Beta
Biodiversitat, Ecologia,
Tecnologia Ambiental i Alimentària

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

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Laia Llenas Argelaguet, BETA Tech. Center

From farm to market: Upcycling manure to improved fertilizing products

Who are we? The problem of Osona

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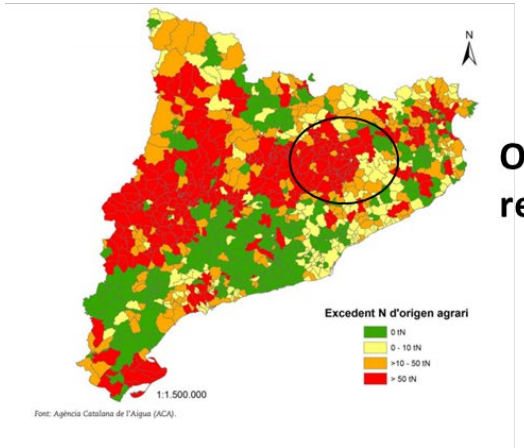
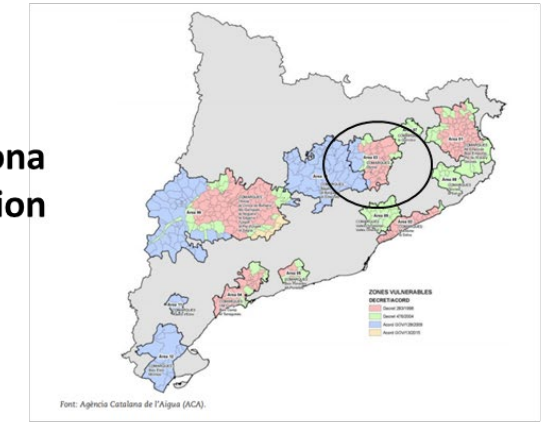
N Excess in Catalonia



Osona region

Nitrate Vulnerable zones



- Relevant Agrifood sector (mainly livestock production and meat processing): 20% of workers, 26% of companies and 51% of turnover.
- 2263 farms and 2.2M of livestock heads.
- Production of 8.584.281 kg N from livestock waste per year.
- **Excess of 4,489,083 Kg N per year** considering the available arable fields in the region.

BETA TC is aiming to contribute to the sustainable rural development and transition to circular bioeconomy.

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The livestock sector in Europe

- The **EU livestock sector** is the largest in the world.
- Meat, milk and eggs make up 40% of the EU's agricultural value and it accounts for 48% of total EU agricultural activity, with an **estimated €130bn output value annually**.
- Total farm livestock population in Europe excrete around **1400 Mt of manure annually**.
- Total N and P excreted by livestock in the EU27 are estimated at **7-9 Mt N/year** and **1.8 Mt P/year**.
- The livestock manure produced is larger than the amount that can be used in local agriculture.

More than 90% of manure produced in EU27 is currently returned to agricultural fields → **Clear role in current Nutrient imbalances at EU level**

Nutrients generated by livestock

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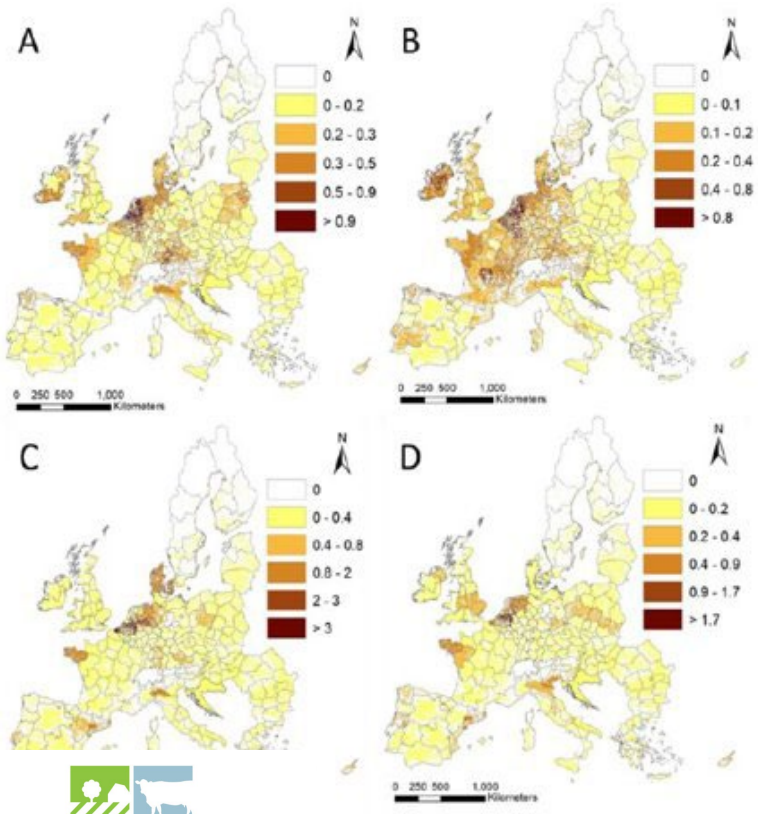
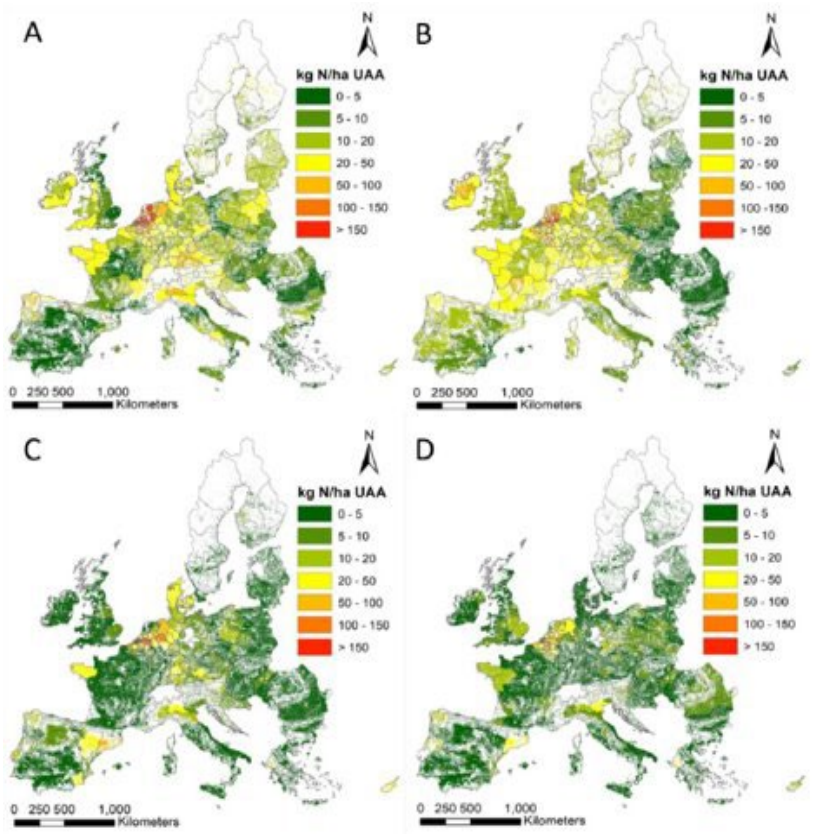
Animal densities by livestock

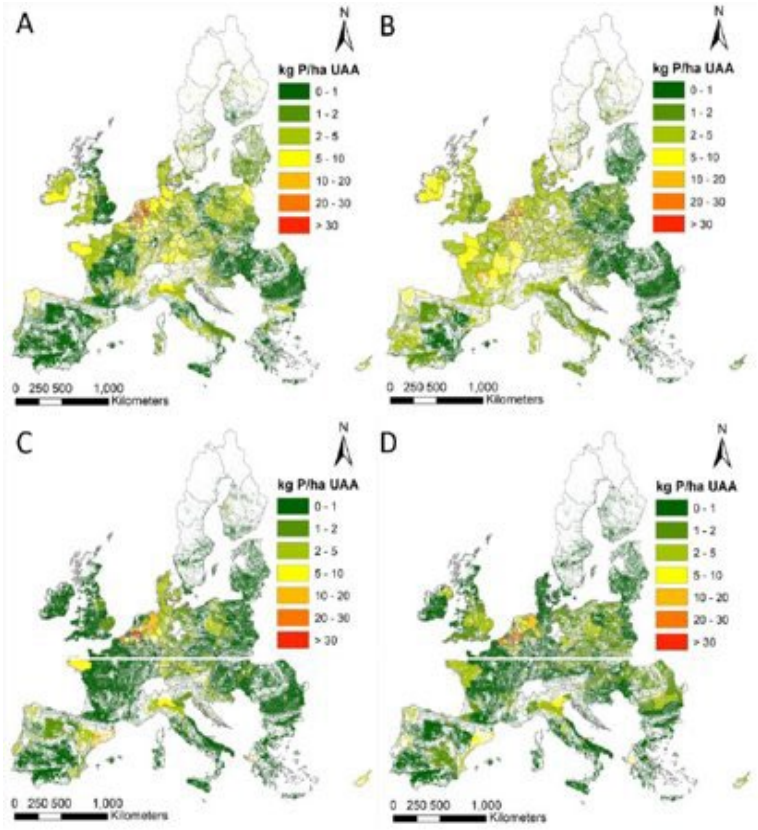


Nutrients generated by livestock waste

Nitrogen



Phosphorous



A: Dairy cows, B: beef cattle, C: pigs, D: poultry

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Nutrient Balances in relevant EU regions

- **An evaluation of the existing nutrient imbalances** in six relevant EU regions in Europe was done to see where those nutrients coming from livestock waste can contribute in the long-term to sustainability of production agriculture. The results showed that:
  - Animal manure sources can sustain nitrogen and phosphorous requirements in most of the studied countries (The Netherlands, Belgium and Italy).
  - In France and Spain data showed high differences within regions (northern regions need mineral fertilizers input to sustain plant uptake from soil whereas other regions have a clear nutrient excess problem)
  - Germany is the only country that needs mineral fertilizers input in all the regions.

- These results indicate that **it is necessary to transform part of nitrogen and phosphorus from animal manure** sources into high-added value **bio-based fertilizers** that can be distributed throughout different regions and countries, and thus reducing importation and usage of mineral sources.

How can we address this problem?

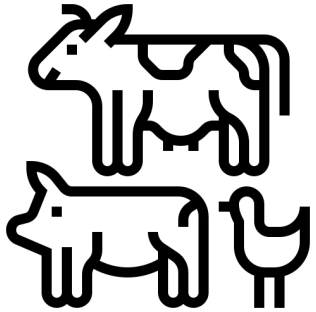
Let's consider the wastes rich in nutrients as an opportunity!

Nutrients – A business opportunity!

CHALLENGES

- Increasing global demand for mineral fertilisers
- Resource Depletion
- Regional Nutrient Imbalances

- In Europe, 1400 Mt/year of manure
- 7-9 Mt N/year + 1.8 Mt P/year
- More than 90% of manure is currently returned to agricultural fields



- Political barriers
- Social acceptance

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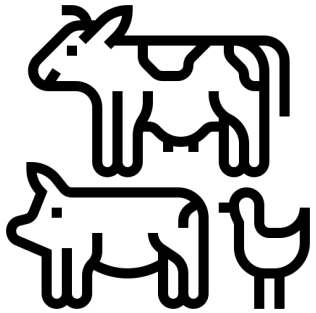

- Political barriers
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OPPORTUNITIES

A good Nutrient Management should provide real benefits and solutions to all those facing challenges related to their inefficient use.

- **Livestock sector**: Diversify the revenue sources. New farm activities bringing **new business opportunities** in the current fertilizers market.
- **Agricultural sector**: Well-defined and **standardised fertilizers** achieving the same consistency in performance than conventional mineral fertilisers.
- **Chemical Industry**: **Diversify nutrient sources** to produce fertilizing products. On-farm and centralised Tailor-Made Fertilizers production.
- **Technology providers**: **New market opportunities** for technological companies providing efficient & effective technologies for nutrient recovery.
- **Policy makers:** Providing **policy relevant information** to support new policies and legislations that enhance circular bioeconomy.
- **Society**: Alternative internal secondary nutrient sources that will, in the long-term, ensure **food security and sustainable agriculture**.

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From farm to market: Upcycling manure to improved fertilising products

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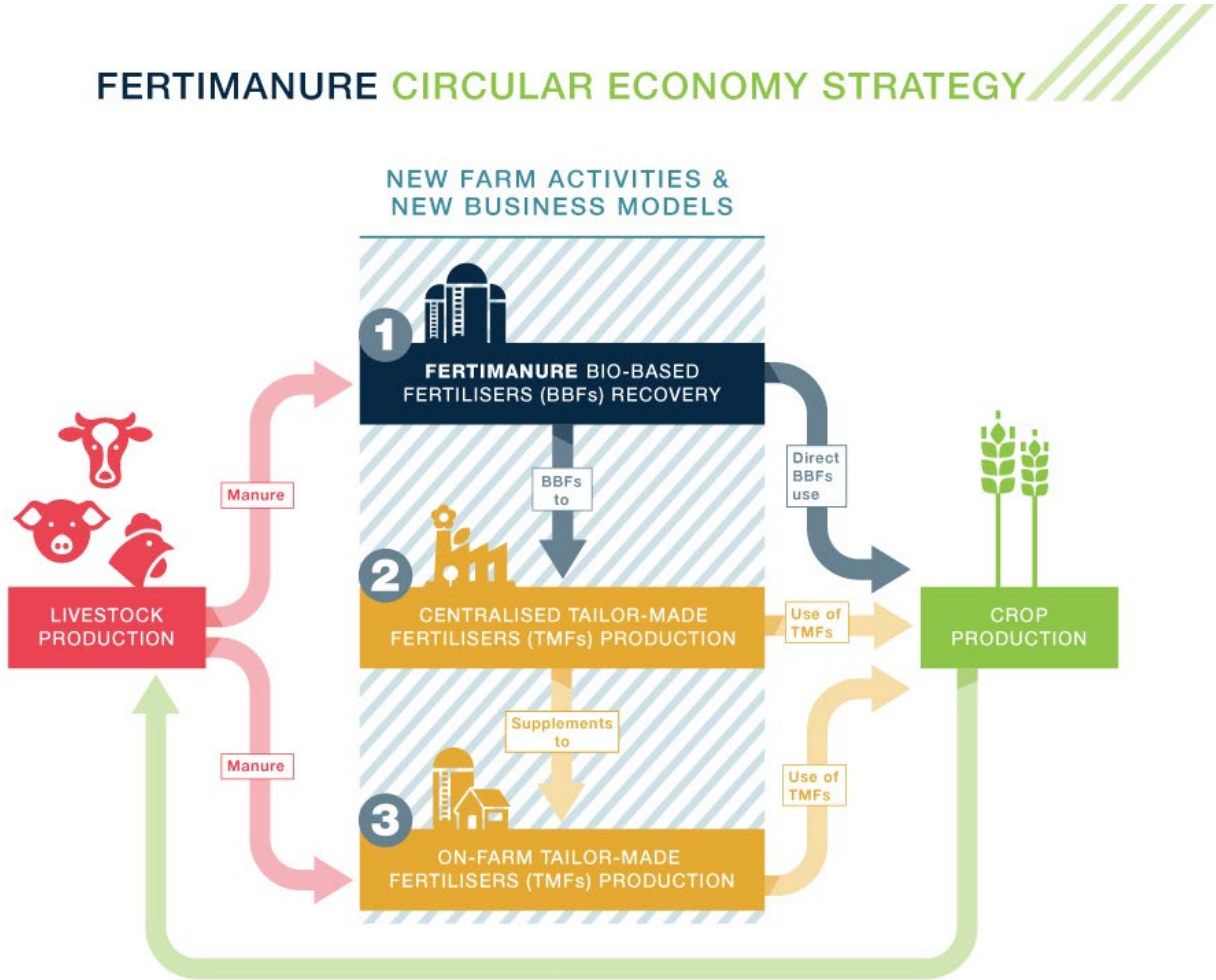

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What is FERTIMANURE about?

Develop, integrate, test and validate innovative Nutrient Management Strategies to efficiently recover mineral nutrients and other relevant products with agronomic value (organic amendments and biostimulants) from animal manure, to finally obtain reliable and safe fertilisers that can compete in the European fertilizers market.

What is FERTIMANURE about?

FERTIMANURE…

- Is not only about innovative technologies.
- Needs to solve regional and inter-regional nutrient imbalances (export nutrients in a high-added value form).
- Will obtain high-quality, safe and marketable fertilising products from animal manure. The fertilising products include: mineral, organic and biostimulants.
- Will develop specific and complementary business models and exploitation strategies, covering all actors of the value chain.
- Needs to be in line and have an impact to all those EU initiatives linked to nutrient management and fertilising products use (including policies and legislation).

TECHNOLOGY + NUTRIENT MANAGEMENT + QUALITY/SAFETY + BUSINESS + ACCEPTANCE

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On-Farm innovative nutrient recovery technologies

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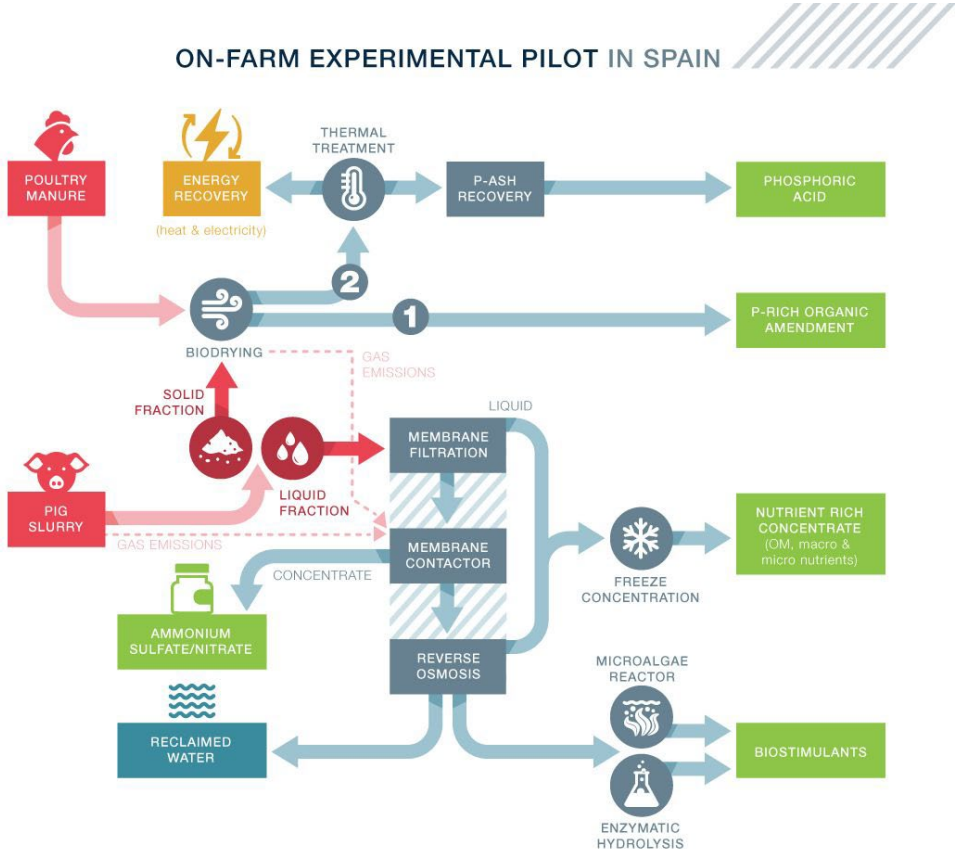

The infographics for the other on-farm pilots can be found in our website

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FERTIMANURE Fertilising Products

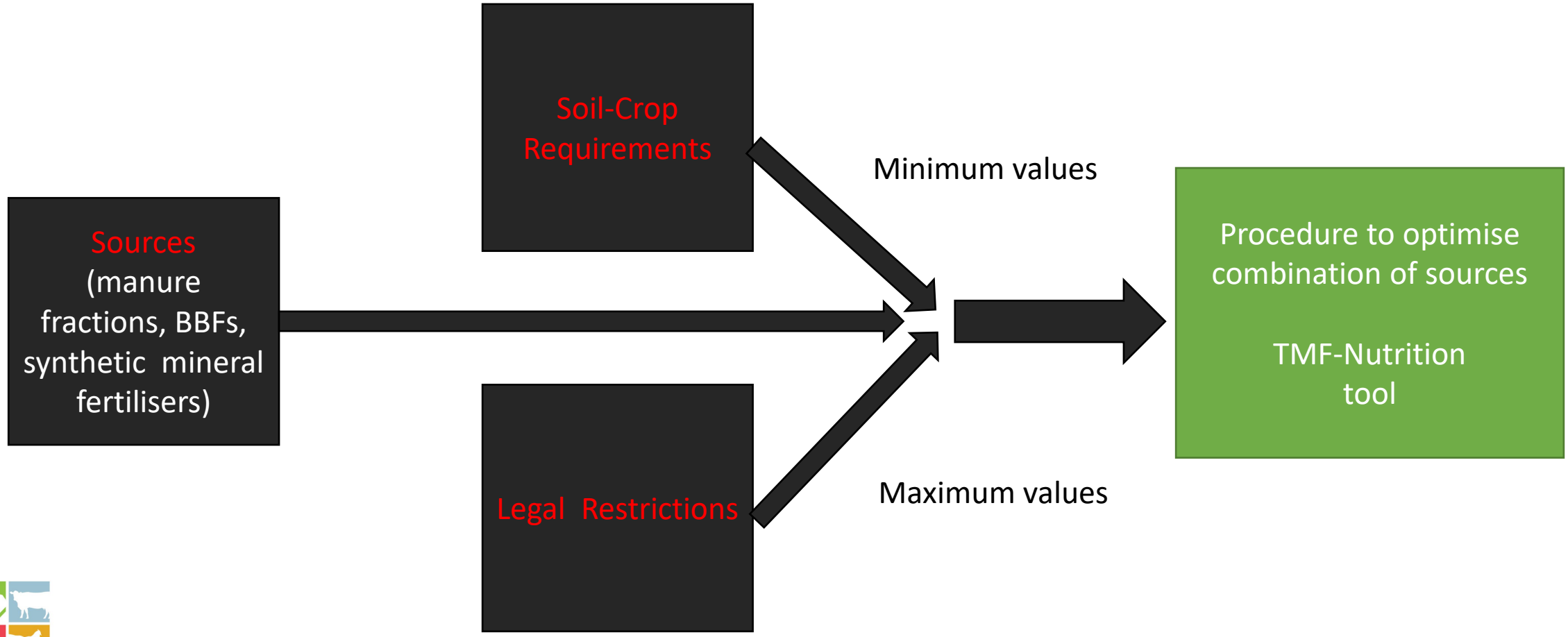
Bio-based Fertilizers (BBFs) are fertilising products or a resource for the production of Tailor-Made Fertilisers that is derived from biomass-related resources. The BBFs of FERTIMANURE are “obtained through a physical (other than low tech separation), thermal, thermo-chemical, chemical, and/or biological processes for the treatment of manure or digestate that result into a change in composition due to a change in concentration of nutrients and their ratio’s compared to the input material(s) in order to get better marketable products”.

FERTIMANURE On-farm pilots are porducing 19 BBFs

A Tailor-Made Fertilizer (TMF) is a customized fertiliser that meets with the nutrient requirements of a specific crop by taking into account the soil type, soil fertility status, and growing conditions and fertilisation practises and **are produced from BBFs** (produced from manure or digestate and/or other recovered fertilising products that are available) **and/or mineral fertilisers** (MF) (and/or biostimulants).

Different TMFs will be formulated…

FERTIMANURE Fertilising Products



Agronomic performance

Assess bio-based fertilisers (BBFs) and tailor-made fertilisers (TMFs) produced in the context of FERTIMANURE for their ability to substitute current mineral fertilisers that are produced based on finite fossil-based resources.

LAB

→ Assess N & P (and C) dynamics of manure derived BBF vs mineral fertilizers in controlled experimental conditions of **laboratory assays;**

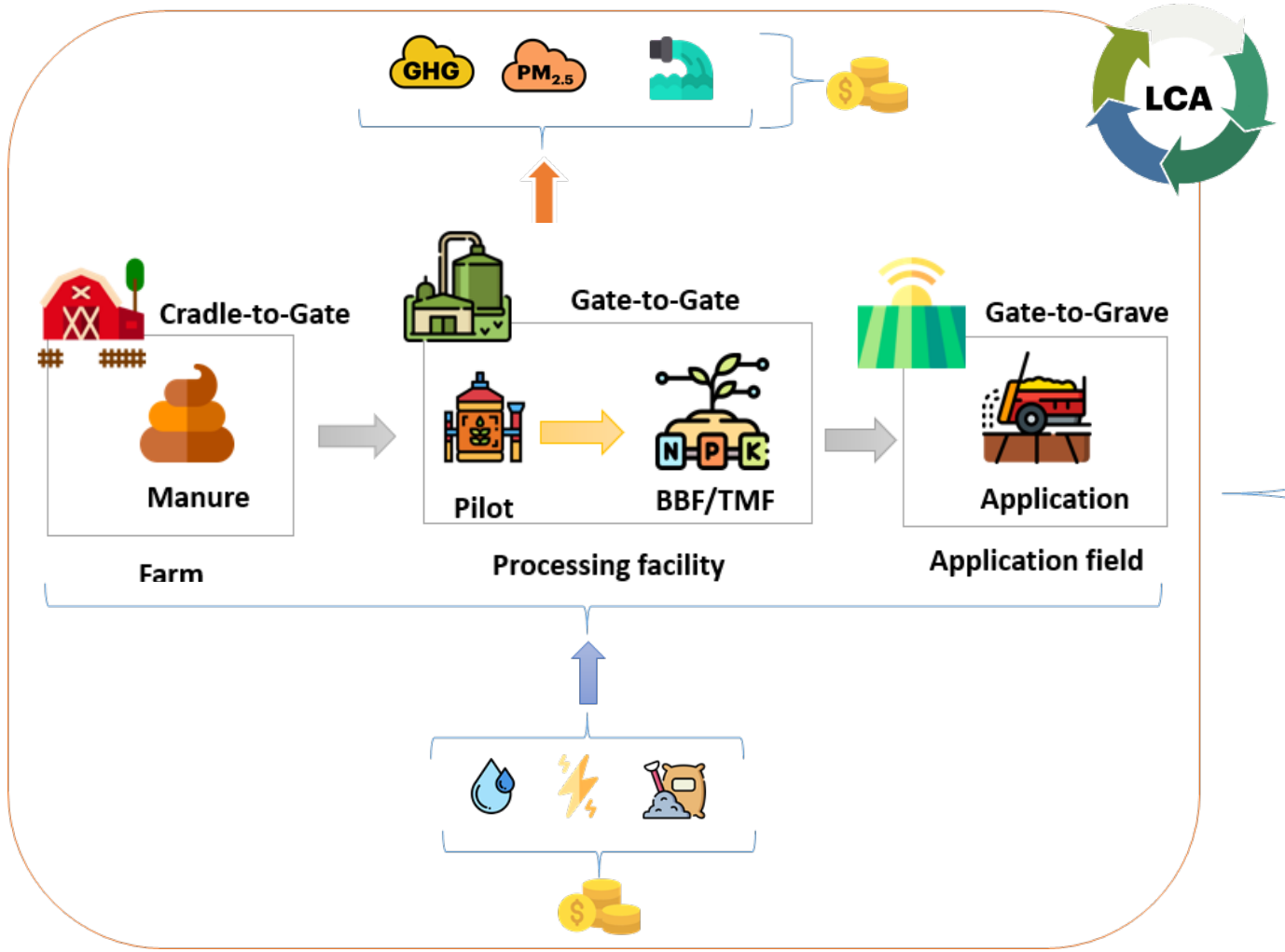
FIELD

→ Evaluate and demonstrate agricultural and environmental performance of novel manure derived BBF at relevant (uncontrolled experimental conditions; e.g. weather) **open field scale** (TRL increase) as compare to mineral fertilisers from finite sources;

DEMO

→ Demonstrate and communicate obtained results to agricultural end-users via **demonstration field sites and interactive events**.

Sustainability Assessment



- Techno-economical (**LCC**)
- Environmental impact (**LCA**)
- Socio-economic impact (**S-LCA**)

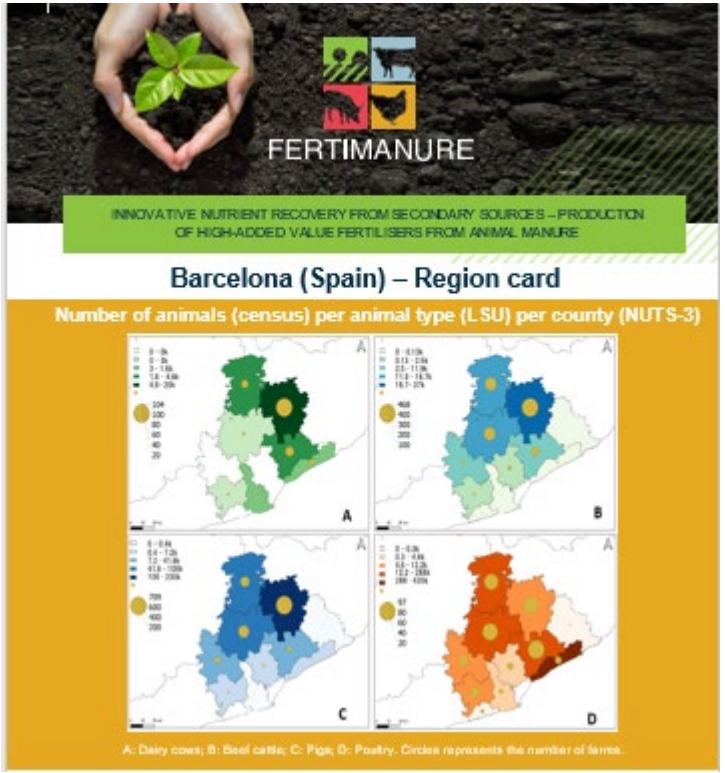
Business and Exploitation

- **Mapping stakeholder groups** relevant for the BBFs development and market uptake
- Preparing **market analysis for new BBF** and innovative cross-sector **value chains** (farmers – processors – agriculture) in 8 participating EU countries
- Development of business plans for **3 types of end-products** defined in the project concept (mineral fertilizers, organic amendments, bio-stimulants)
- Development of a **long-term exploitation strategy** that will support successful integration of BBFs on the market

PARTICIPATORY APPROACH BY USING QUESTIONNAIRES AND PERFORMING BRAINSTORM SESSIONS

Main exploitable results obtained so far

- **Region cards** giving an overview of animal production, nutrient production and manure management.
- **Nutrient imbalance analysis** on the on-farm pilot plant regions at NUTS2 level.
- **Project Database** containing the information of 163 projects related with FERTIMANURE.
- Questionnaire on end-users preferences (9 language versions).



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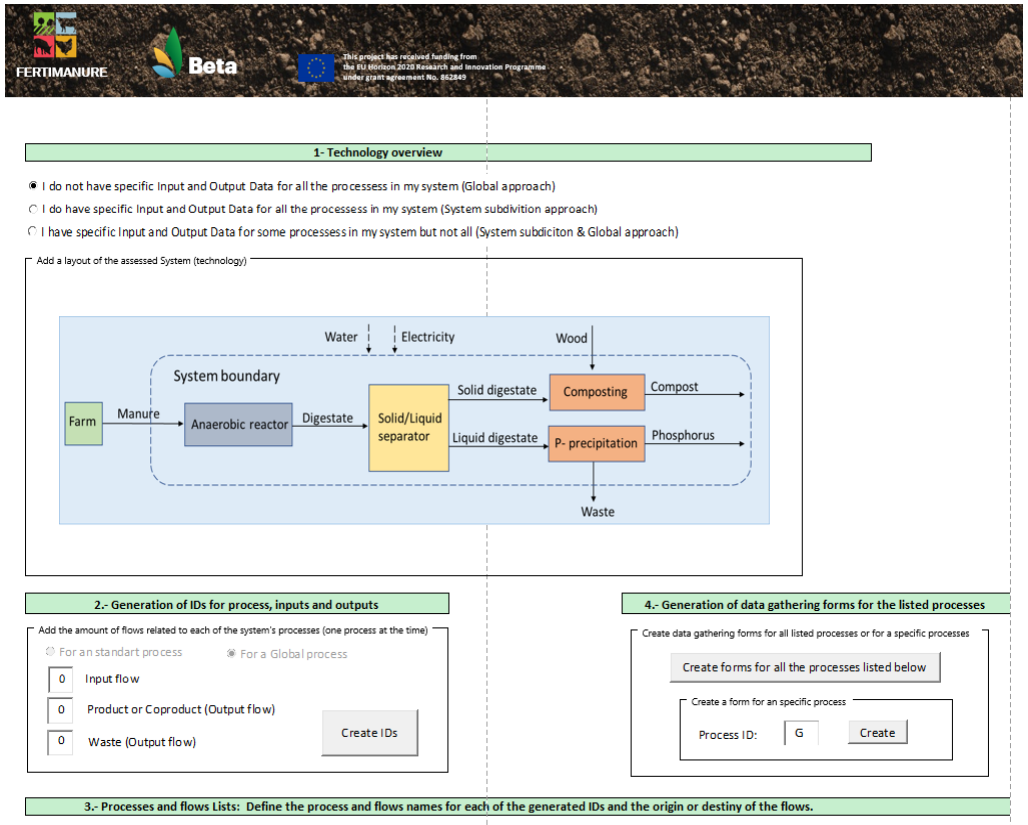
Main exploitable results obtained so far

- **5 on-farm experimental pilots** for nutrient recovery from animal manure.
- **19 different BBFs** fertilisers have been produced.
- Innovative procedure to produce **on-farm TMFs**.
- Creation of the **TMF Nutrition Tool**
- **FERTIMANURE DgTools** for collecting LCI data.
- 4 EIP **Practice Abstracts**



THANK YOU!

For more information:

www.fertimanure.eu

www.betatechcenter.com

laia.llenas@uvic.cat