

Use of insect larvae as an alternative for the management of livestock manure in the pig sector in Catalonia



Author: **Joan Andrés Escudero Barberà**

Faculty of Veterinary Medicine June 2021



Objectives

- Highlight the main problems derived from the production of manure in Catalonia.
- Study the different current possibilities applicable in the production and management of manure, with the objective of minimizing the environmental impact.
- Assess the alternative management of manure with the use of insect larvae.



Problem

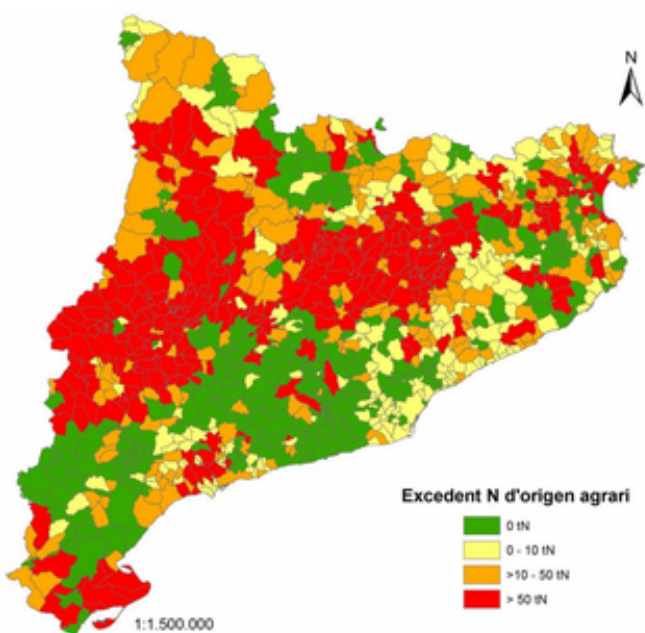


Fig 1. Surplus nitrogen of agricultural origin (tons / year) at municipal level

In Catalonia:

- There are more than 7 million pigs
- It has one of the highest pig densities in the world
- 90% of pigs are present in intensive systems.
- It generates thousands of work places and has great economic impact

High pig density = High pig manure density



What are the consequences ?

- Pig manure and its variable composition has been studied under various parameters
- Some of its components are problematic

NO_3 , NH_3 , P_2O_5 , K_2O , Cu...

- Groundwater nitrification and compromises potability
- Eutrophication and / or excessive nutrient concentration in surface water
- Soil and water acidification
- Mucosal irritation in animals
- Odour problems and loss of air quality
- Phytotoxicity by heavy metals
- Other environmental consequences



Collection of evaluated actions

At the origin

- **Water system control** → (drinking troughs, cover ponds...)
- **Diet** → (enzymes, pH changes, granulation...)
- **Genetic** → (genetically modified)

On waste management

- Dispersal or controlled injection in the fields
- Aerobic digestion / composting
- Anaerobic digestion
- Direct thermal drying



New alternative: use of insects

It is the natural way that nature has to decompose manure

After a phase separation, it is obtained:

- **Liquid phase:** Potential contaminant has been reduced → fertilizer use
- **Solid phase:** Where contaminants have been accumulated.

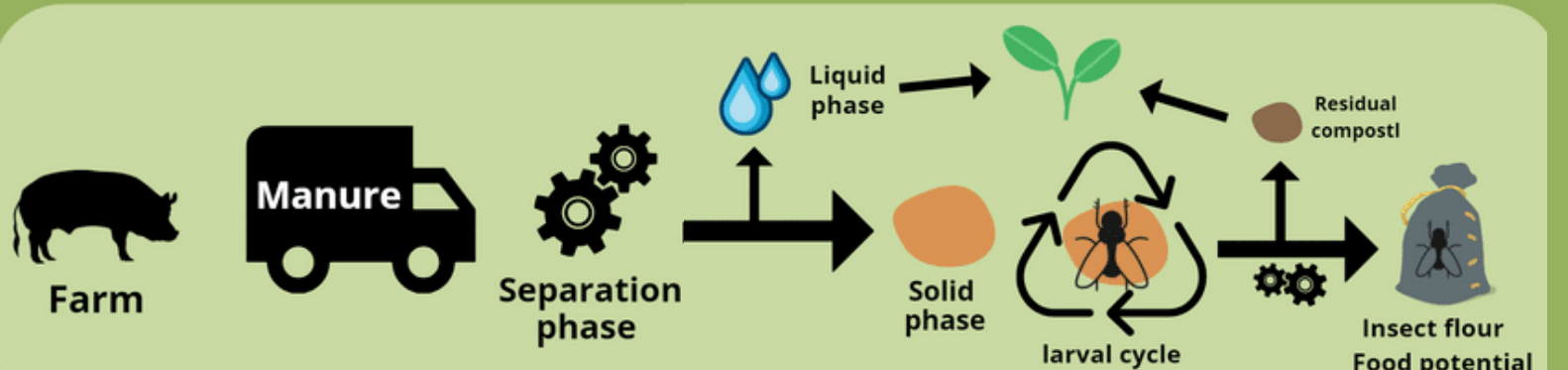


Fig 4. Summary scheme of the processed

We propose the reconversion and revaluation of the solid phase with the fly larva *Hermetia Illucens*

Insect	Growth substrate	Reference
<i>Hermetia illucens</i>	Chicken manure	(Sheppard et al, 1994)
<i>Hermetia illucens</i>	Pig manure	(Newton et al, 2005)
<i>Hermetia illucens</i>	Municipal waste	(Studt-Solano, 2010)
<i>Hermetia illucens</i>	Pig manure	(Dortmans et al, 2017)
<i>Hermetia illucens</i>	Chicken manure	(Bortolini et al, 2020)

Table 1. Collection of numerous studies using *Hermetia Illucens* for the management of organic waste.

Nutritionally:

- Complete and very competent amino acid profile
- High quality protein and fat content
- It contains vitamins and minerals
- Presence of bioactive compounds



Fig 3. *Hermetia Illucens*



Conclusions

- It is necessary to have a knowledge of the different ways to reduce and / or manage the pig manure in order to be able to adapt the distinct alternatives to each operation.
- With increase in global feed requirements forecasted, the use of insects as a source of quality protein is being considered. The revaluation of slurry as a larval feed substrate could provide a possible bimodal solution for the pig sector and the food industry. However, there is still a lot of research to be done on this subject at the moment.