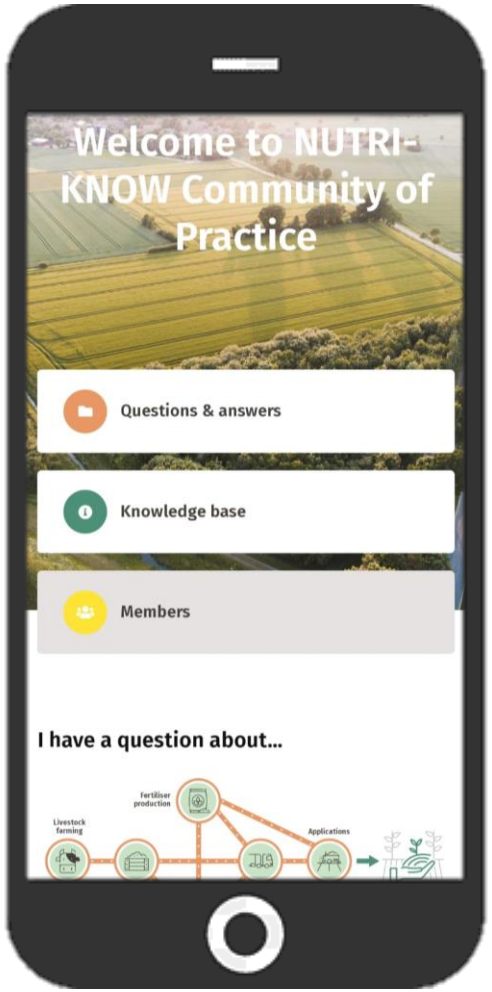
NUTRI•KNOW

WEBINAR Nº6

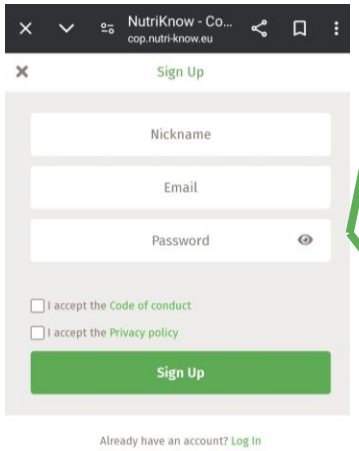
Transport

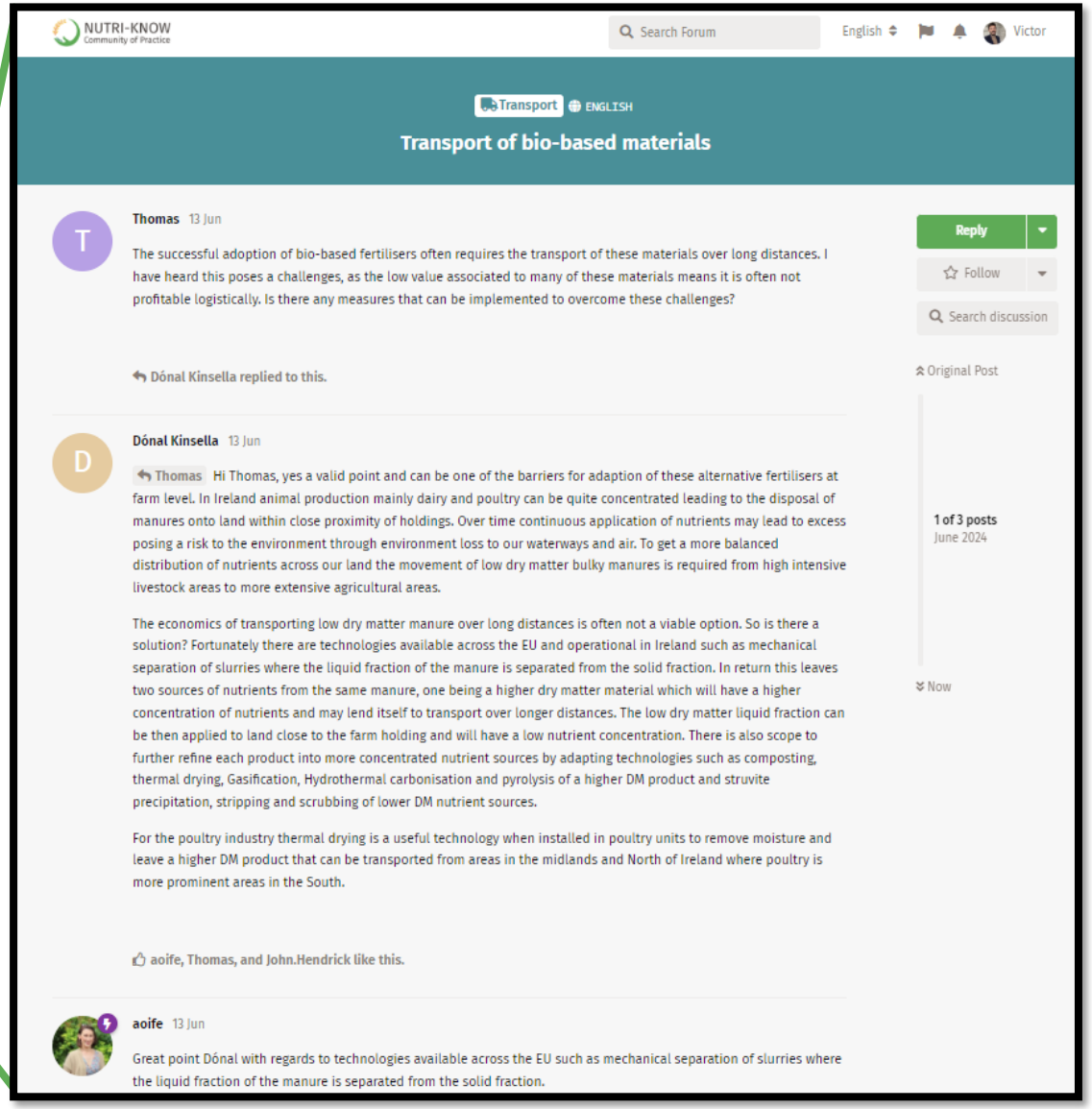
12th November 2024

Join our **Community Of Practice**!



Sign up and explore!





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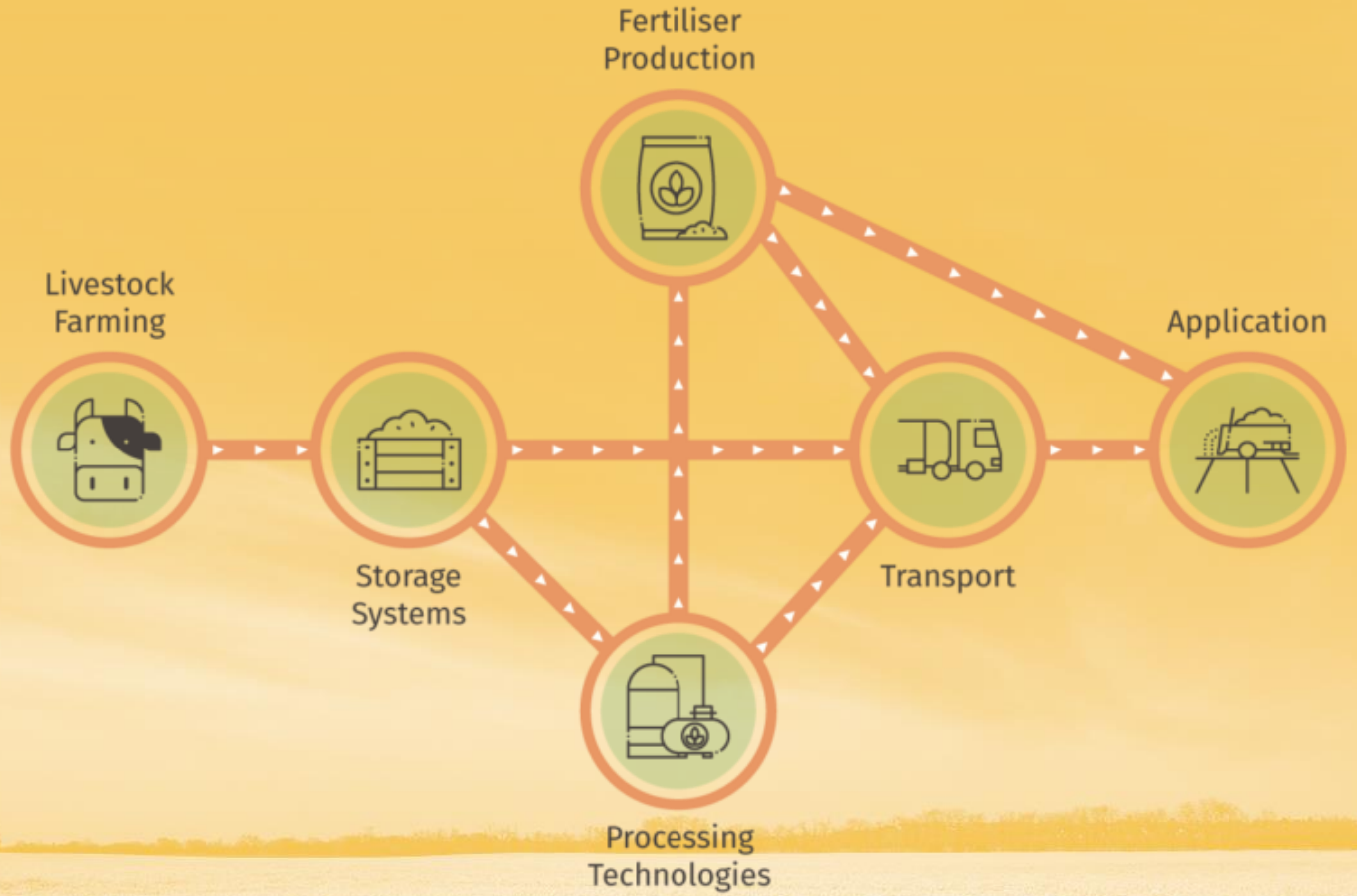

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Overview webinar series

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Overview webinar series

Time: 10:30 – 11:30AM

- October 8: Introduction webinar
- October 15: Livestock Farming
- October 22: Application
- October 29: Processing Technologies
- November 5: Fertiliser Production
- **November 12: Transport**
- November 19: Storage Systems

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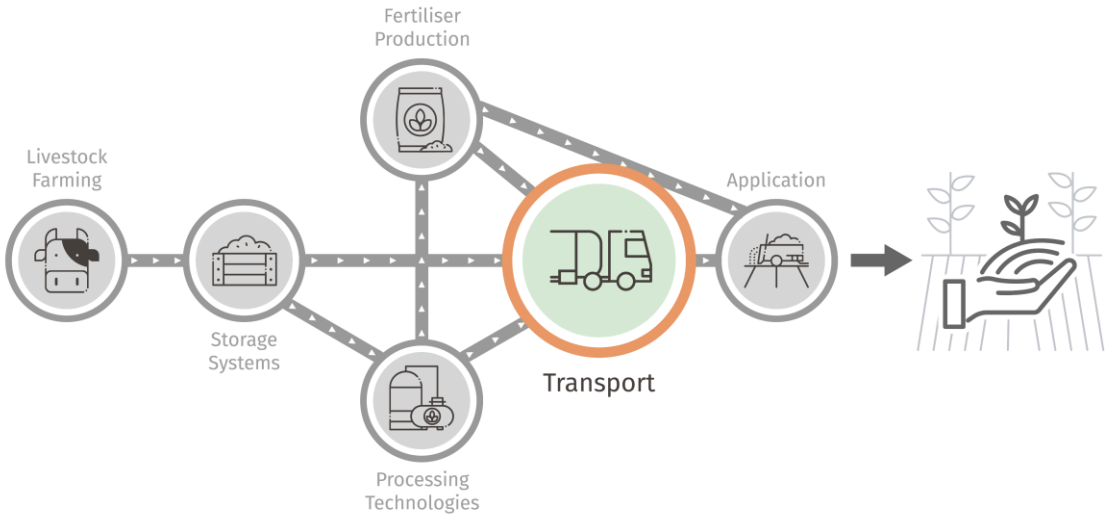
Transport of nutrients



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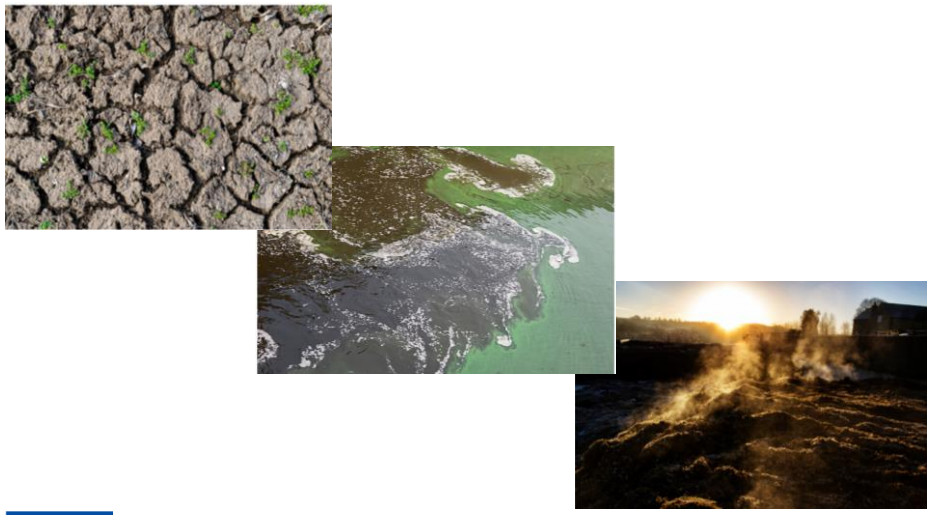
Innovations to optimise nutrient transport

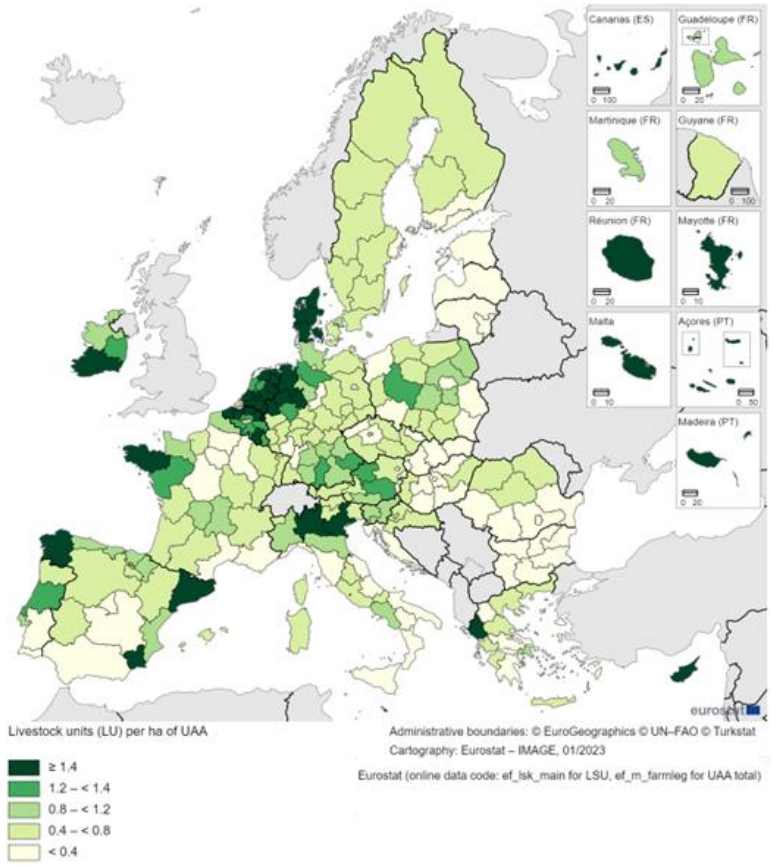
Current situation

Nutrient imbalance:

- Soil degradation
- Water contamination
- Greenhouse gas emissions



Livestock density



Source: Eurostat
Data from January 2023. Planned update: 26 January 2026 (with data from the Farm Structure Survey 2023).

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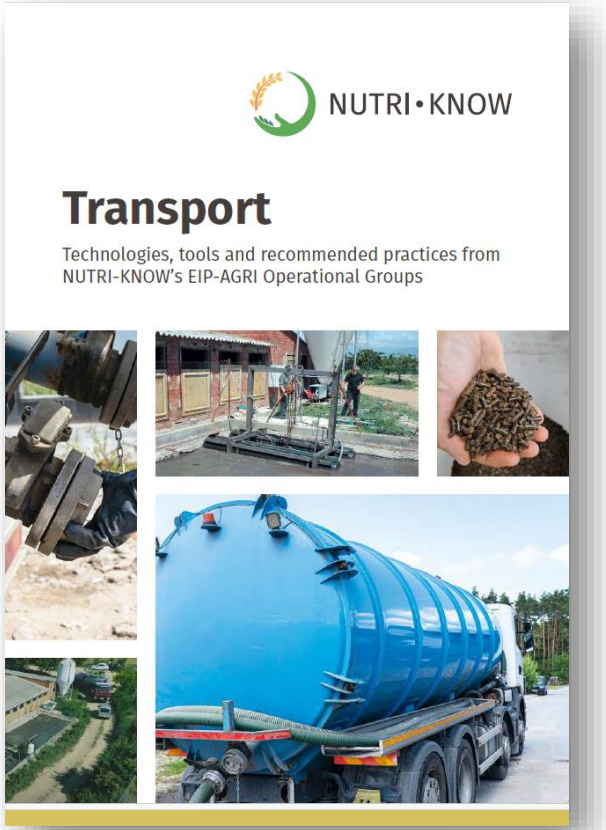
Processing Technologies for Nutrient Management

- Case 1: Slurry Concentrator (Ester Vega, UVIC-UCC)
- Case 2: Transport and traceability (GPS) of livestock manure in Catalonia (Esther Artigas, DACC)
- Case 3: Manure Management Tools (Clara Fullana, FCAC)
- Case 4: Bioferti+ (Nagore Guerra, UVIC-UCC)
- Q&A



Information on the other technologies via https://www.nutri-know.eu/wp-content/uploads/2024/10/Nutriknow_Booklets.zip

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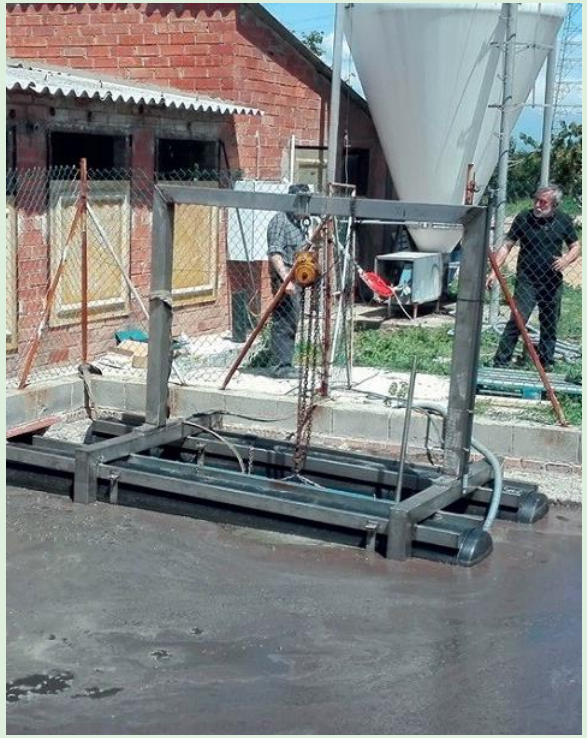
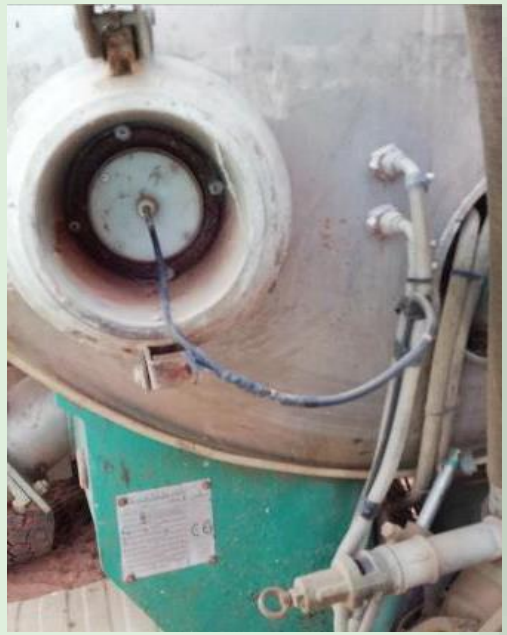
OG Slurry concentrator

Technologies to optimise nutrient transport





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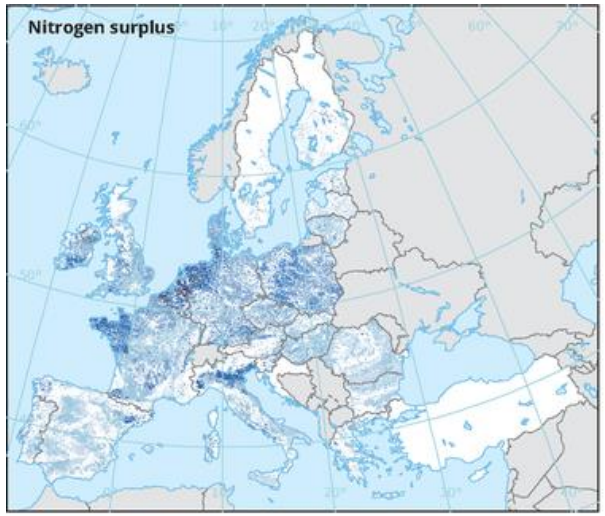
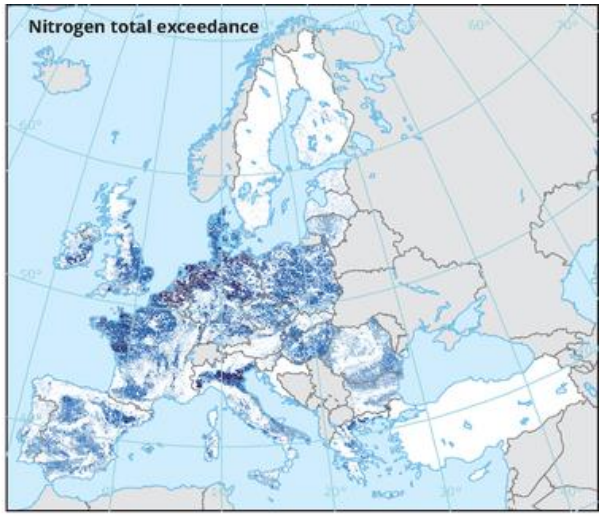
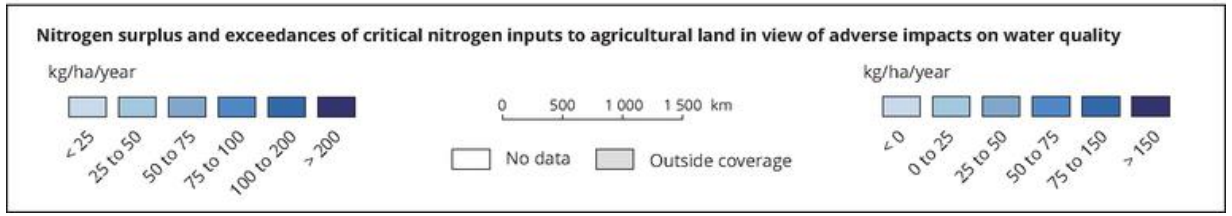
Slurry concentrator Context

Nitrogen surplus

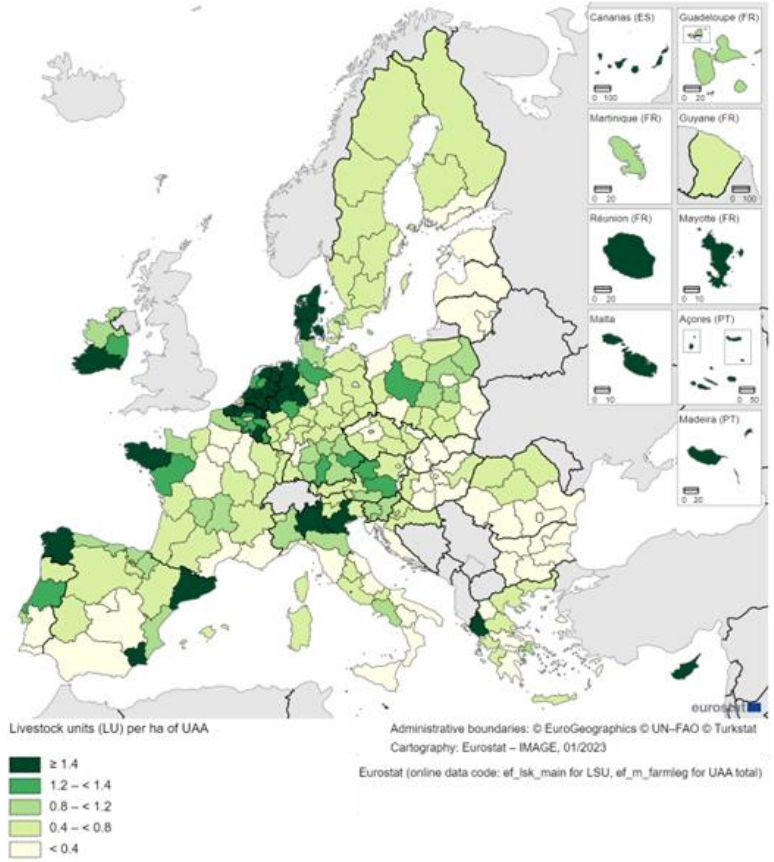






Source: European Environment Agency
Published 03 Dec 2019 | Modified 20 Sept 2024

Livestock density



Source: Eurostat
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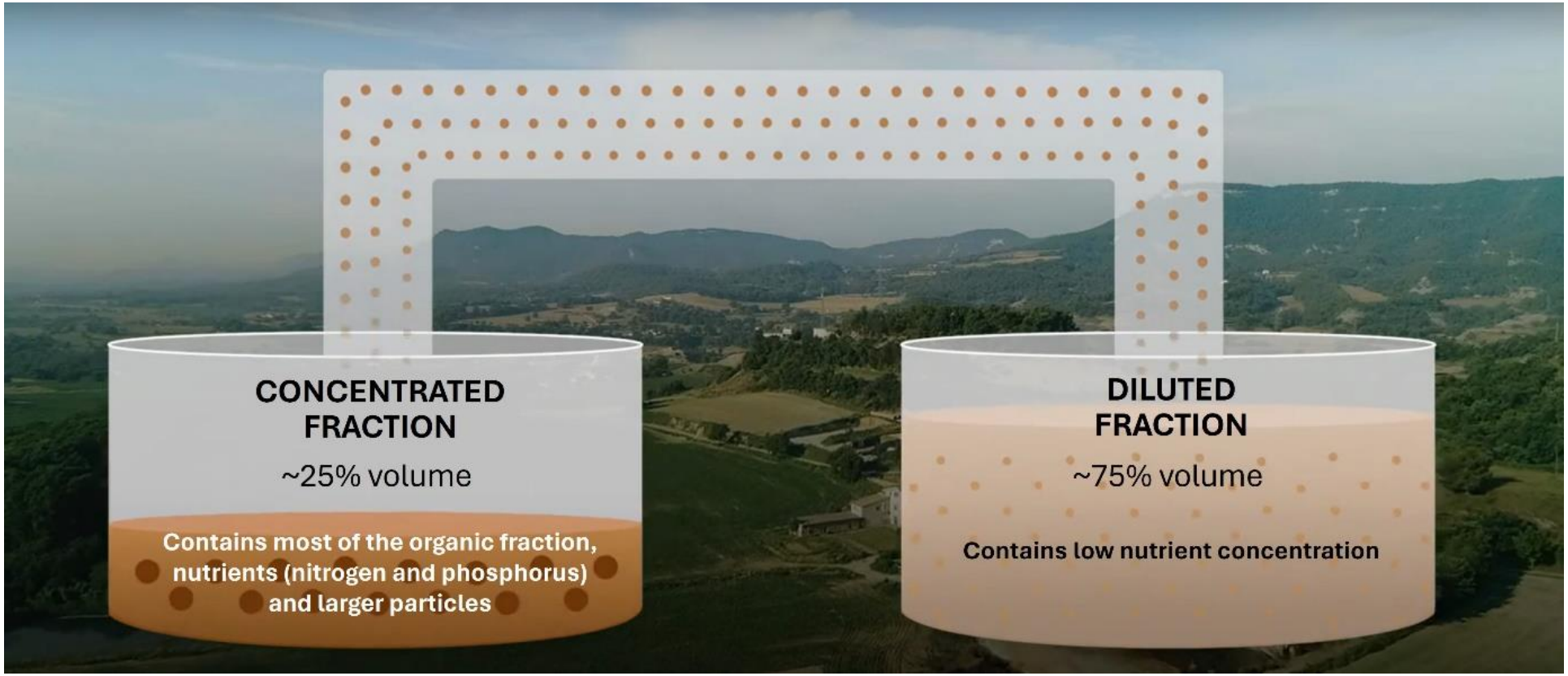
Slurry concentrator Technology



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Slurry concentrator Technology

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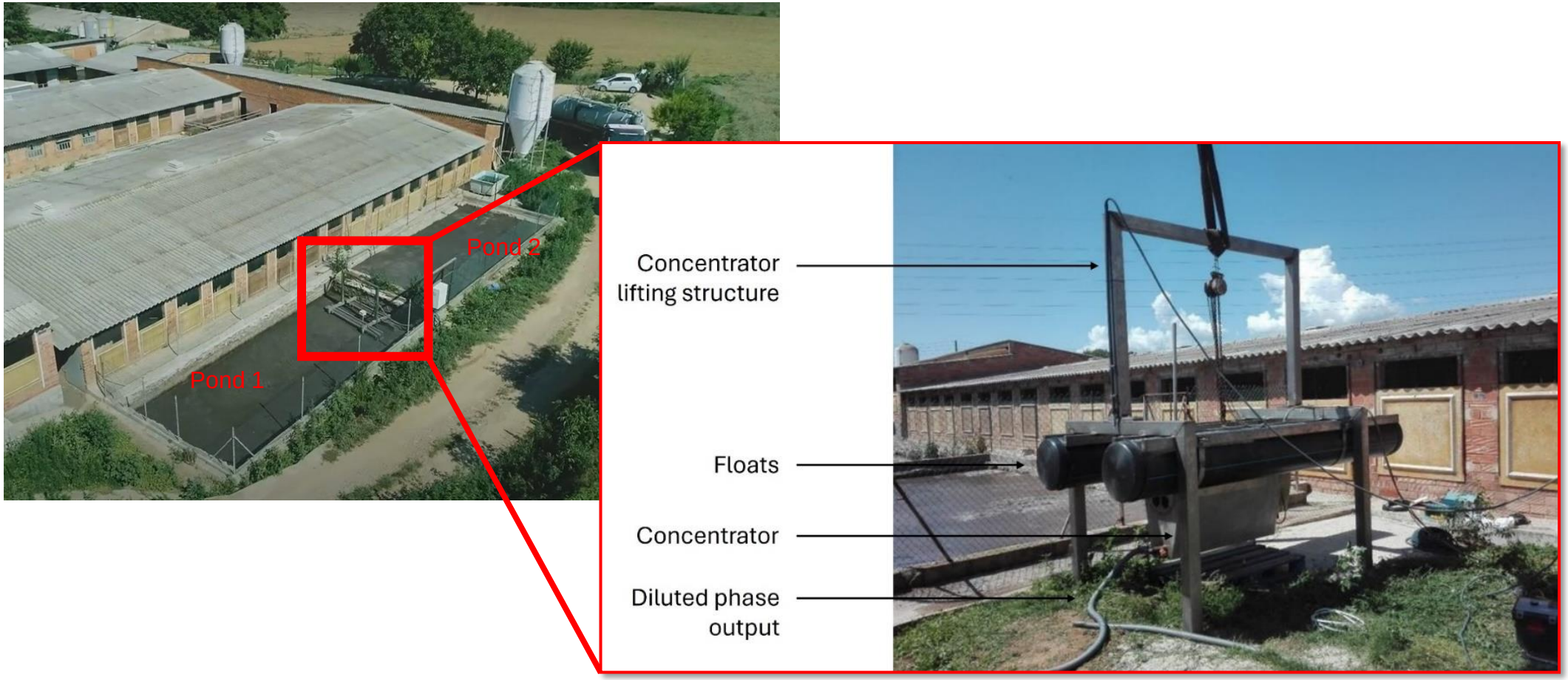
Slurry concentrator
How it works?



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Slurry concentrator

The equipment used to manage the two fractions is the same (tractor with a pump and a slurry tanker) which reduces investment costs, but also operating costs.

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Slurry concentrator
Economic viability

	Cost	Units
CAPEX (Capital Expenditure)		
Investment		
Concentrator……..	40,000	€
OPEX (Operational Expenditure)		
Operational costs		
Concentrator cleaning (2h/month)……..	300	€/year
Engine replacement (service life 4 years)……	100	€/year
Cost of slurry treatment		
Breeding slurry (0.14 kWh/m3)……..	0.018	€/m3
Fattening slurry (0.27 kWh/m3)……	0.035	€/m3

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Slurry concentrator
Economic viability - Transport

	Cost	Units
Transport		
Tank volume……....	20	m3
Truck consumption 25 tones….....	35	L/100km
Diesel price……..……	1.2	€/L
Approximate distances		
Nearby farms……..……..	20	km
Distant farms……..…….	250	km
Average farms……..……..……	135	km

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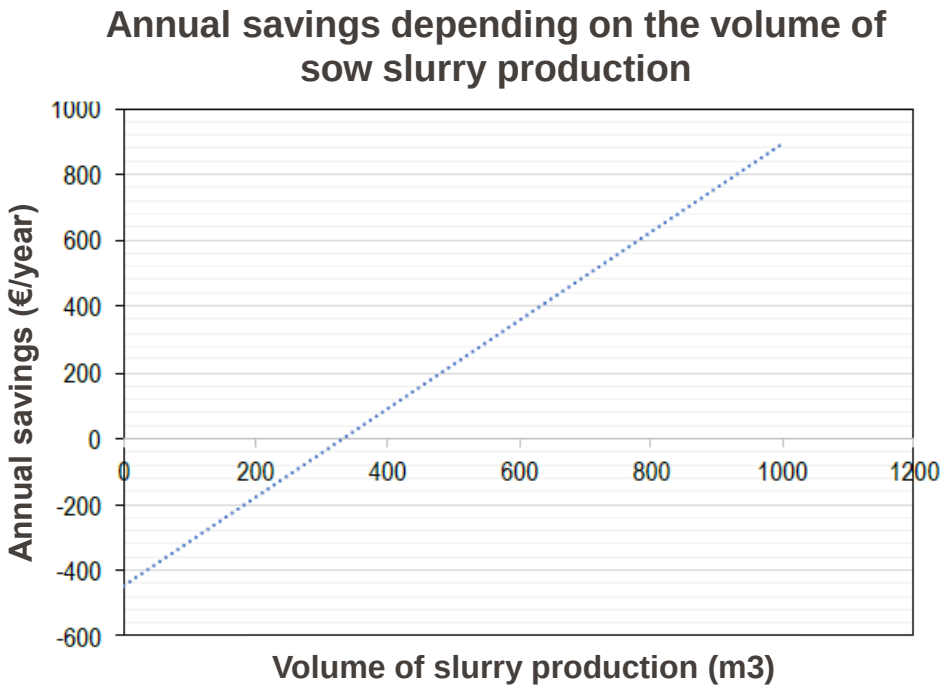
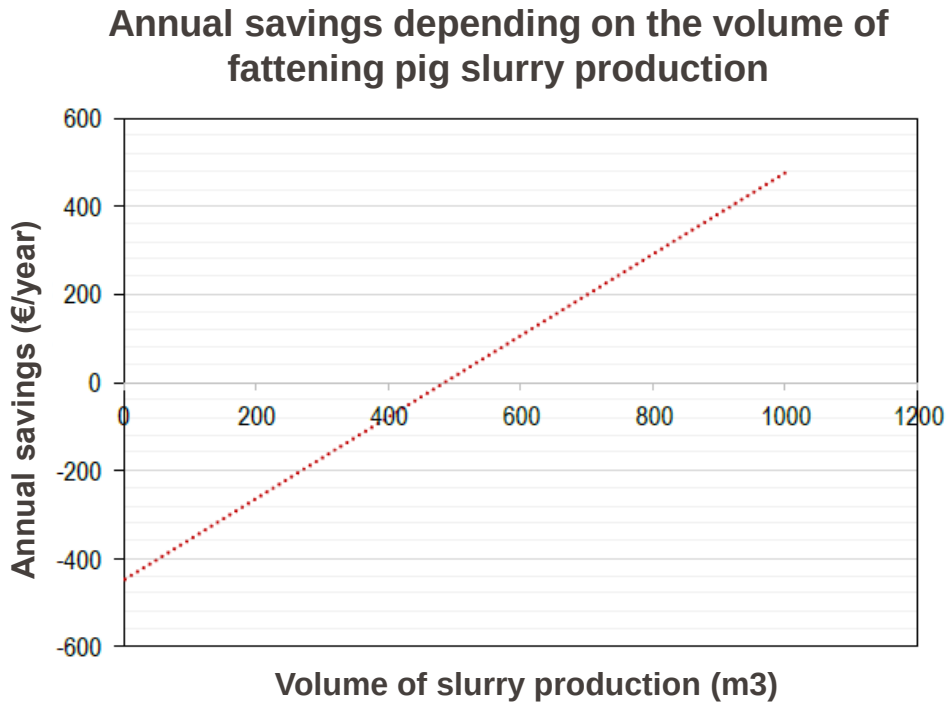
Slurry concentrator
Economic viability - Transport





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Slurry concentrator
Economic viability - Transport

Volume of slurry from sow or fattening operations required to achieve a **5-to-10-year return on investment**:

5 years		10 years	
sow	fattening	sow	fattening
6298 m3	9105 m3	3316 m3	4795 m3

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Slurry concentrator RESULTS

- **Increased Efficiency**: differentiated management of the two phases **minimises transport costs** and **optimises nutrient application** to the soil, both from an agronomic and environmental point of view.

- **Cost Savings**: using the **same equipment** for application. Slurry concentrator can be a **shared solution** for a group of farmers.

- **Enhanced Monitoring and Precision**: The system enables easier monitoring of applied nutrients to the soil.

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Livestock manure transport in Catalonia

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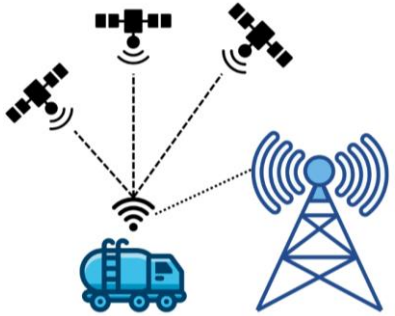
Livestock manure transport in Catalonia

- In Catalonia, livestock manure transport vehicles (such as tanks, trailers, and tractors) are required to have an electronic global positioning system (GPS) and a unit for receiving, recording, and transmitting data about the origin, destination, and characteristics of the manure.
- This data must be sent in real-time to the platform managed by the department responsible for agriculture and livestock farming in Catalonia.
- In the GPS Traceability section of eDERAN, you can consult the information sent electronically to the Department on the destinations of livestock droppings by GPS system.
- In certain cases, vehicles responsible for transporting treated sludge from wastewater treatment plants and other agro-industrial organic waste from production centers to receiving sites must also be equipped with the same equipment and transmit data in real time to the platform provided by the department responsible for waste management.



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Livestock manure transport in Catalonia

Regional regulation D 153/19, of July 3 (Article 14.2)

Requirement to carry GPS and transmit data

When the transport is done by personnel from the farm or the receiving parcel:

- It is mandatory starting from **5 km**.
- It is mandatory starting from **0 km** if the slurry comes from a farm located in a VZ and is applied on a parcel located in a NVZ.

When the transport is done by personnel not affiliated with the farm or the receiving parcel:

- It is mandatory starting from 0 km.

For more information, please refer to Technical Sheet 19

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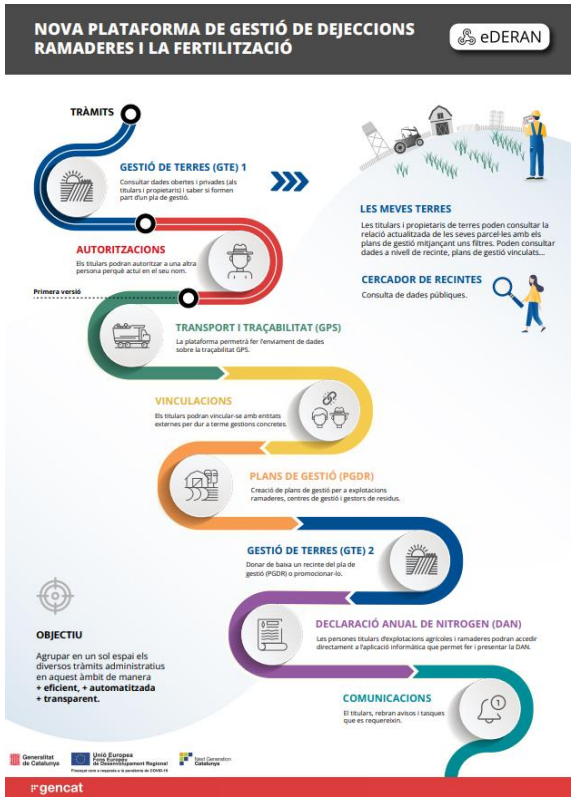
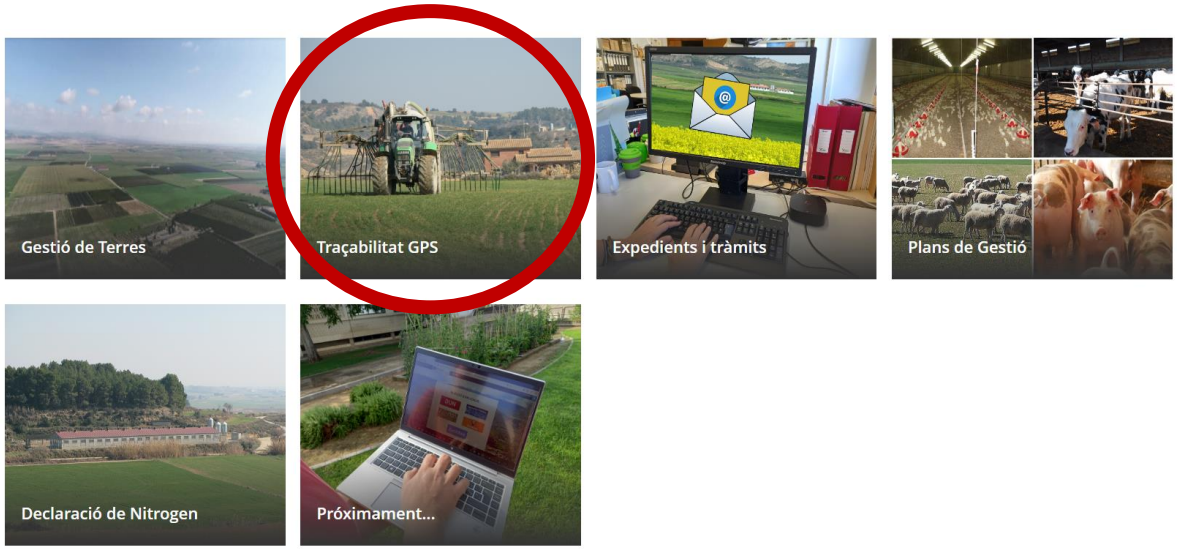
Livestock manure transport in Catalonia

eDERAN





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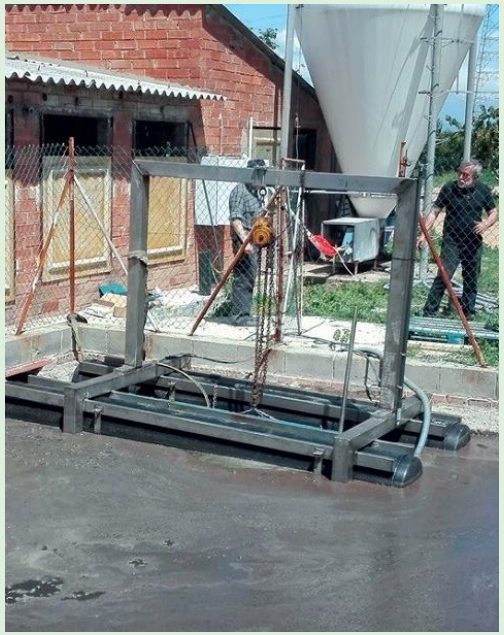
Technologies to optimise nutrient transport



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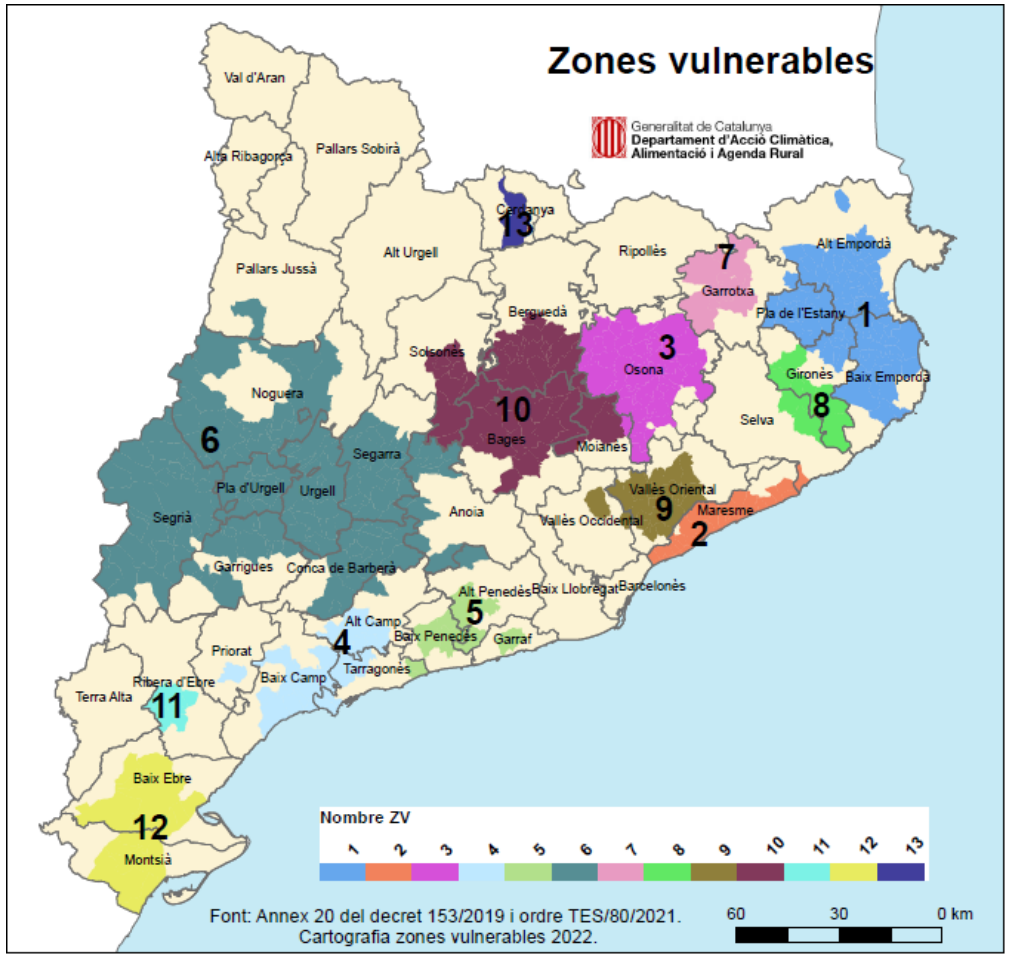
Manure Management Tools



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Manure Management Tools

Slurry storage

Storage system for biogas production

Compost production

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Manure Management Tools

Compost from poultry manure transported with big bags

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Manure Management Tools

Slurry concentrator

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Manure Management Tools

Conductimeters installed on trucks to value nutrient content of manure during transport and in soils

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Technologies to optimise nutrient transport

OG Bioferti+

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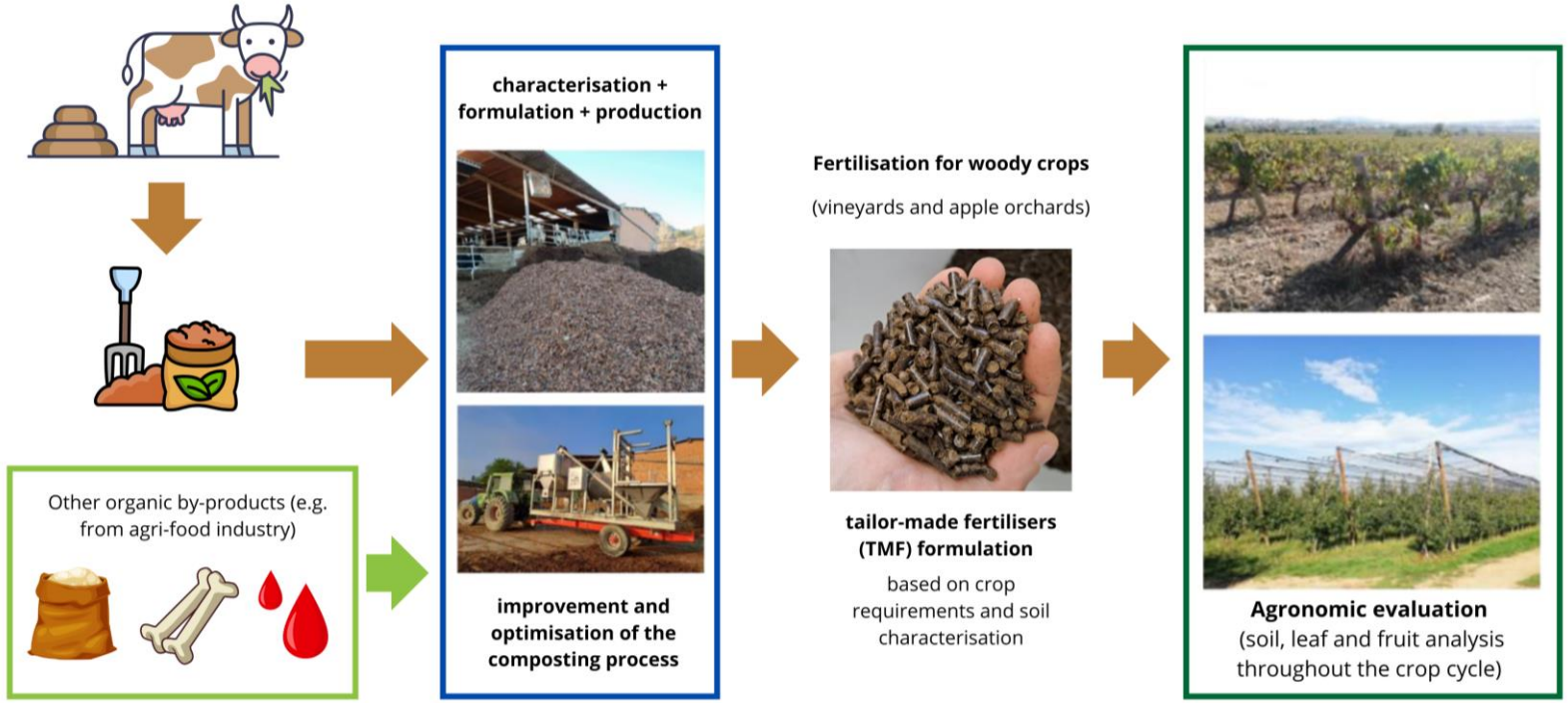
Bioferti+

The main objective of the OG Bioferti+ is the conversion of a **bovine manure** composting plant into a plant producing **high-quality tailor-made fertilisers** (TMF) in the form of pellets to be used to fertilise woody crops (e.g., vineyards and apple orchards).



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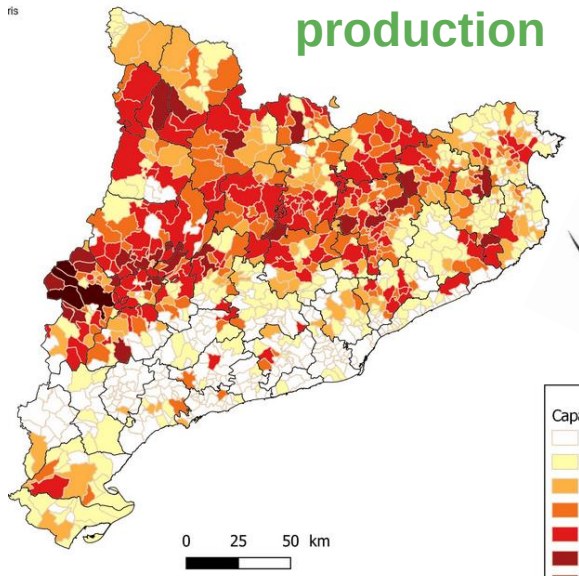
Bioferti+

Challenges

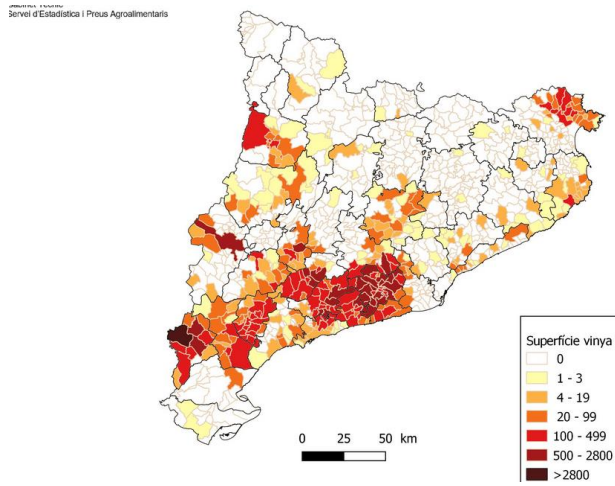
- **By-product valorisation** from cattle manure and other organic waste → transformation into a business model based on **circular bioeconomy**
- **Improve the management of animal manure**
- **Use of organic fertilizers** in the agricultural sector as a substitute of mineral fertilizers or raw manure
- Need of **efficient logistic** models
- **Improve resiliency** of both sectors **to climate change**

Cattle and milking cows production

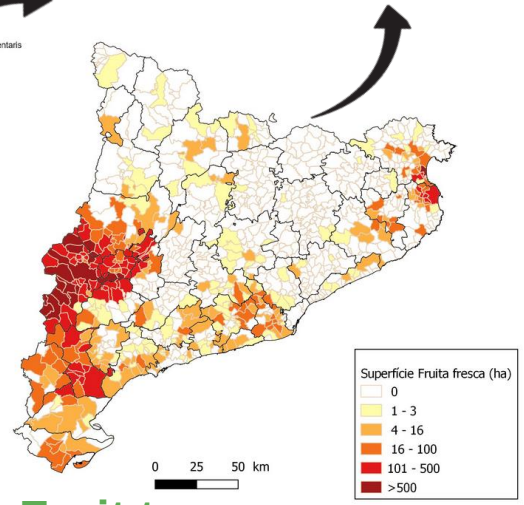


Organic matter and nutrient generation area

High demand of organic matter and nutrients



Vineyard



Fruit trees

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Bioferti+

Innovative solution

- **Modifications in the composting process have been developed** to prevent an excessive retention of moisture and to avoid the product's compaction.
- **Formulation of a tailor-made pelletized bio-based fertilizer** that meets the specific nutritional needs of the target crops (vineyards, apple).
- **Transportation** of highly **concentrated (an pelletised)** fertiliser from intensive organic matter production area to areas with high demand of organic matter and nutrients for their crops

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Bioferti+

Main activities

- **Optimization of the composting process** to obtain a product with a great fertilizing capabilities.
- **Formulation and production of tailor-made bio- based fertilizers** (TMF) for vineyards and apple orchards.
- **Agronomic trials to test the TMFs** in vineyards and apple orchards, and incubation assays to study the nutrient release of the product.
- **Technical, economic and environmental feasibility study** of the developed system.

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Bioferti+

Main outcomes

- The **excess of moisture** in the composting piles **hampering the process, was solved** by the operative modifications applied.
- The **composting process has been improved** monitoring temperature and humidity, to obtain a final product with relevant nutritional characteristics.
- **The TMFs for vineyard and apple orchard were formulated** using the compost produced with the addition of a nitrogen supplement (biochar), based on the nutritional composition of the soil and the nutritional requirements of the crops.
- **Economic, environmental and social sustainability** assessed

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Bioferti+

Benefits:

- The pelleting process offers an economically competitive benefit in terms of **transport**. Also, it represents an advantage from a practical point of view for farmers, since it allows them to use the machinery they already use for chemical fertilisation.
- The **formulation is adapted** to the specific needs of each crop, considering factors such as production type, soil characteristics, and local climate conditions.
- Pellets provide a sustained release of nutrients, gradually decomposing to nourish soil and crops over extended periods. Long-lasting pellets reduce the need for frequent applications, contributing to more **sustainable farming practices**.

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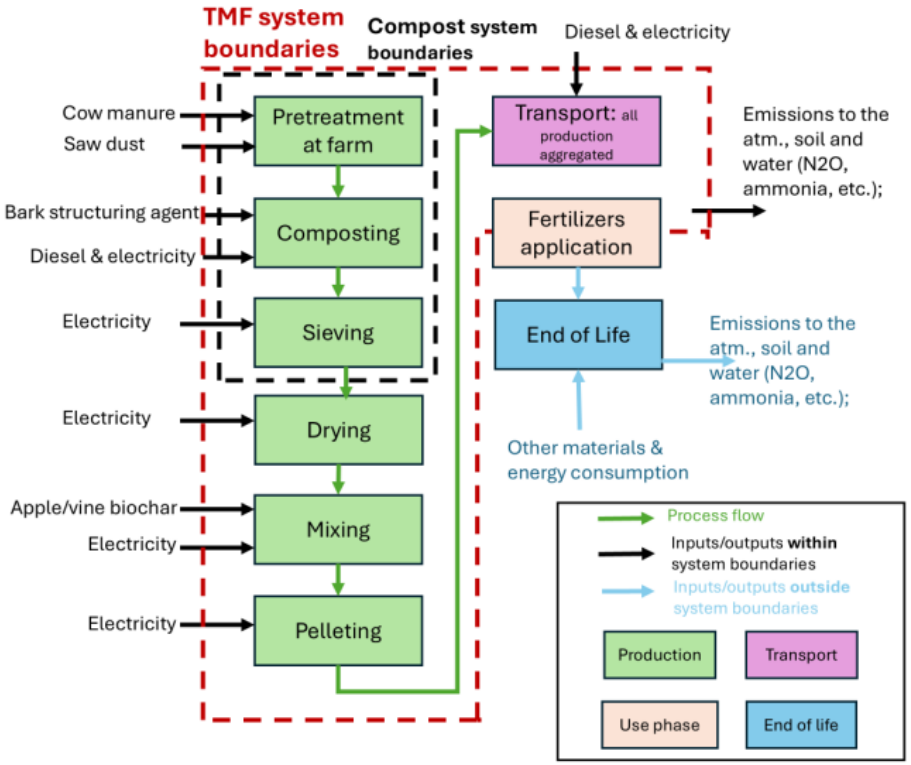
Bioferti+

Limitations: application of TMF vs. Mineral fertiliser



- **Vineyard** (conventional and organic)
  - TMF cost 260€/t vs. Mineral 587€/t
  - Application rate: TMF 1.3 and 2t/ha vs commercial 0.4t mineral/ha or 0.5t organic fertiliser/ha
  - Crop production cost: TMF 47-57€/t vs. 20-30€/t
- **Apple**
  - TMF cost 342€/t vs. Mineral 50€/t
  - Application rate: TMF 4t/ha vs commercial 4t mineral/ha
  - Crop production cost: TMF 156€/t vs. 192€/t

Relevant effect of **transportation cost**: unable to overcome it with the added value of the product at the moment

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Q&A

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November 19: Storage Systems