Does integration promote sustainability in organic multi-species livestock farms
Marc Benoit, Lucille Steinmetz, D. Ulukan, G. Bernes, C. Brock, Anne de La Foye, Bertrand Dumont, Myriam Grillot, Marie-Angéline Magne, T. Meischner, et al.

To cite this version:
Marc Benoit, Lucille Steinmetz, D. Ulukan, G. Bernes, C. Brock, et al.. Does integration promote sustainability in organic multi-species livestock farms. 72nd Annual Meeting of the European Federation of Animal Science, Aug 2021, Davos, Switzerland. hal-03376530

HAL Id: hal-03376530
https://hal.inrae.fr/hal-03376530
Submitted on 18 Jul 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Does integration promote sustainability in organic multi-species livestock farm?


INRAE UMRH, Clermont-Ferrand, France
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

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 \(\rightarrow\) Main combinations and farms, characteristic and performance
  – Search for enterprise combinations (types and thresholds) \(\rightarrow\) 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 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
# Main features of the farms (4 groups)

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

Proposal for a refine LU calculation Benoit M. and Veysset P.
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

marc-p.benoit@inrae.fr

We acknowledge the financial support for the MIX-ENABLE project provided by transnational funding bodies, being partners of the H2020 ERA-Net project, CORE Organic Cofund, and the cofund from the European Commission.
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