Relations between farm size, production intensity and sustainability of dairy farms in Wallonia

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The dairy sector has undergone structural changes

During the past 30 years, the dairy sector has been facing:

- a decrease in the **number** of farms
- an increase of their **size** (area, dairy herd, milk production)

→ Associated with a specialisation and an intensification of farming systems

Stakeholders of the Walloon dairy sector have **opposite perceptions** about the sustainability of these changes.

→ Analysis of the relations between farm size, production intensity and sustainability.

We combined farm classification and regression methods

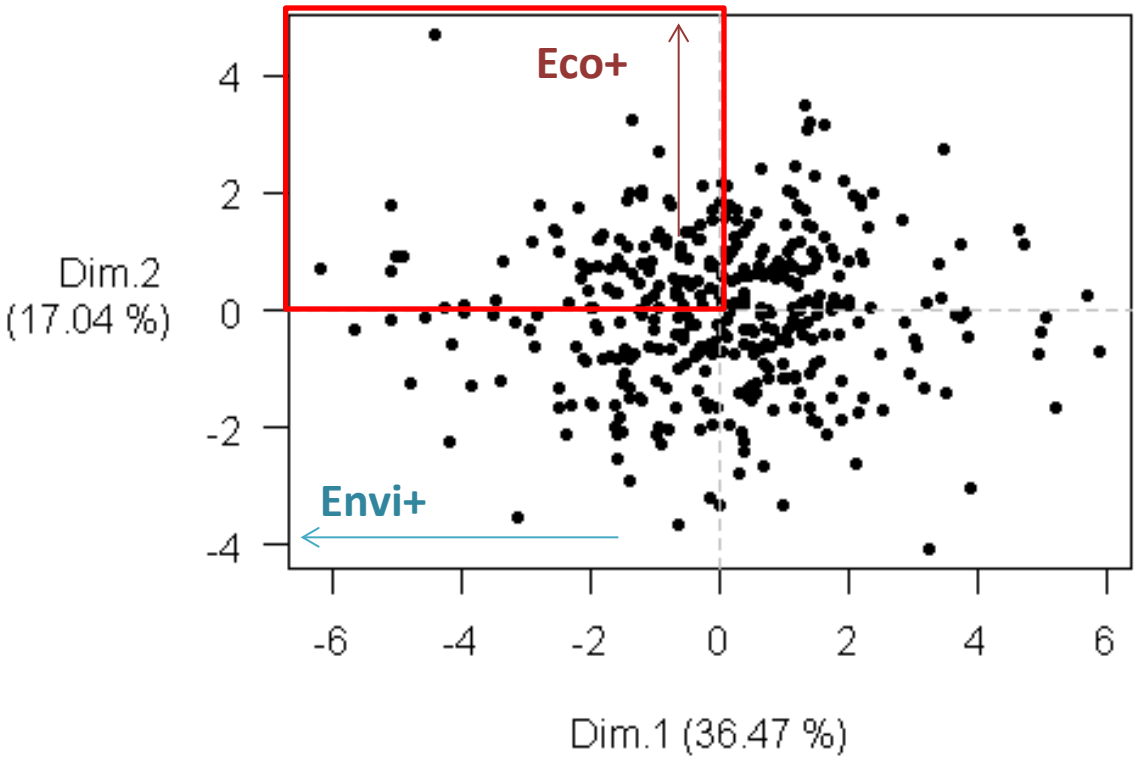
We used a sample of **381 specialised dairy farms** (2008) to analyse the relations between:

- Farm size: total milk production
- Intensity: milk production per hectare
- Economic and environmental indicators

We combined two **methods**:

- Farm classification depending on size and intensity and comparison of these classes
- Linear and logarithmic regression ($R^2 > 0.2$)

Our sample included farms with a diversity of performances



Dim.1 is mainly correlated with **environmental performances**

Dim.2 is highly correlated with **gross operating surplus per work unit**

24 % of farms combined relatively high environmental and economic performances.

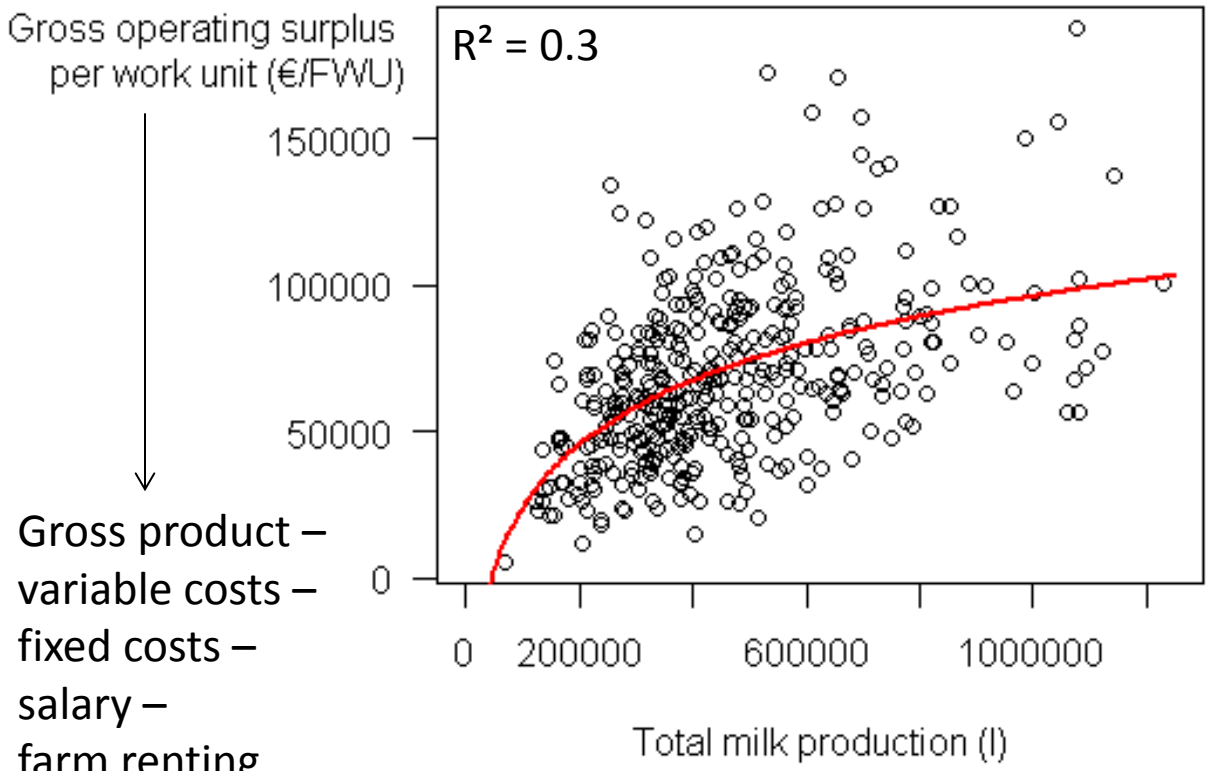
The analysis highlighted three main results

Relations between farm size and sustainability indicators

Relations between farm intensity and sustainability indicators

Comparison of size and intensity classes in terms of economic and environmental performance

Gross operating surplus tended to increase with the farm size



Gross product – variable costs – fixed costs – salary – farm renting

↑ size

- ↑ dairy cows/WU
- ↑ gross product/WU
- ↑ gross operating surplus/WU
- even if ↑ variable costs/WU

These relations are **logarithmic**

- 200 000 l to 300 000 l: + 13 000 €/FWU → + 6.5 %
- 600 000 l to 700 000 l : + 5000 €/FWU → + 0.8 %

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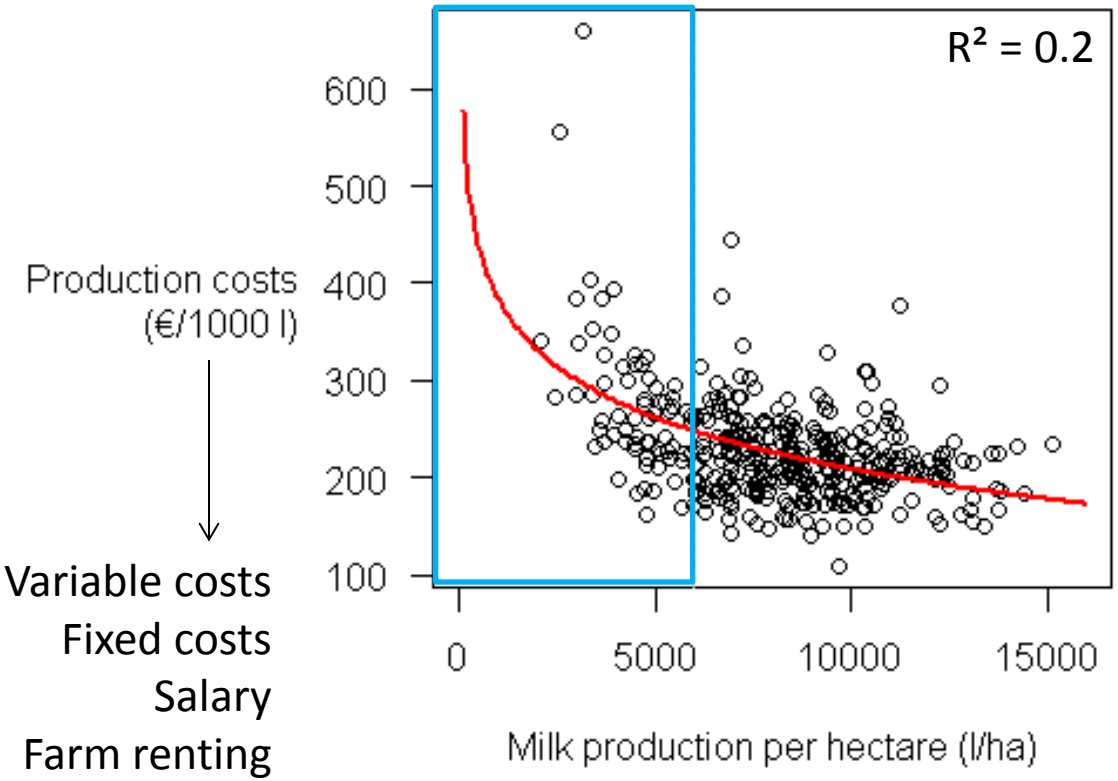
Relations between farm size and sustainability indicators

Relations between farm intensity and sustainability indicators

Comparison of size and intensity classes in terms of economic and environmental performance

Intensity affected economic indicators expressed per unit of product

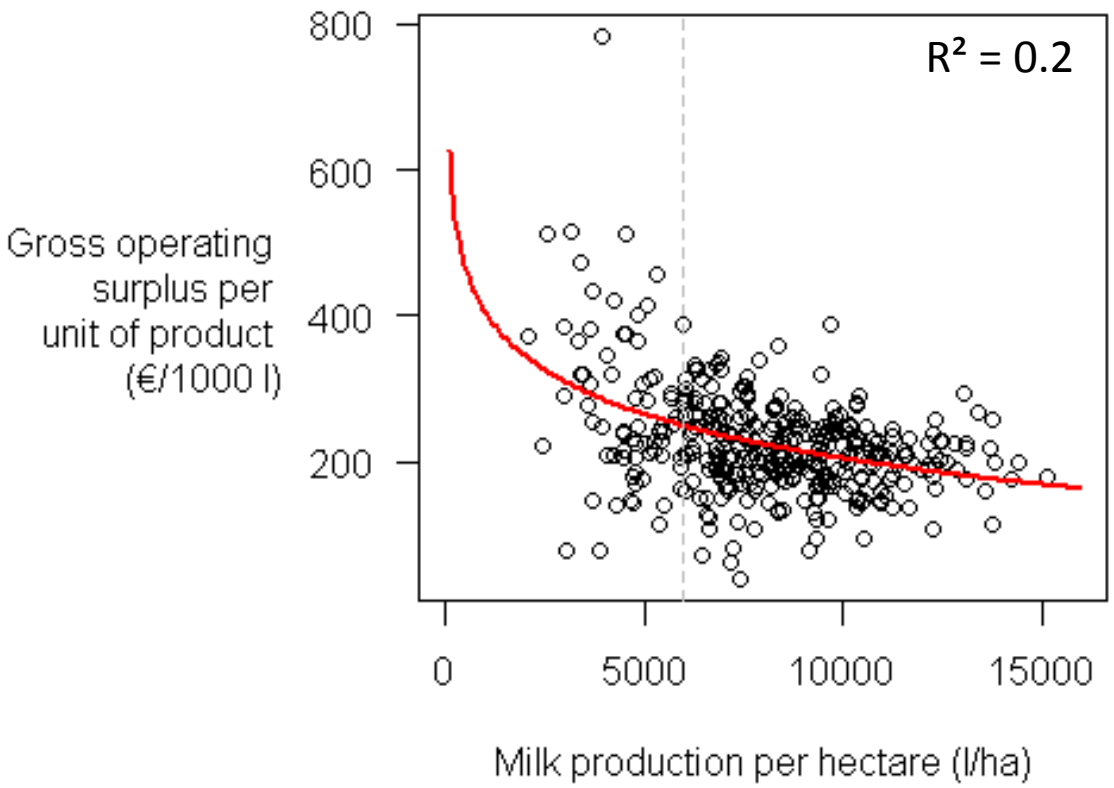


↑ intensity:
- o ↓ fixed costs/1000 l
- o ↓ production costs/1000 l

→ **« economies of scale »**

Logarithmic relation: only **low intensive farms** (< 6000 l/ha) had higher production costs per 1000 l.

Low intensive farms had higher gross operating surpluses per 1000 l



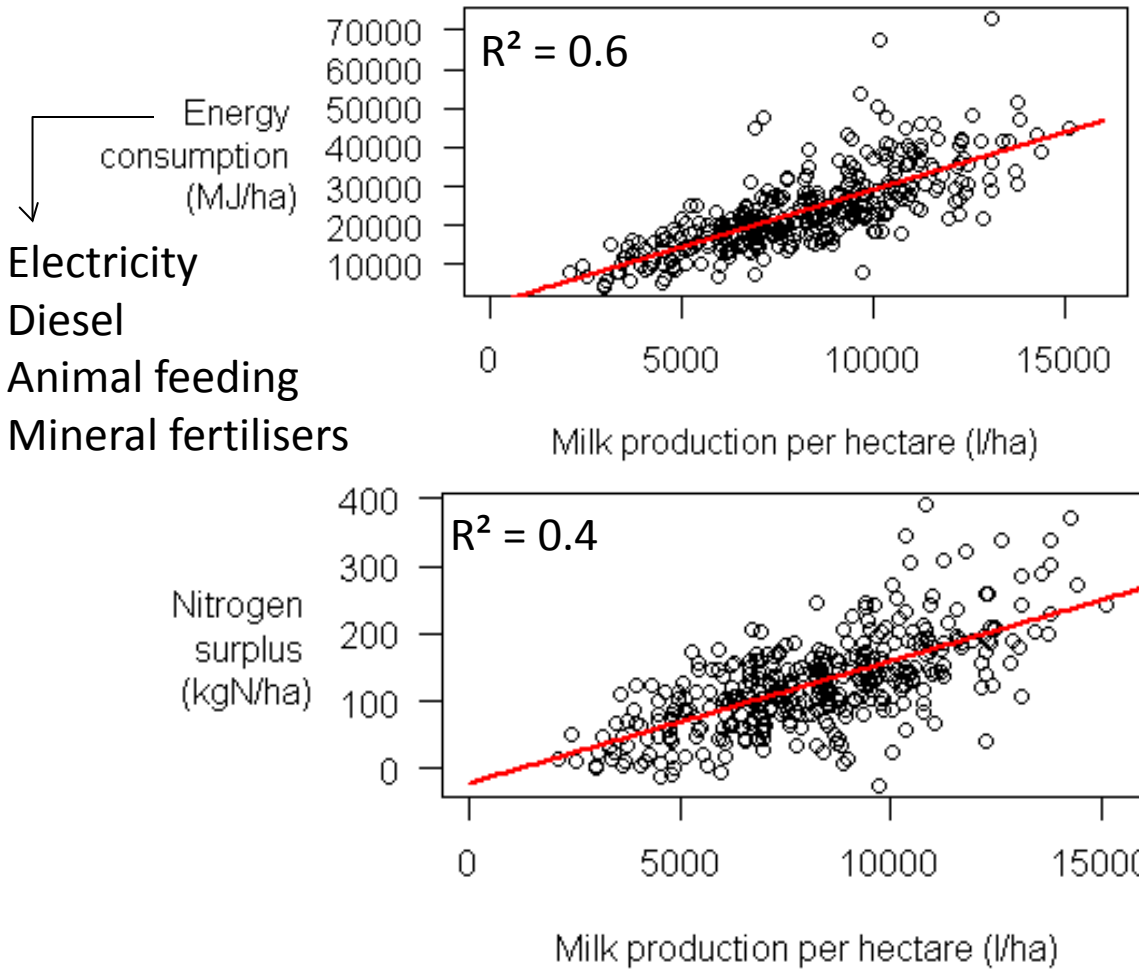
Low intensive farms (< 6000 l/ha) had :

- a higher **milk price**
- more **subsidies**/1000 l

↓

30 % of low intensive farms are **organic farms**

Intensity affected energy consumption and nitrogen surplus per hectare



Electricity
Diesel
Animal feeding
Mineral fertilisers

↑ intensity:

- ↑ **inputs consumption** per hectare (animal feeding and mineral fertilisers)
- ↑ **indirect energy** consumption per hectare
- ↑ **nitrogen inputs** per hectare

No significative relations between intensity, energy consumption and nitrogen surplus **per 1000 l**.

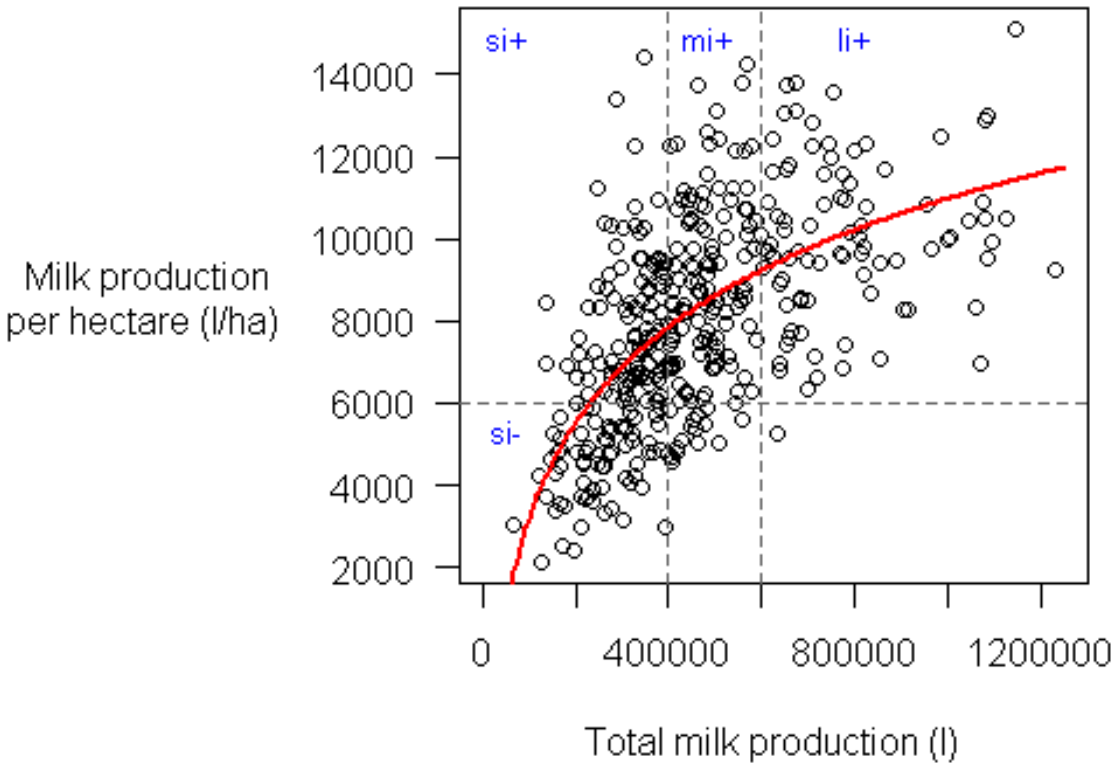
The analysis highlighted three main results

Relations between farm size and sustainability indicators

Relations between farm intensity and sustainability indicators

Comparison of size and intensity classes in terms of economic and environmental performance

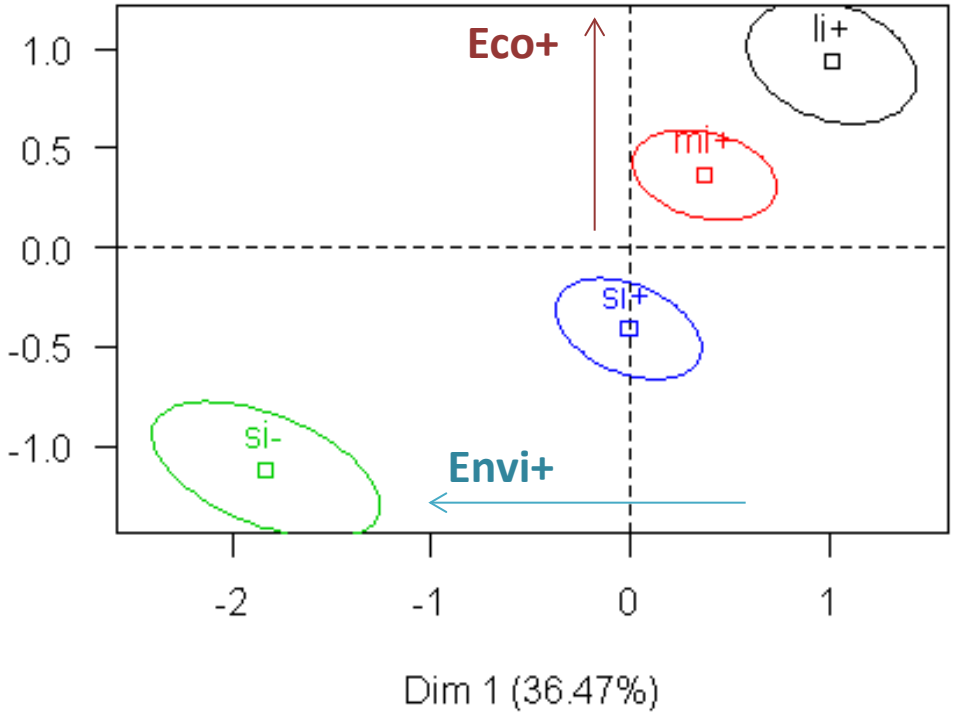
Farm classes were defined from size and intensity thresholds



- **Size** thresholds
  - 0 – 400 000 l : S
  - 400 000 – 600 000 l : M
  - > 600 000 l : L
- **Intensity** threshold
  - < 6000 l/ha : i-
  - ≥ 6000 l/ha : i+

‘Extreme’ structures had opposite economic and environmental performances

Dim 2
(17.04 %)



li+ : eco+/envi-
si- : envi+/eco-

Structures li+ and si- seemed to inhibit farms **to combine** relatively good economic and environmental performances

Size and intensity had various impacts on farm sustainability

This data-based analysis led to conclude that:

- Economic relations were **logarithmic** → increasing size/intensity had more impact on smaller/less intensive farms.
- Environmental performances per hectare decreased **in a linear way** with intensity.
- Li+ and si- farms were **not appropriate structures** to reconcile good economic and environmental performance.

→Identification of optimum farm size and intensity to have good economic performance without having serious environmental impact.

All relations were characterized by a **great diversity → within** each class, there are some areas of improvement for sustainability performance.

« The most universal quality is diversity. »

Michel De Montaigne

Picture: CRA-W