Organic versus conventional agriculture: comparison of economic and environmental sustainability

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Organic dairy farming can be more viable than conventional dairy farming based on total costs (EUR/ha) and net income (EUR/ha).

Conventional wheat production can be more viable based on net income (EUR/ha) but with a higher carbon footprint per land unit.

- Carbon footprint per land unit was smaller for organic dairy farming.
- Carbon footprint per product unit in the composite index (CI) was higher for organic dairy farming in comparison to conventional dairy farming.
- Organic dairy farms have lower score for production value (EUR/ha).
- Organic wheat production has a lower net income than other strategies.

Introduction

~ 13.2% of total GHG emissions in the EU are directly related to agriculture. Most essential GHG emissions are caused by agricultural soil ~ 46.3% and intestinal fermentation processes in cattle ~42.4%. In Latvia, agriculture is the third largest source of GHG emissions, generating 21% of Latvia's total GHG emissions. Organic farming has been valued as one of the most suitable solutions to conventional agriculture for achieving climate goals. The purpose of the research is to evaluate and compare the sustainability of biological dairy farming and conventional dairy farming and also conventional and organic wheat production, using economic and environmental indicators and the composite index method.

Methodology

Define sustainability categories

Environmental dimension

Economic dimension

\[ I_{CI} = \sum W_i x I_i \]

Where

\[ I_{CI} \] Composite index

\[ W_i \] indicator weight (equal for each indicator)

\[ I_i \] indicator value (normalised)

Selection of indicators

Defining criteria and collection of data

Normalization of indicator scores

Weighting of scores

Aggregation of scores

Conclusions

The method can be used for an initial analysis in decision-making, evaluating which farming strategies are more economically viable, which has the lowest carbon footprint, and how to choose from different alternatives.