Organic versus conventional agriculture: comparison of economic and environmental sustainability

Lauma Balode, Ilze Luksta, Ieva Pakere, Dagnija Blumberga

Riga technical University, Institute of Energy Systems and Environment

Contact information:

Azenes iela 12/1

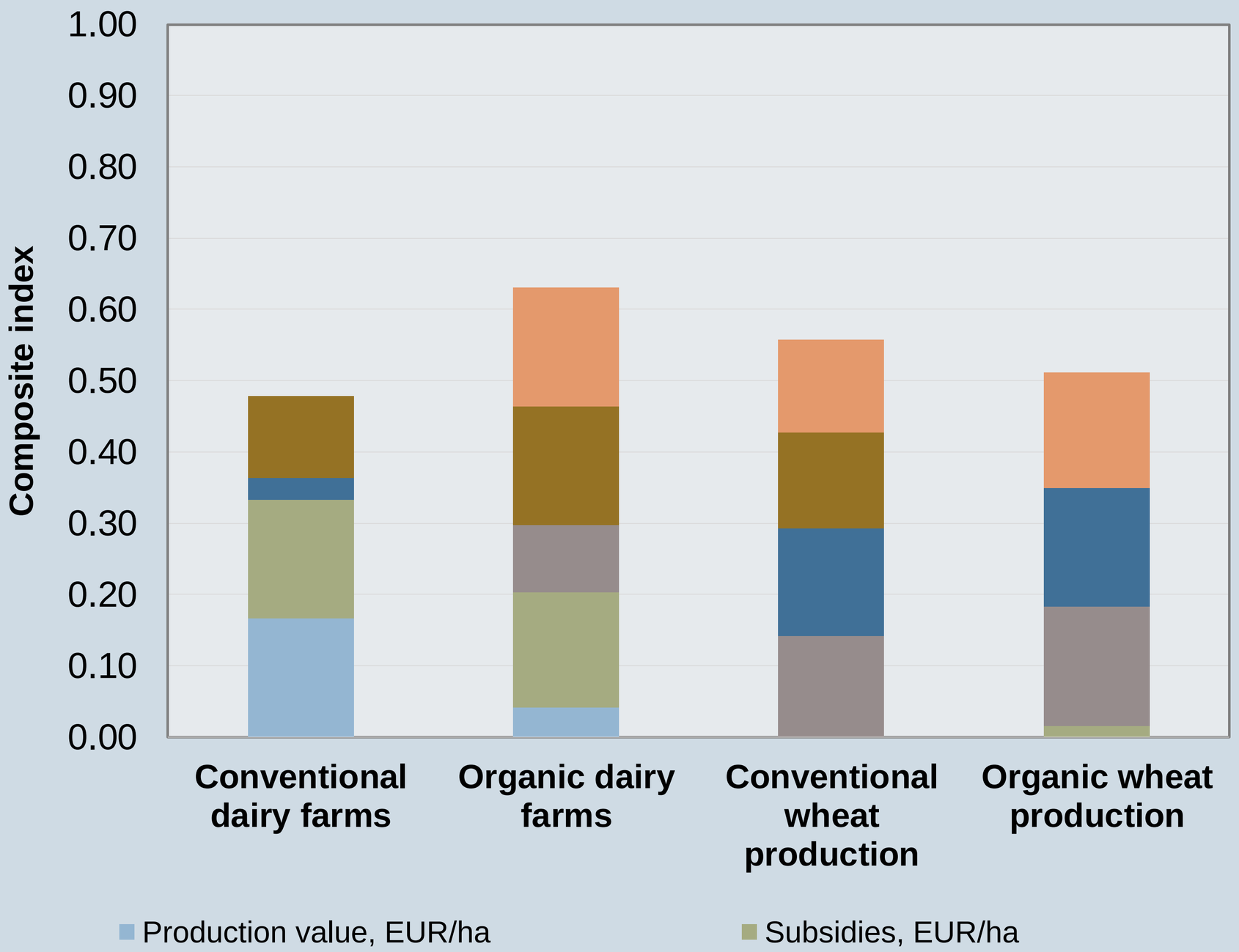
Riga, LV-1048, Latvia

lauma.balode_2@rtu.lv

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

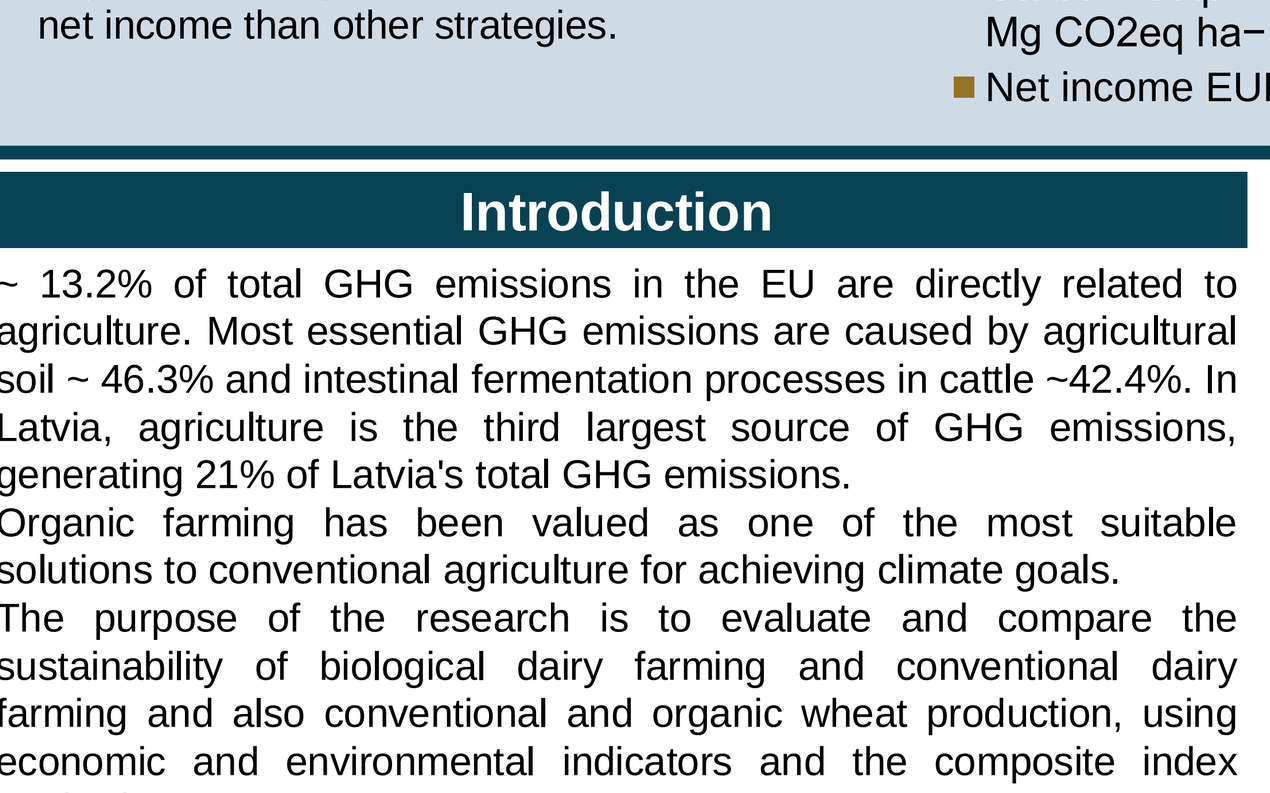
~ 13.2% of total GHG emissions in the EU are directly related to agriculture. Most essential GHG emissions are caused by agricultural soil ~ 46.3% and intestinal fermentation processes in cattle ~42.4%. In Latvia, agriculture is the third largest source of GHG emissions, generating 21% of Latvia's total 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.

No	Indicator	Units	Impact
i1	Mean total costs, EUR	EUR/ha	-
i2	Production value	EUR/ha	+
i3	Net income	EUR/ha	+
i4	Subsidies, green payments, support payments	EUR/ha	+
i5	Carbon footprint per land unit	Mg CO_2eq ha^{-1}	-
i6	Carbon footprint per product	kg CO_2eq	-

Methodology



$$I_{CI} = \sum_j^n W_j x\, I_i$$

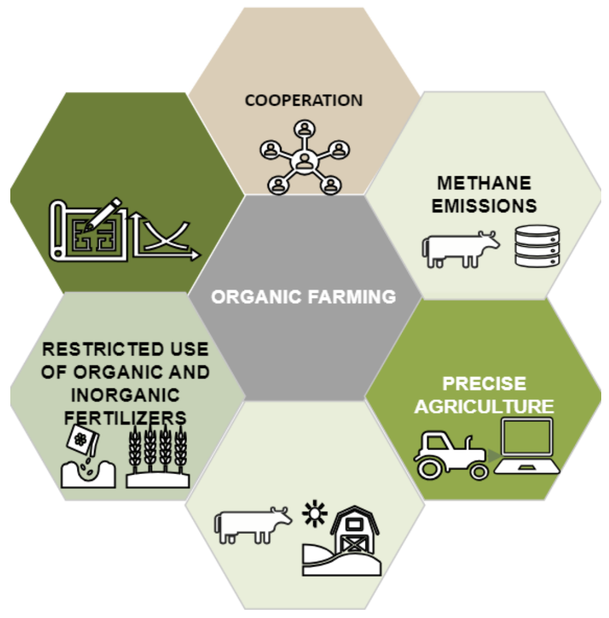
Where

I_{CI} Composite index

W_j indicator weight (equal for each indicator)

I_i indicator value (normalised)

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.

Acknowledgment

This research is funded by the Latvian Council of Science, project “Climate Neutrality Decision Models in Action”,project No. VPP-KEM-Klimatneitralitāte-2023/1-0002.