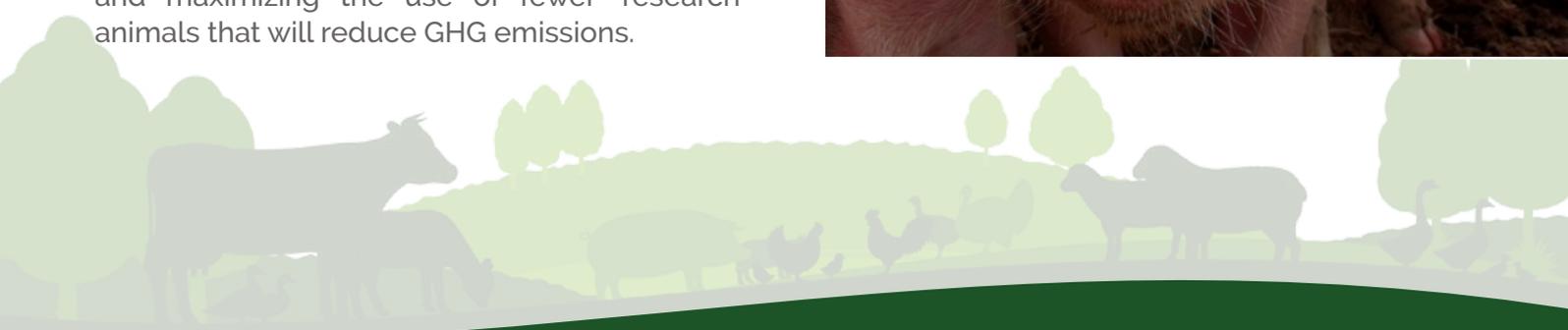
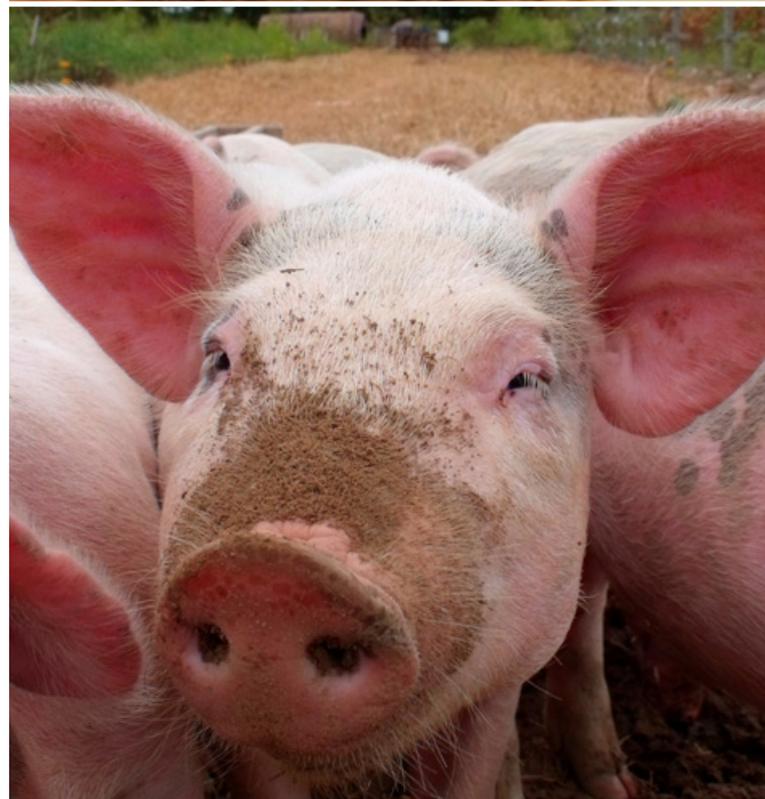
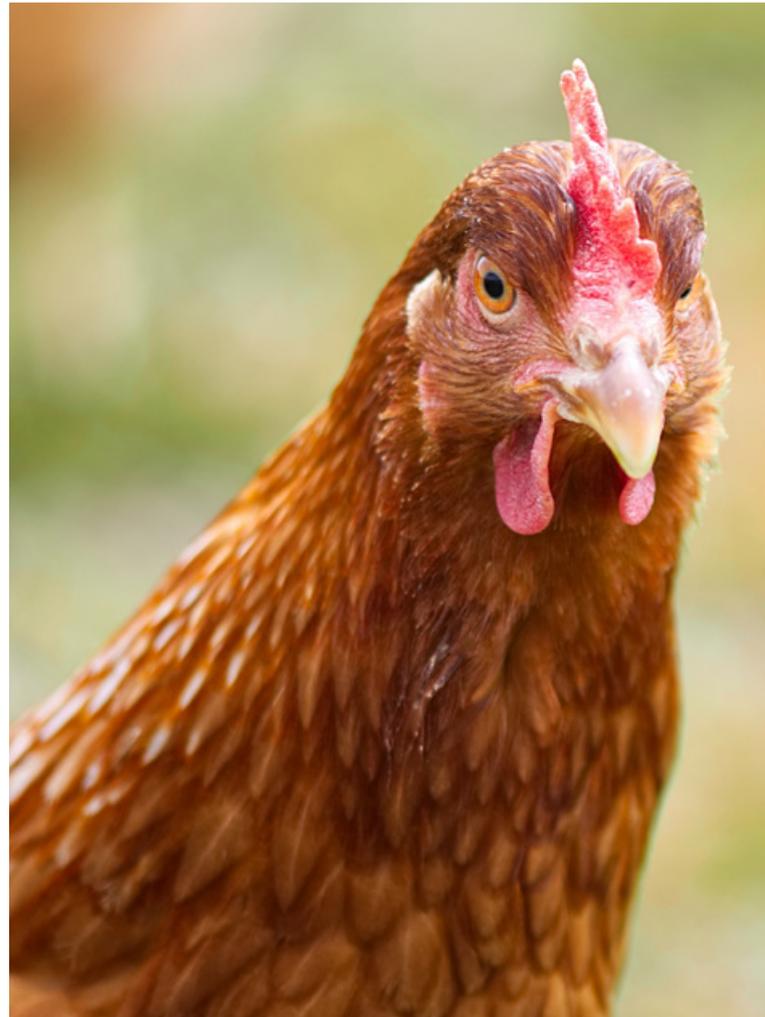
IMAGE has looked at preserving genetic diversity of livestock at risk from climate change and how gene 'banks' might play an important role in managing appropriate livestock resources that can adapt and combat expected environmental changes. They found an urgent need to strengthen and protect the genetic resources in gene banks in order to make a greater diversity of global genetic materials available. This in return would lead to more available genes to select for climatic resilience traits.



SAPHIR has assessed vaccine strategies needed to combat disease challenges that may occur more frequently and which are often a challenge coming with climate change. Researchers found that regular vaccination of livestock reduced antibiotic use thus reducing environmental impact by livestock and therefore contribute to decreasing the anti-microbial resistance in humans. Implementing successful vaccine strategies requires a great deal of collaboration between researchers, industry, farmers and national organizations. In order the vaccine strategies to be effective, it needs to consider social/cultural issues as well as science.



SmartCow is addressing livestock challenges by building capacity of key European cattle research infrastructures through better coordination and integration. It is encouraging networking, joint activities, multidisciplinary approaches, transnational access and refining data collection, protocols, and reference methods. It will also develop methodologies that avoid duplication and maximizing the use of fewer 'research' animals that will reduce GHG emissions.



Policy recommendations:

Research groups and stakeholders – Getting them Working together to build Community and Impact

- The Fitter Livestock Farming Cluster of EU projects was formed through encouragement by the EU Common Dissemination Booster Initiative to better grasp the 'bigger climate change picture'. This has ensured a continued flow of project scientists and stakeholders addressing questions and finding solutions (such as about livestock and climate change) that surpass the lifespan of a single project. It crucially gives projects the opportunity to share results and platforms to disseminate information and results. This means where projects overlap in time, they can continue to disseminate information from all the projects over a much longer period and thus have a much greater impact. Despite no funding, the clustering has worked to the benefit of all the projects.
- For clustering to happen in the future, it requires help from both EU and stakeholders. It is recommended that the European Commission identifies a number of "high level" themes (like livestock and climate change) and strongly recommends or imposes rules where new projects participate in these clusters to interact with stakeholders.
- The EU could encourage projects to cluster using financial assistance to pay for networking time and dissemination materials. Flexibility is also required so that dissemination funds from a project that is ending can be passed to another that continues. Stakeholders should be encouraged to join cluster networks as well as project networks. Linking national farmer subsidies to a stakeholder role should be considered.

Encouraging Sharing of Knowledge

Data is often not shared very well and thus not always exploited in the best way to mitigate climate change. For example, gene banks need

to be better documented and opened to greater shared access so they can be better utilized. Incentives are required to facilitate incorporation of data from on-farm technologies. Governmental organisations could provide cheap or free genotyping in exchange for being able to share data. This would encourage farmers to collect and share data and thus become more profitable and more environmentally aware. Work is also required in recording phenotyping complex animal traits appropriate to mitigation and adaptation.

Insisting on the use of up-to-date technologies and techniques

Only when agricultural end-users deploy the latest and most appropriate science and technology, will the livestock agriculture be able to contribute fully to the battle against climate change. The livestock industry must be encouraged to use more genomics integrated technologies like precision farming, and more science-based decision support tools for reducing the environmental footprint.

Farmers and producers need to be encouraged to use practical tools through targeted subsidies as aides for culling and breeding choices and avoid producing and rearing animals that are surplus to requirement and thus incur environmental and economic costs. Providing access to decision support and advanced breeding tools (e.g. sexed semen) at subsidized rates would encourage precision breeding, thus reducing GHG emissions. At the same time, society needs to be better informed about the advantages that novel technologies will offer (e.g., in terms of environmental footprint, animal welfare, precision medication), and that it shouldn't be perceived as a "further industrialisation of livestock production". The animal, the farmer, and society at large can all benefit from these technologies.

EU funded projects like those in Fitter Livestock Farming cluster contribute to reducing the environmental impact of the EU cattle sector as can future climate change orientated projects.



Common Dissemination Booster

These projects have received funding from the European Union under Grant Agreements:

GENTORE - 727213; Feed-a-Gene - 633531; SAPHIR - 633164; IMAGE - 677353; GplusE - 613689; SmartCow - 730924

For more information see

<https://www.gentore.eu/fitterlivestock.html>