Does integration promote sustainability in organic multi-species livestock farms

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Does integration promote sustainability in organic multi-species livestock farm?

Marc Benoit, L. Steinmetz, D. Ulukan, G. Bernes, C. Brock, A. De La Foye, B. Dumont, M. Grillot, M.A. Magne, T. Meischner, M. Moerman, L. Monteiro, B. Oehen, D. Parsons, R. Primi, L. Shanz, P. Veysset, C. Winckler and G. Martin

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Background and challenges

- Agrobiodiversity is a core principle of agro-ecology and organic farming
- Not only crop-livestock integration but also between livestock species integration (or type of production)
- Mix-Enable: a Core-Organic project
  - Assessing the benefits of combining several animal species
  - Farm monitoring, experimental devices, participatory research

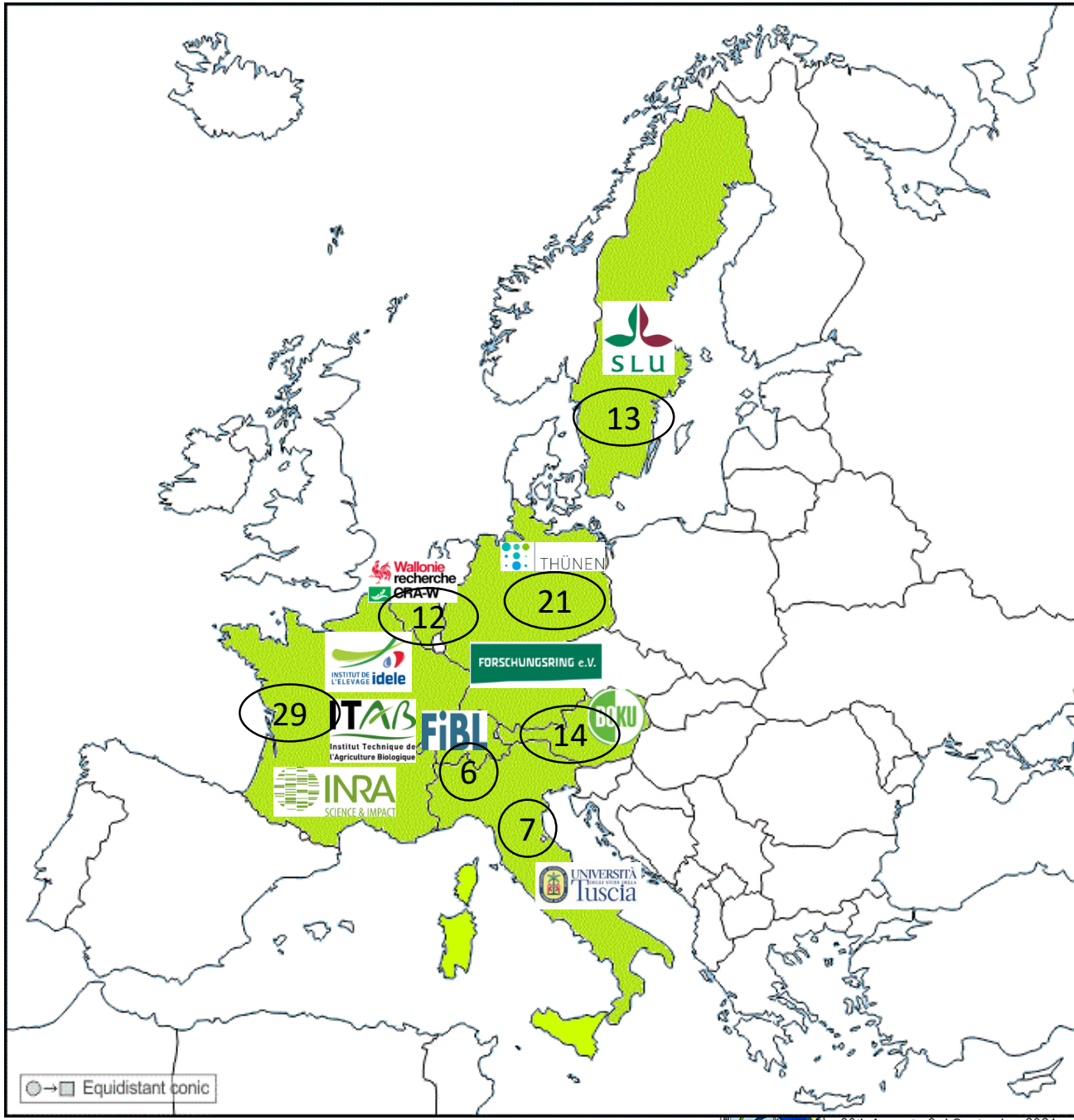
Mix-enable

MIX-ENABLE

9 partners from 7 different countries

WP2 (monitoring)

WP3 (indicators and analysis) based on 102 farms



Material and method

- Data monitored
  - Farm structure (area, workers, type of animals and number etc.)
  - Production (kg, Protein, MJ, €, type of marketing)
  - Inputs (Feed and fertilization)
  - Work organization (Who, how, when?)
- Global analysis with both
  - Agronomical approach (i.e. technical organisation and performance)
  - Type of marketing
  - Work organization and farmers satisfaction
  - Efficiency of the production
- 2 types or analysis
  - PCA + AHC → Main combinations and farms, characteristic and performance
  - Search for enterprise combinations (types and thresholds) → Farm Efficiency

Some methodological challenges
Multi-species and productions (meat, milk…)

- Share of each species → how? New proposal for LU calculation (with net energy from IPCC, for herbivores. See session 67)
- What efficiency?

  Output/input

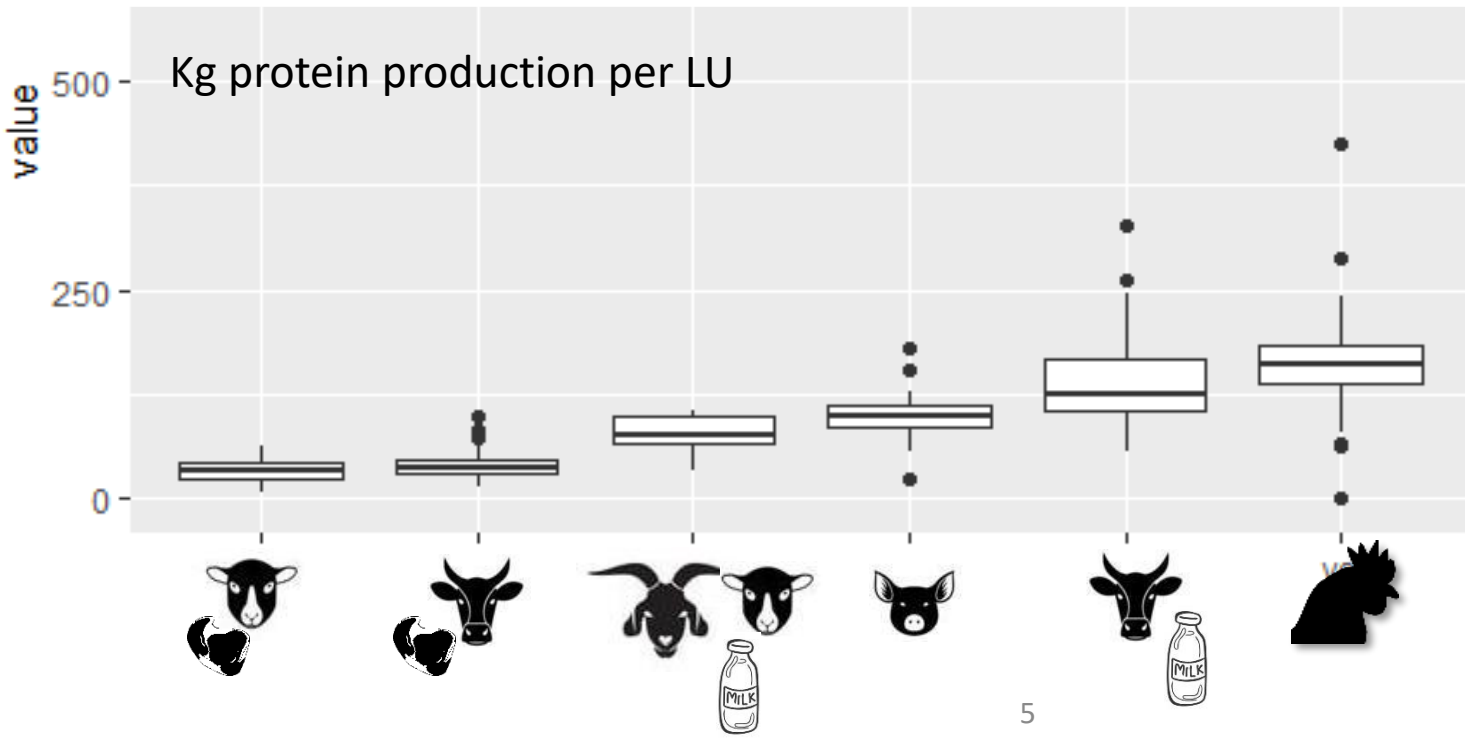
  → Concentrate / Output (animals; proteins)

  Depends on species and production

  → Centered-reduced per enterprise: Eff-CR

  → Then global indicator

$$Eff_{farm} = \sum_{entr=1}^{n} EffCR_{entr} \cdot \%LU_{entr}$$



PCA - AHC

96 farms

- 6 countries
- 2 or more animal entreprises per farm
- Ruminants in all farms
- Beef cattle and dairy cattle are me the more represented

38 variables

n= 14 Farm structure (area, size, production types & importance)

n= 3 Sales type and other activities

n=6 Performance (productivity and efficiency)

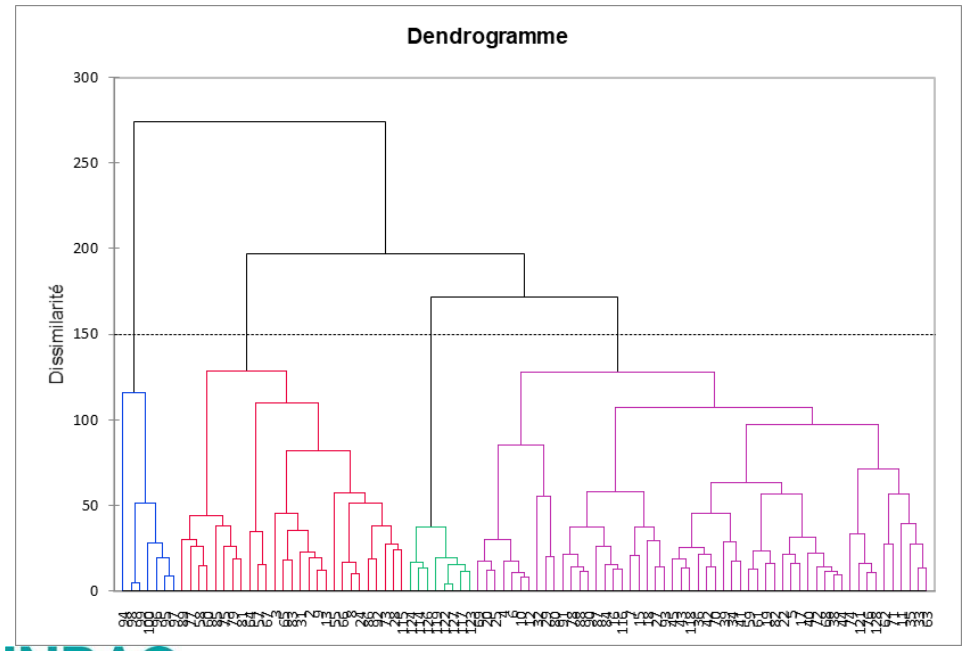
n=15 Social aspects (satisfaction, knowledge, farmers origin etc.)

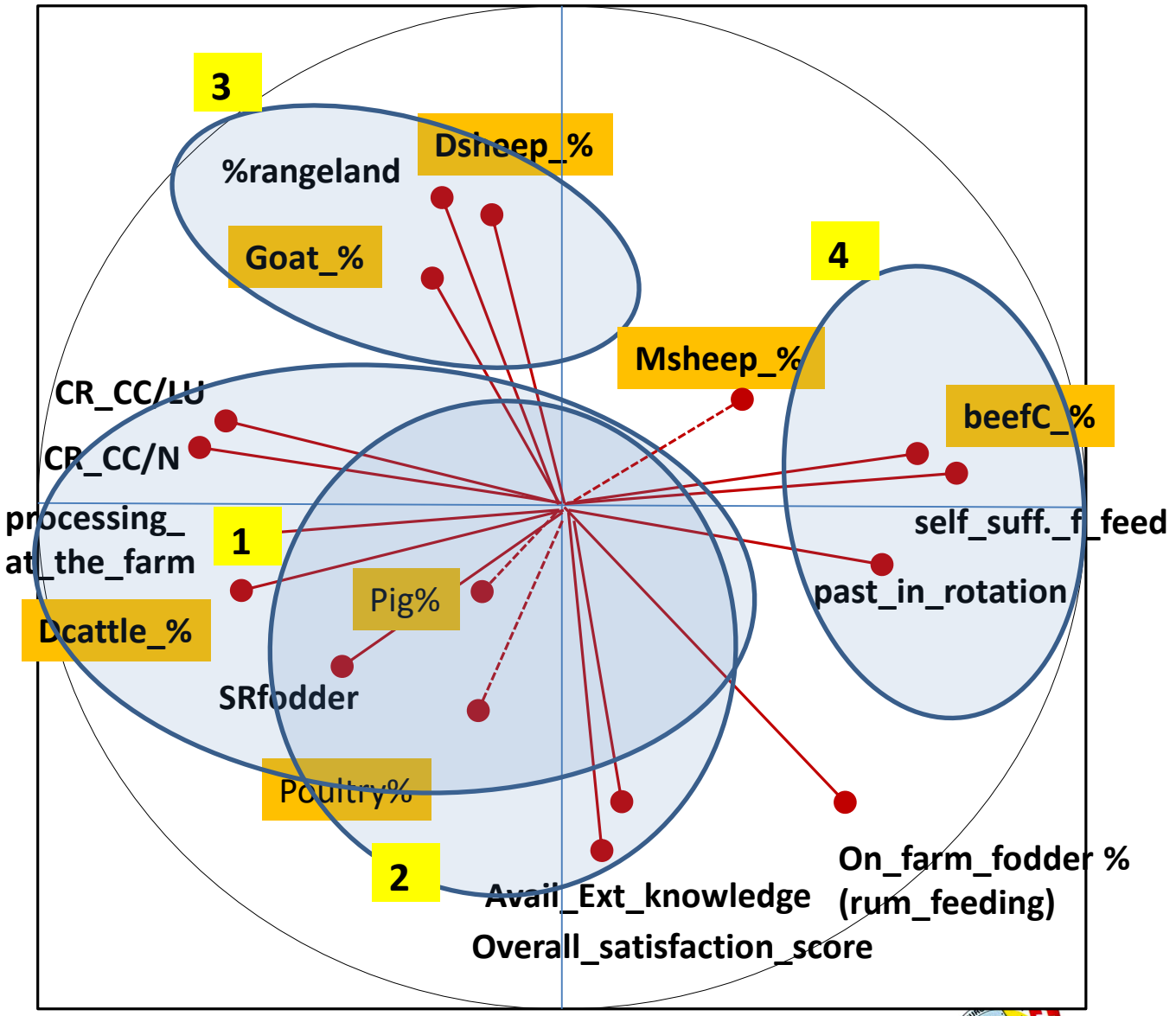
AHC

4 groups of farms

Number of farms:

1	27
2	54
3	7
4	8





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la science pour la vie, l'humain, la terre

Main features of the farms (4 groups)

	1	2	3	4
Main (second)	Dairy Cattle (+pig)	Beef Cattle (+poultry)	Dairy Sheep (+ goat)	Beef Cattle (+ Meat sh)
LU	64	**101**	**112**	44
LU/AWU	14	**47**	18	**34**
AWU	4.4	2.2	6.1	1.3
% farm fodder (R-feed)	81%	**84%**	**46%**	**98%**
Process/Short ch (€)	**82%** - 64%	39% - 44%	**71%** - 82%	0% - 53%
Worker Paid/Unpaid	**36%** - 7%	18% - 12%	**46% - 31%**	14% - 0%
Social-specific			**Training ↘**	**Satisf. Income ↘**
Conversion to OF	1995	2001	**2011**	2004
farmer_1_off_roots	**56%**	17%	**0%**	12%
Prod/LU (CR)	**-0.31**	**+ 0.15**	**+ 0.10**	+ 0.03
Conc/LU (CR)	**- 0.20**	**+ 0.10**	**+ 0.60**	**- 0.65**
CC / Prod (CR)	**- 0.14**	**+ 0.04**	**+ 0.49**	**- 0.62**

What combination for a good efficiency? (low input/output)

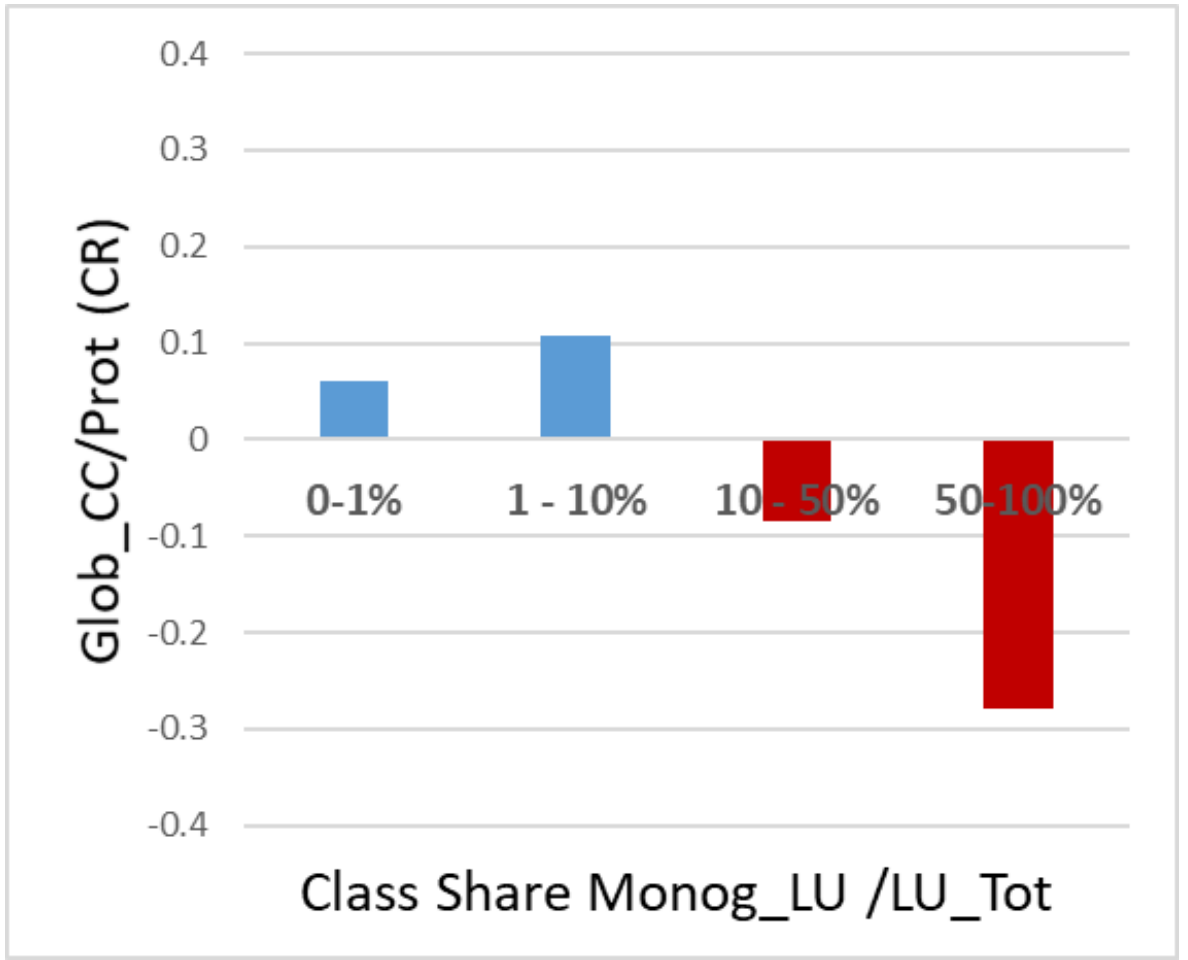
- CC/Prot (CR): seen as non-efficiency indic.
  → Negative is good

- Beef cattle and Sheep (meat): -0.62
  See poster 36.21 (Vazeille et al)

- Role of monogastrics ?

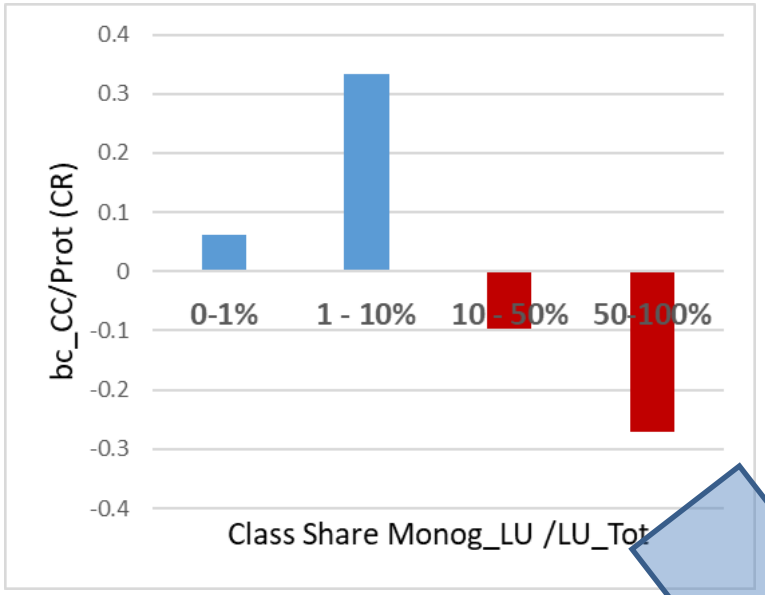
→ The more monogastric, the best global efficiency

→ **Why / How?**

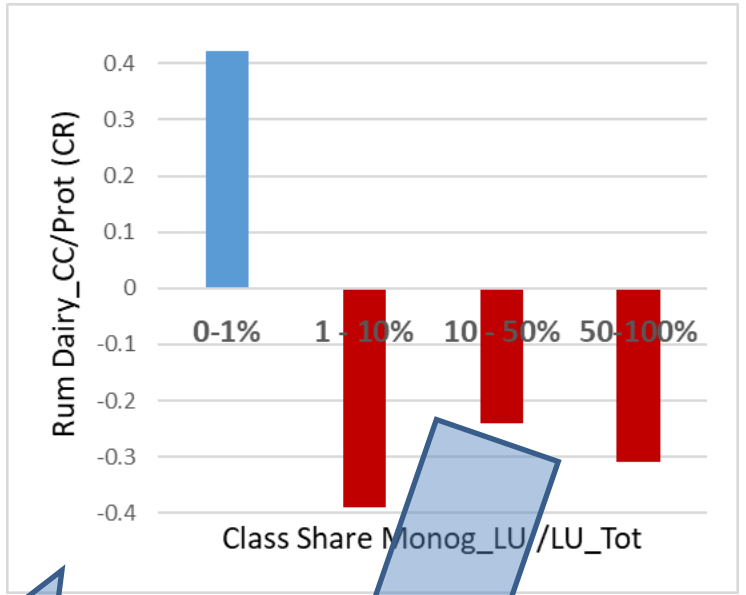


Relation between share of LU-Monogastric and animal efficiency

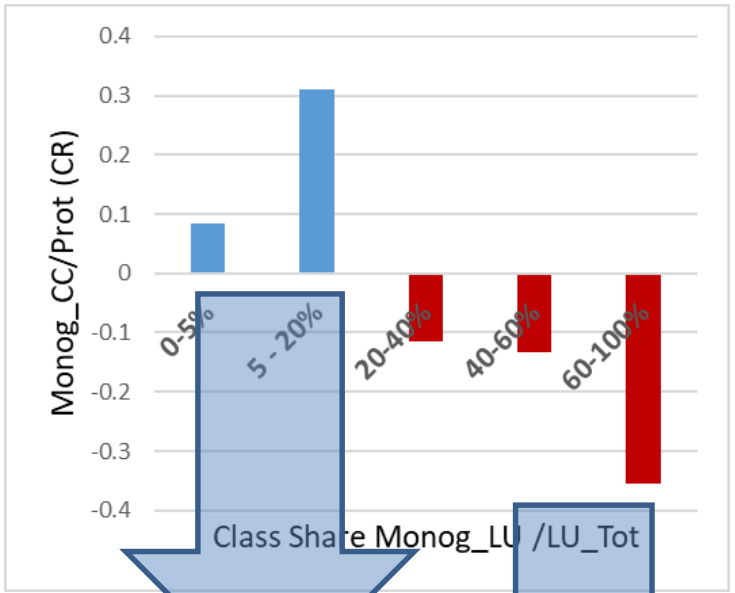
Beef cattle efficiency



Dairy efficiency



Monogastric efficiency



Significant effect of feed importation on pasture fertility and on feed self-suffic.

More importance on short channel marketing?

Large enterprises are more rationalised/ efficient

Take-home messages

- Small and big ruminants (beef cattle / meat sheep)
  - Complementarity in feeding, parasitism
  - Low added value on meat (compared to conventional F) → profitability depends to a large extent on technical performance
- Ruminants and monogastrics
  - Increasing global efficiency when share of monogastrics ↗
  - Hypothesis
    - Important fertility transfer (*Steinmetz et al 2021)*
    - When lower share of Monogastrics → Technical management is less importance for farmers and more investment on processing / marketing (to be checked)
- Dairy sheep and goat
  - Very frequent in Italy, with
    - Low agronomic potential (rangelands)
    - 82% short channel marketing

Low Animal Efficiency

Conclusion

- **A wide range of data** (technical, marketing, work) on 100 farms, 6 countries, 6 types of production. Huge data verification work (and lack of overall economic results)
- The association of animal enterprises could appear as promising but this leads to numerous methodological issues (calculation of LUs, comparison of performance, input allocation,…)
- Interesting first results
- Additional analyses should be carried out, e.g. effects of the level of integration between enterprises and the role of work organization on farm efficiency and farmers' satisfaction
- There is too much diversity in the sample (farm size, type of sales, type of workshops combined etc.)
  → for more refined analyses, it would be necessary to re-sample within-combination

Thank you for your attention

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CPA - Results

F1+F2: 20% total var.

Main features

F1: opposition between

1 Beef_C (+M-Sheep) and feed Self-Suff

2 Dairy_Cattle (+monog.) + conc. +process.

F2: opposition between

1 Dairy Sheep (goats), rangelands

2 Availability on knowledge and global satisfaction