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# SELF-SUFFICIENCY FOR ANIMAL FEED: A MULTI-LEVEL FRAMEWORK TO PROMOTE AGROECOLOGICAL FARMING SYSTEMS

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# Once upon a time trucks travelling across frontier

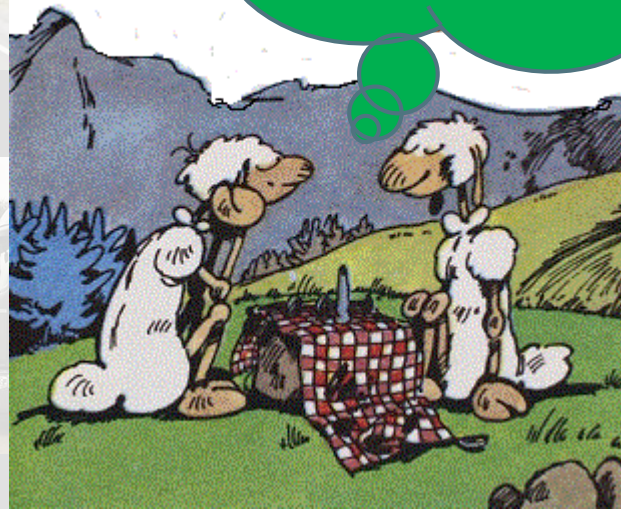




*One 's upon a time lories  
travell' ... frontier*

We want hay, straw,  
ammonium nitrate, and soya  
for Roquefort production

*We could be  
self-sufficient for  
feeding !!!*



# Main points for this presentation

- ⦿ A conceptual framework and indicators to assess feed sufficiency
- ⦿ Choice of sample farms & methods
- ⦿ Using framework at farm level to define feed self-sufficiency
- ⦿ Examples and Challenge at territory and supply chain level

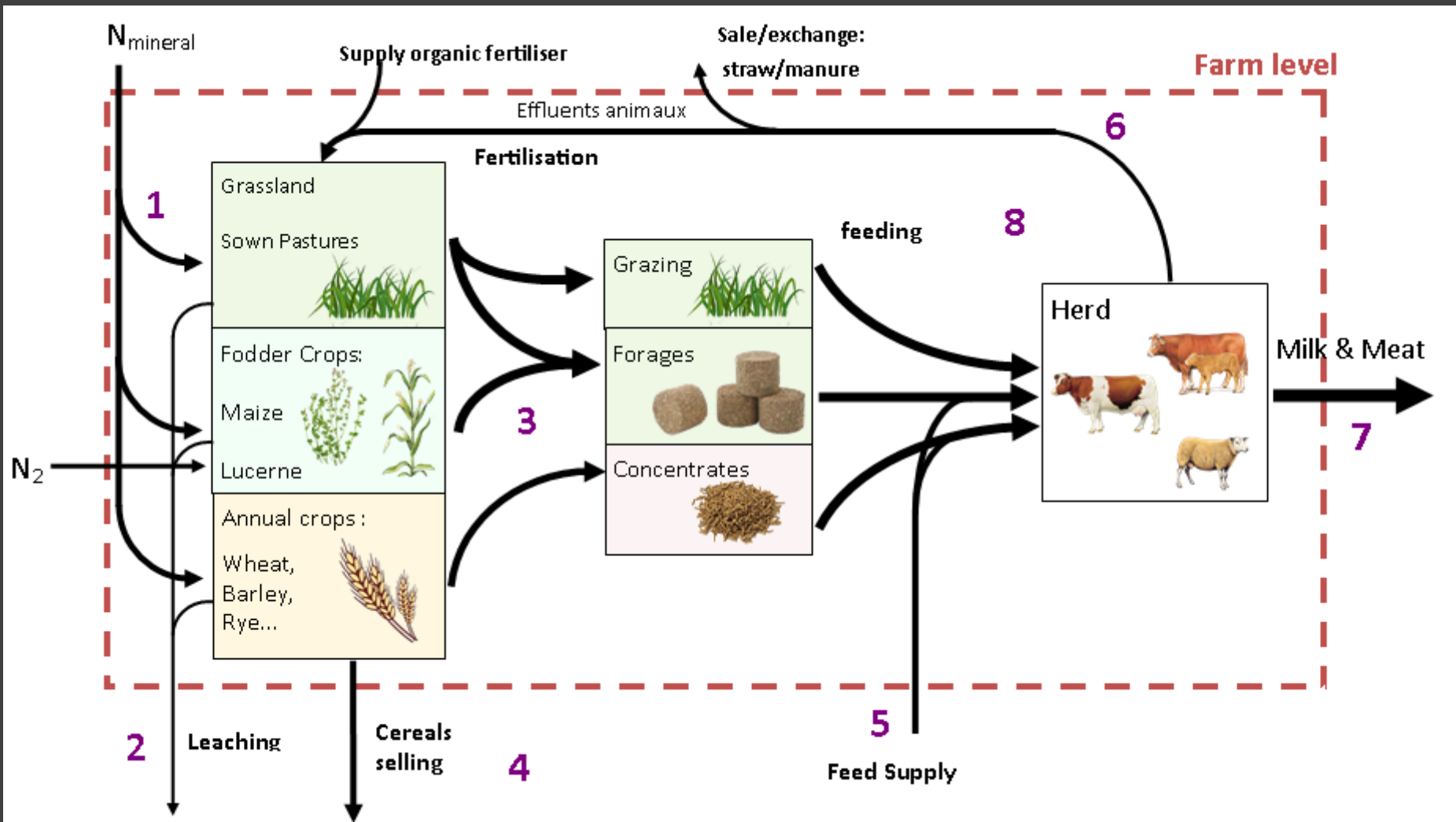
# Issue and objective of the study

- ⦿ Self-sufficiency as a driver of agroecological transition.
  - ⦿ Most farmers combine livestock with forage and crop production to increase self-sufficiency for animal feeding.
  - ⦿ Few farms can develop local exchanges to use local resources.
- ↪ To build framework characterizing self-sufficiency for animal feeding at farm level in order to discuss the issue of this feed self-sufficiency at different levels :
- farm, local farmer's group, territory or supply-chain.*

# Hypothesis for the conceptual framework

- ① How to scheme the feed sufficiency at farm level using stock and flow approach:
  - Explaining different feed inflow and outflow used by animals.
  - Calculating the production impacts at farm level.
- ② What is the relevance of these flows at territory level ?
  - Flows approach can be used at territory level by aggregating data.
  - Exchanges between farmers at local level can foster feed sufficiency.
  - Supply chain actors must take into account needs for self-sufficiency for animal feeding.

# Conceptual framework





# Methodology: Sample Farms and studies

## Analysis at farm level

*Agriculture census (Agreste, 2010) in Aveyron department : Dairy cow, suckling cow and Dairy sheep farms represent 70% of the farms*

Collect data from:  
20 farms Dairy and suckling cows (*Dumas 2015*)  
21 farms Dairy sheep (*Di Bartolomeo 2014, Galtier 2015*)

Stock&Flow Modelling and indicators assessment ①

## Territory Level

Aggregation of the farms at the agricultural region "Segala" 2 199 EA  
*Grimaldi 2013*

Stock&Flow Modelling at local region *without performances analysis* ②

## Territory and Supply chain Level

Analysis of exchange and agreement between farmers in two local regions  
*Mélaç 2014, Péquignot 2015*

Interviews of stakeholders at farmers 'groups and supply chain level ③ ④

# Indicators to assess feed sufficiency

Feed Sufficiency

Forage Sufficiency Indicator → based on ratio forage production / consumption

Energy Sufficiency Indicator → based on energy part of forage and concentrates

Protein Sufficiency Indicator → based on protein part of forage and concentrates

Farm Features

Crops & Forage crops area

Rangeland per LU

Stocking rate

Animal Productivity

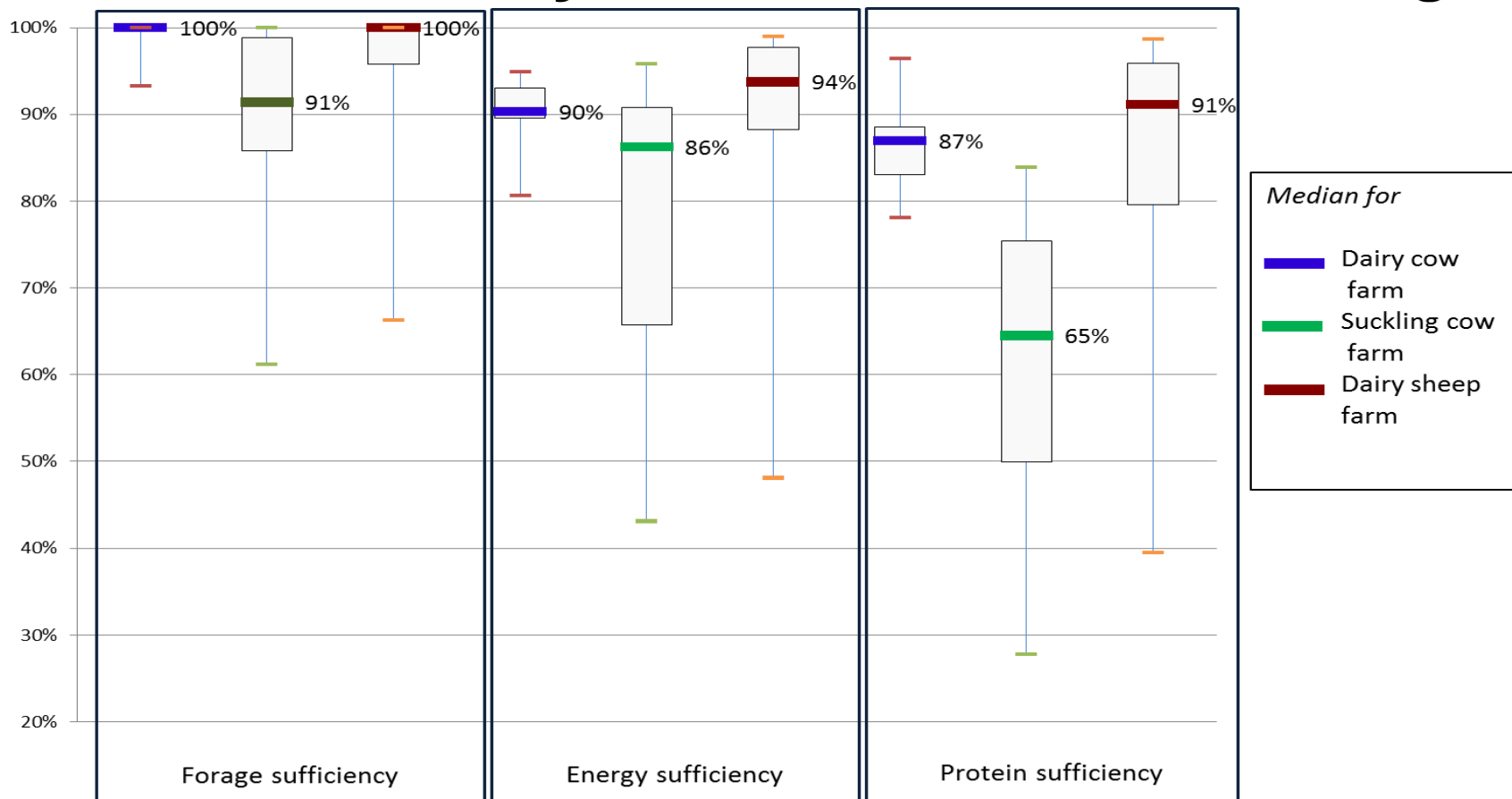
*Production Impacts*

Nitrogen Environmental Impact → based on nitrogen losses (kg Nitrogen lost by ha of AA)

Food Productivity Impact → based on protein production (kg protein produced by kg Nitrogen input)

# Feed sufficiency at farm level

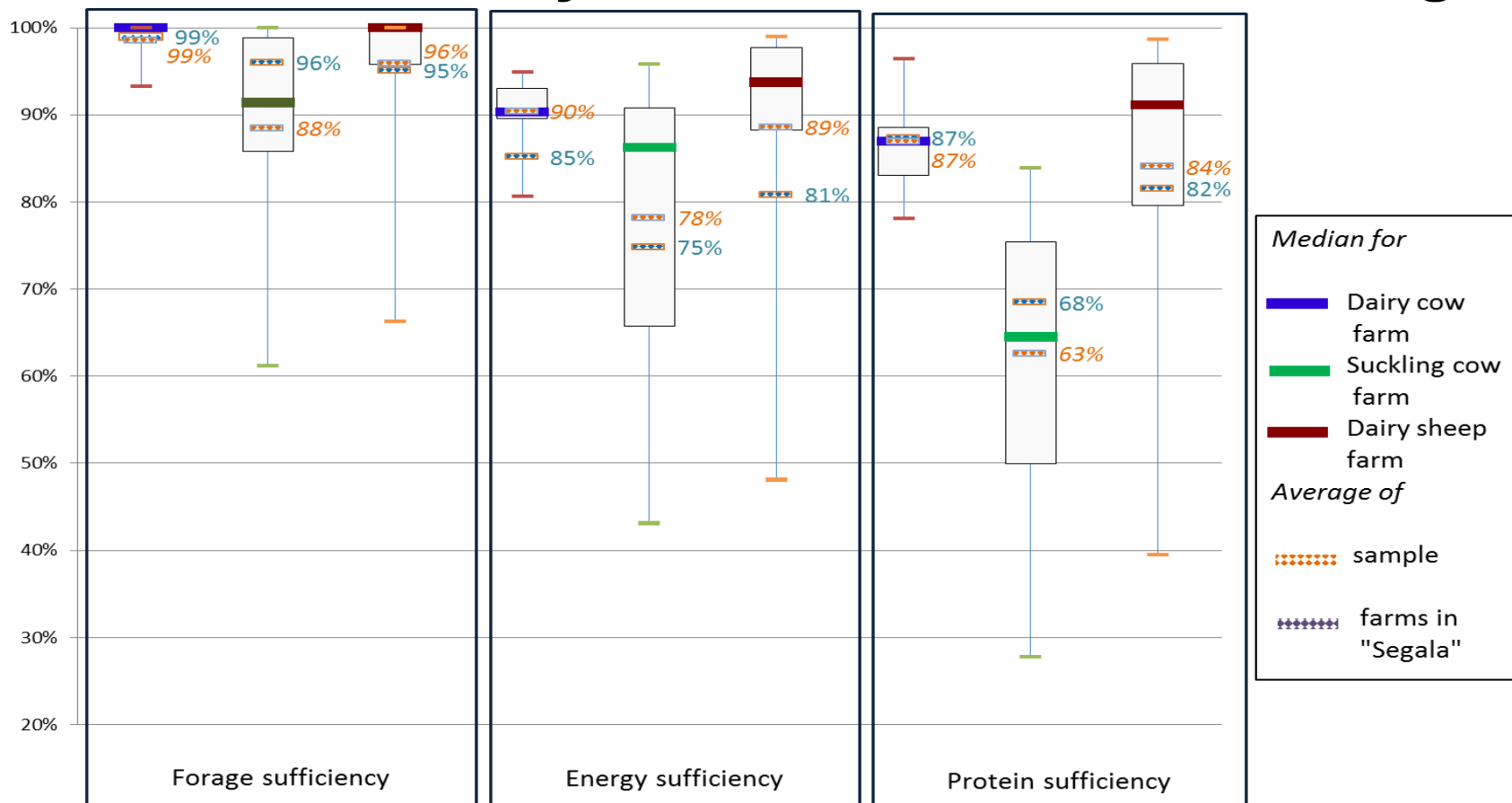
## Feed self-sufficiency for different livestock farming



A large diversity in dairy farms,  
mainly for Energy and Protein

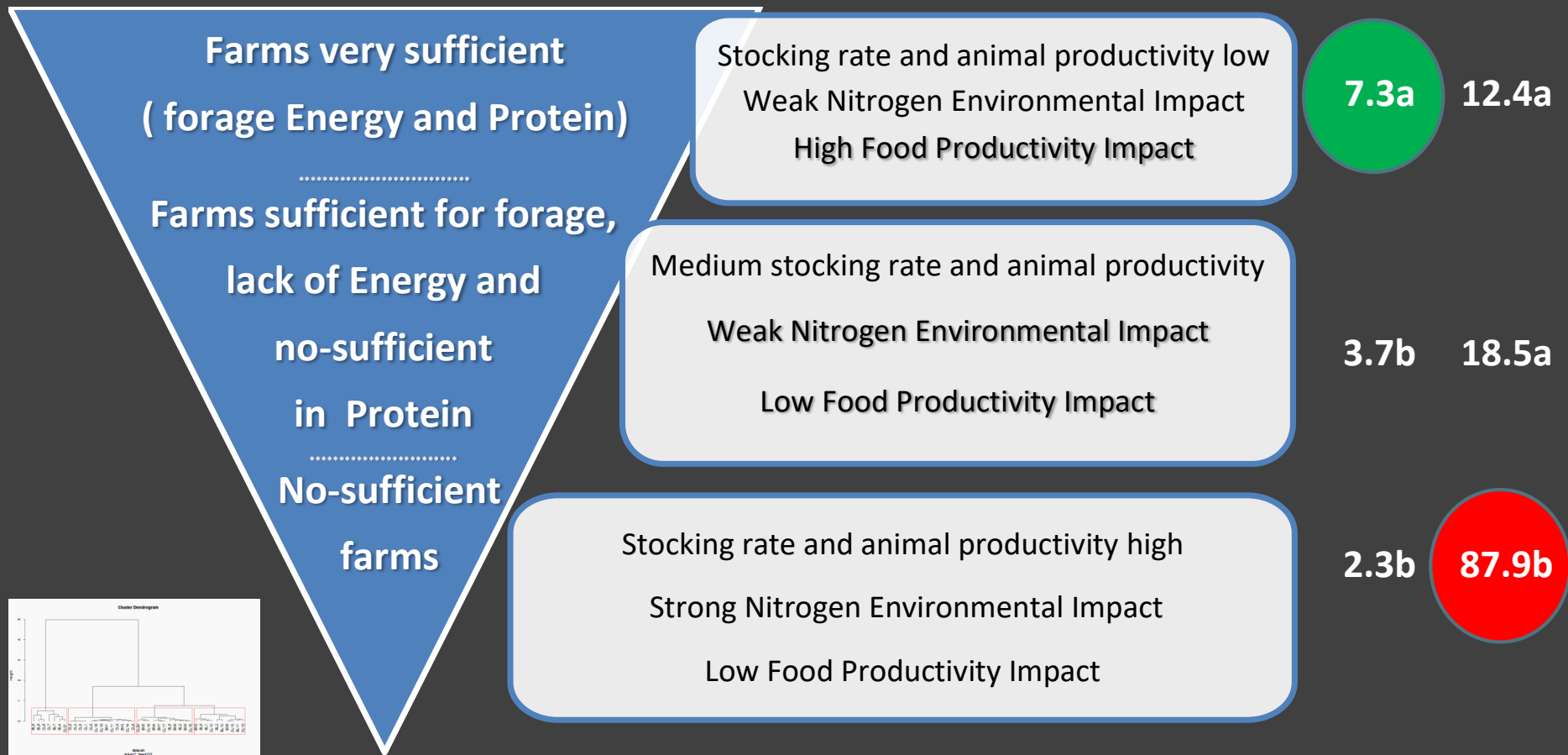
# Feed sufficiency at regional scale

## Feed self-sufficiency for different livestock farming



The averages of sample farms and all farms of the census in this small region are close

# Impacts for different stages of farm sufficiency



Three stages of farm sufficiency defined by PCA and clustering method



# Improving agreements and exchanges at Territory level

- Local initiatives arise to develop exchange between farmers



*A web-network  
for organic farming*



Exchanges between crops farmers and livestock farmers : [www.ecebio31.fr](http://www.ecebio31.fr)

*After one year:*

*41 livestock farmers and 65 crops farmers  
95 offers (mainly hay and « meteil »)*

**Stakes** Limiting prices hazard  
Local food network  
Crops with agronomic benefits

**Levers** Agronomic training  
Technical advises and monitoring  
Economic agreements  
Sustainable exchanges

**Limits** Web interface & design  
Price agreement  
Haulage and Storage services

# Local protein for animal fed: a challenge for supply chain level

- Agricultural cooperatives attempt to propose new services and products to the farmers



Develop clusters of fields to produce Alfalfa

**Stakes** Increase the area limiting haulage  
Preserve the water catchment  
Add value to productive areas

**Levers** Alfalfa fields in irrigated areas  
Small units for the dehydration of Alfalfa  
Sufficient group of crops and livestock farmers

**Limits** 1<sup>st</sup> cutting management and use

Availability of 800ha for Alfalfa within a radius of 20km

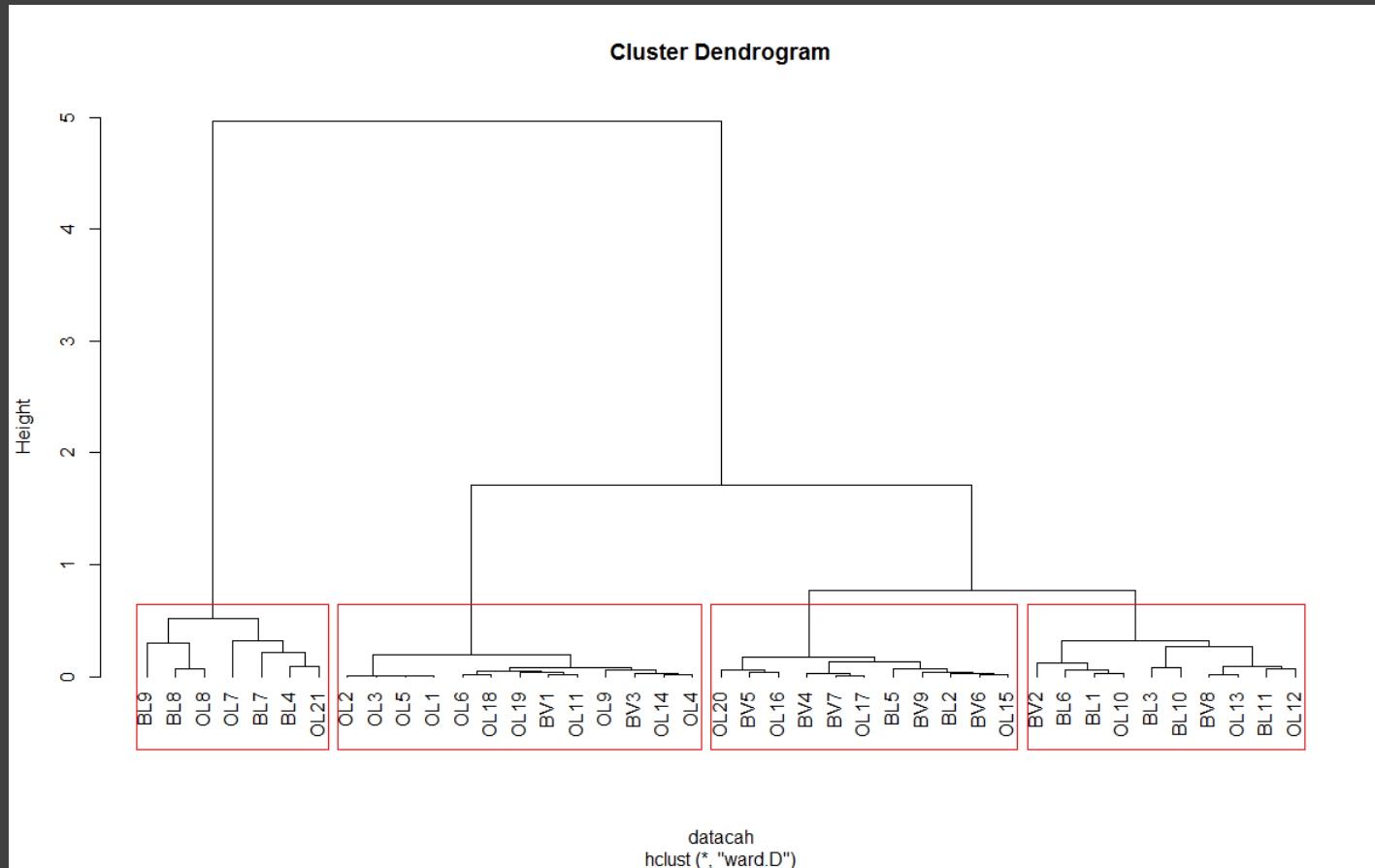
# Outlook for regional level

- ⦿ The actors of territory share an incentive for local production of forages and cereals. Debate is more complex for proteins.
- ⦿ Technical weaknesses could be overcome.
- ⦿ Logistic threats could limit the local initiative.
- ⦿ Territorial sufficiency or local feed production can be improved by new cooperation between farmers and supply chain actors.
- ⦿ Large types of resources can be used by farmers (knowledge, training, experiment, technical advises...).

# Conclusions: a framework for farm sufficiency

- The different stages of self-sufficiency are linked to farm performances:
  - ➔ Intensifying production and animal productivity increase energy and protein requirements .
  - ➔ Farmers need to supply animal with purchased concentrates, limiting the self-sufficiency at farm level.
- Aggregation at the regional level shows similar results to self-sufficiency for animal feeding among the main part of the farms.

# Three stages of farm sufficiency defined by PCA and clustering method







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