

Sustainability effects of the uptake of more grass-based feeding practices: Evidence from Sweden

FADN in practice: Why FSDN would have been better

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Outline

- **The case study**
 - Aim, data and policy relevance
- **Variables**
- **Challenges** of the Farm Accounting Data Network (**FADN**) and combining **alternative data sets** for ensuring the quality of policy evaluations
- Expected **benefits** and **challenges** from the Farm Sustainability Data Network (**FSDN**)
- Appendix: Results

The case study

- Aim
 - to examine the sustainability effects of the uptake of more grass-based feeding practices by dairy farmers in Sweden
- Data
 - FADN, 2002 to 2021
- Policy relevance/ policy evaluation
 - does not estimate the effect of specific policy support
 - contribute to designing policies to encourage farmers' uptake of grass-based feeding practices

Variables and definitions of variables used

Variable	Explanation
Dependent variable	
• Grassland area	Area of grassland per livestock unit (Ha/LU)
• Ley area	Area of ley (Ha/LU)
Confounding variable	
• Stock density	Density of ruminant grazing livestock (LU/Ha)
• Total farm size	Total farm size in hectare (Ha)
• Specialize in milk and fattening	Proportion of farms specialized in milk and fattening production
• Specialize in milk	Proportion of farm specialized in milk production
• Specialize in milk and crop	Proportion of farm specialized in milk and crop production
• CAP support	Amount of CAP support received in Swedish Krona (SEK)
• Culling rate	Cows removed or sold due to low milk production or ill health or death as a percentage of the total number of animals
• Amount of concentrate used	Total expenditure on purchased concentrate (SEK/LU)
Age	Age of the farmer in years
Outcome variable	
• Farm net income	Farm net value added minus wages, rent and interest paid plus subsidies and taxes on investment (SEK/LU)
• Total working hours	Time worked in hours by total labour input on holding (Hours/LU)
• Amount of fertilizer used	Total expenditure on purchased synthetic fertilizer (SEK/Ha)

Challenges of FADN & combining alternative data sets

1. Choice of sustainability proxies: what are the challenges?

- Economic variable: Farm net income → No challenges
- Environmental variable: Fertilizers expenditures → Expenditures are only a proxy for the environmental pressure
- Social variable: Annual working hours → Results (may) have dual/opposite meaning:
 - i) more employments improve rural development / but increase the costs;
 - ii) Increased labor need reduces the time for leisure or social activities




2. Alternative sources

- Company register → Full register for all agricultural firms. No environmental and social variables
- Surveys to all FADN farms → The response rate (15-25%) affects the sample size, hence the richness of the data, cross-sectional

FSDN instead of FADN

How the transition to FSDN will improve the quality of future evaluations?

1. Benefits with FSDN

- Economic variable:  No changes on the particular study. Otherwise more economic variables (market, innovations...)
- Environmental variable:  More environmental dimensions including: chemicals (both fertilisers + pesticides), energy, biodiversity, climate
- Social variable:  More social dimensions: Annual working hours, along with salary category, education, accidents.

2. Challenges with FSDN

- i) Uncertainties with the data collection process
- ii) It takes time until panel-data are created

Thank you!

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Appendix: Results

- An increase in grass-based feeding practices (either grassland or ley area) is associated with a decrease in both farm net income and fertilizer expenditure, along with an increase in total working hours, on average.
- The results show heterogeneity across farming systems
 - uptake of more grass-based feeding practices among **conventional farm** systems is associated with a **decrease in farm net income** and an **increase in total working hours compared to the uptake by organic farm systems**.

Note for considered fixed effects: farm, year, county.

Appendix: Results - tables

Appendix Table 1: Predictive effects of grassland area increase on farm net income, total working hours, and amount of fertilizer used

	Log farm net income		Log total working hours		Log fertilizer expenditure	
	(1)	(2)	(1)	(2)	(1)	(2)
Log grassland area	-5.4118*** (1.8522)	-5.4579** (1.9662)	0.4882*** (0.0735)	0.5077*** (0.0696)	-0.7489*** (0.1666)	-0.6929*** (0.1564)
Controls	No	Yes	No	Yes	No	Yes
Farm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4668	4668	4668	4668	4668	4668
Adjusted R²	0.3886	0.3950	0.8582	0.8574	0.6730	0.6749

Appendix Table 2: Predictive effects of ley area increase on farm net income, total working hours, and amount of fertilizer used

	Log farm net income		Log total working hours		Log fertilizer expenditure	
	(1)	(2)	(1)	(2)	(1)	(2)
Log ley area	-4.2201*** (1.0813)	-4.0336*** (1.2520)	0.1391*** (0.0378)	0.1295** (0.0378)	-0.4649*** (0.1377)	-0.4301*** (0.1437)
Control	No	Yes	No	Yes	No	Yes
Farm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4397	4397	4397	4397	4397	4397
Adjusted R²	0.3932	0.3984	0.8596	0.8620	0.6729	0.6750

Appendix: Results - tables

Appendix Table 3: Heterogeneous effects by farm system for grassland area

Variable	Log farm net income		Log total working hours		Log fertilizer expenditure	
	(1)	(2)	(1)	(2)	(1)	(2)
Log grassland area *	-3.5941*	-3.0761	0.4469***	0.4315***	-0.8697***	-0.7943***
conventional system	(2.03457)	(2.0923)	(0.0745)	(0.0741)	(0.1539)	(0.1599)
Farm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4668	4668	4668	4668	4668	4668
Adjusted R²	0.3857	0.3950	0.8582	0.8574	0.674	0.6759