



Agronomic and economic interest of straw-manure exchanges between crop and livestock farms

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Introduction

System specialization over the last decades

Area with high agronomic potential → crop farm

+ Use of synthetic fertilizers

→ Decrease in organic matter levels in soils to a critical level

(Loveland and Webb, 2003)

Closing nutrient cycles



Introduction

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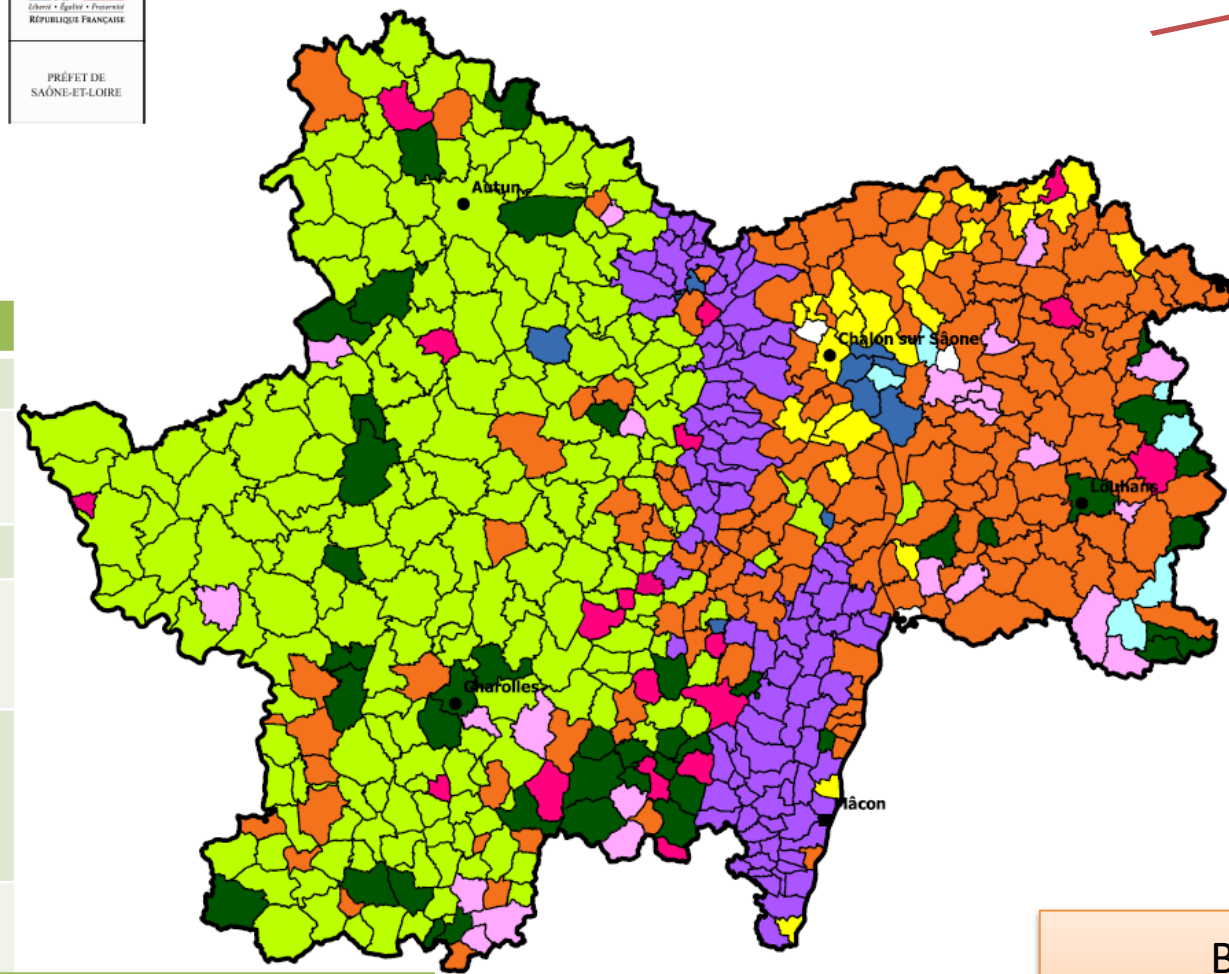
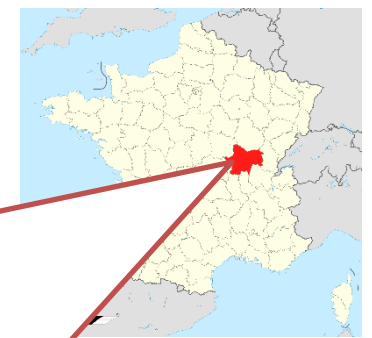
→ Decrease in organic matter levels in soils to a critical level

(Loveland and Webb, 2003)

Questioning of development actors in Burgundy Franche-Comté to design **mixed crop-livestock** farming at the territory level

What are the market value of manure for livestock and crop farmer considering its agronomic benefit at short and long term?

Material and method



Livestock farm		
UAA (ha)	105	
Forage area (ha)	94	
Work unit	1	
Prod.	Animal Beef cattle	112 LU (with 66 cows)
	Vegetal	Wheat-barley-triticale, grass silage and hay
Average net income (k€)	18.34	

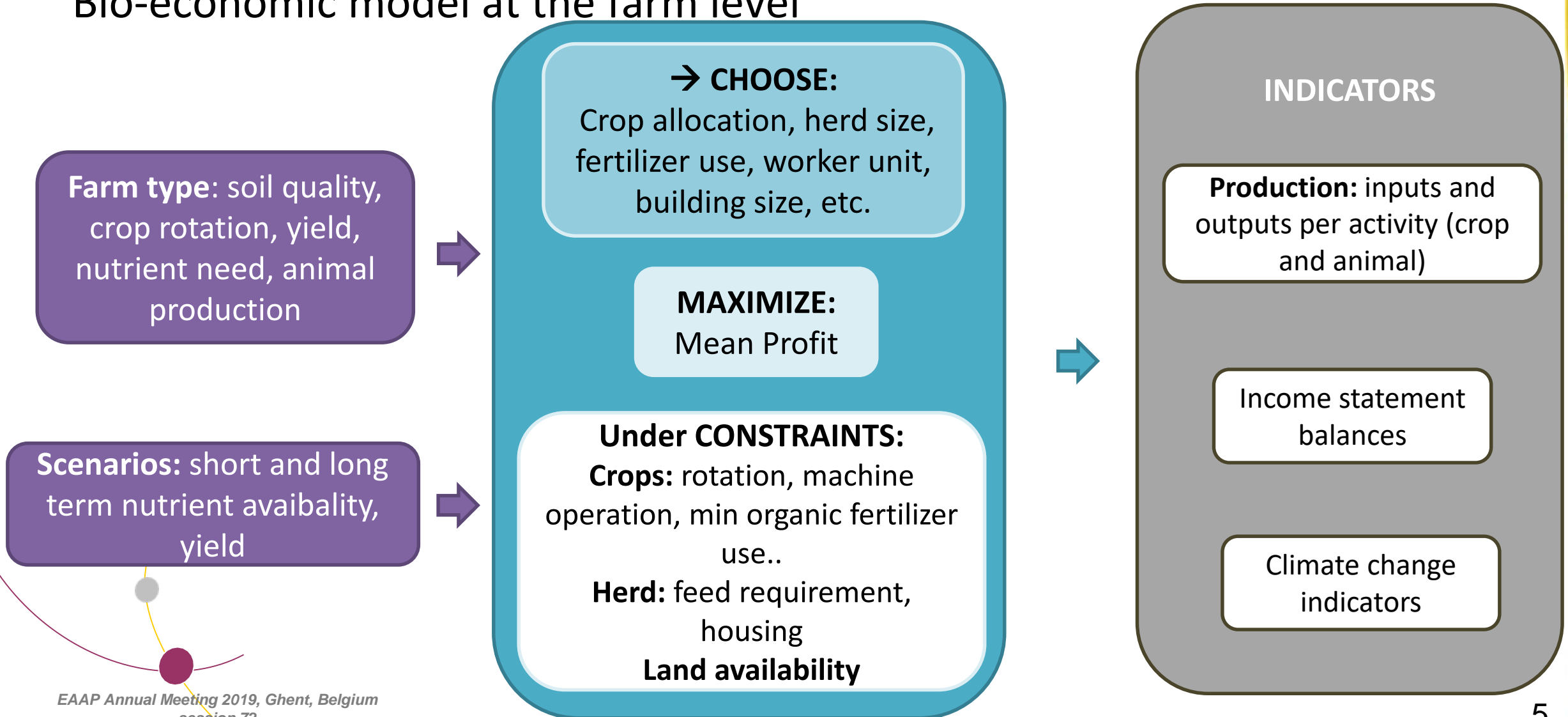
Crop farm	
UAA (ha)	250
Work unit	2
Soil type	Deep silts SOM < 2%
Vegetal productions	Rapeseed-wheat-barley
Average net income (k€)	108.00

Straw dependence
 Interest in selling some of the manure produced?

Burial of straws?
 Other sources of organic matter?

Material and method : the ORFEE model

Bio-economic model at the farm level



Material and method : Crop scenarios

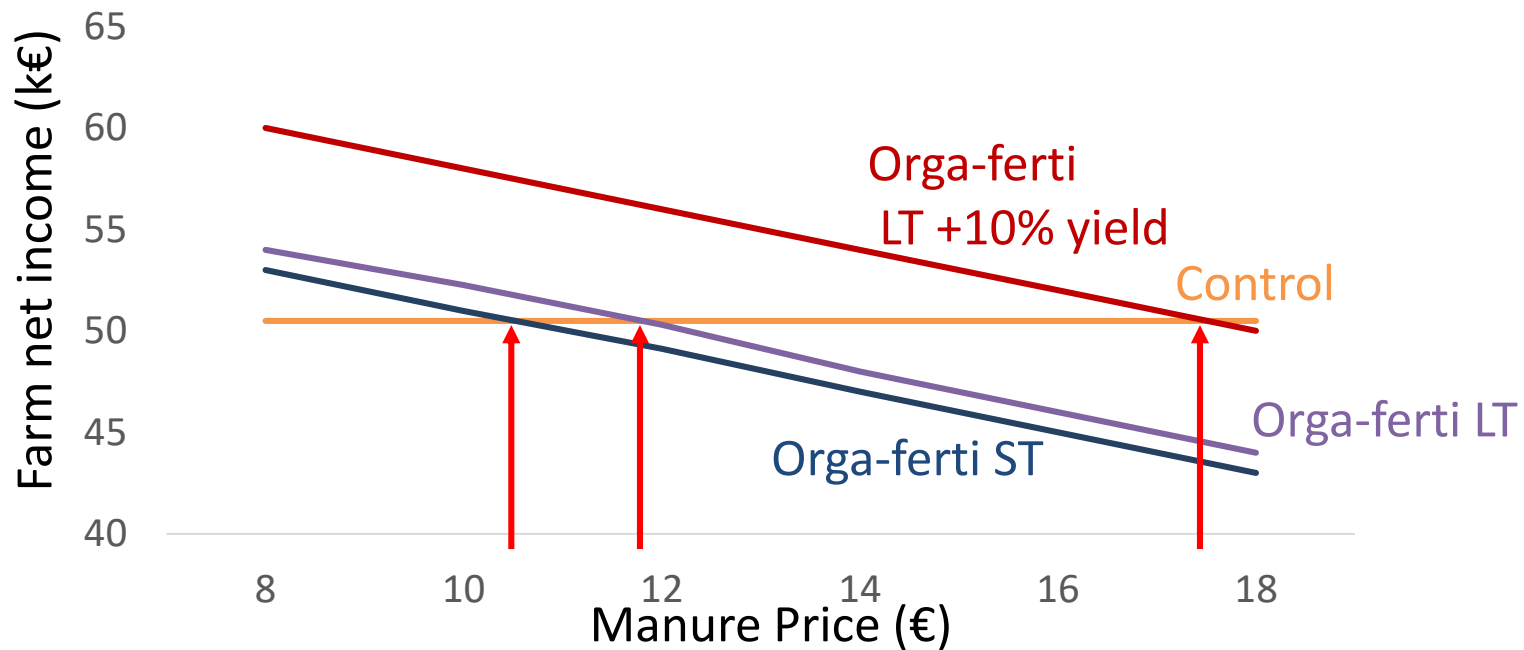
Crop scenarios	Control	Orga-Ferti Short-Term	Orga-Ferti Long-Term	Orga-Ferti Long-Term +10% yield
Fertilization type	Mineral	Both min and orga	Both	Both
Manure spreading (T/ha/yr)	0	12	12	12
Possibility to sell straw (T)	0	Up to 100% of cereal straw	Up to 100% of cereal straw	Up to 100% of cereal straw
Organic matter content	<2%	<2%	>2%	>2%
Mineralization of humus under the crop (Nkg/ha/yr)	33	33	50	50
Manure application period	0	0-3 years	10 years and +	10 years and +
Yield				+10%

Material and method : Livestock scenarios

Livestock scenarios	Control	Allowed sale of manure
Fertilization type	Both	Both
Possibility to sell manure	No	Up to the limit of maintaining 2% of OM in soil
Manure spreading (T)	802 (100%)	No constraint
Organic matter content	> 2%	> 2%
Mineralization of humus under the crop (Nkg/ha/yr)	50	50
Manure application period	10 years and more	10 years and more

Results

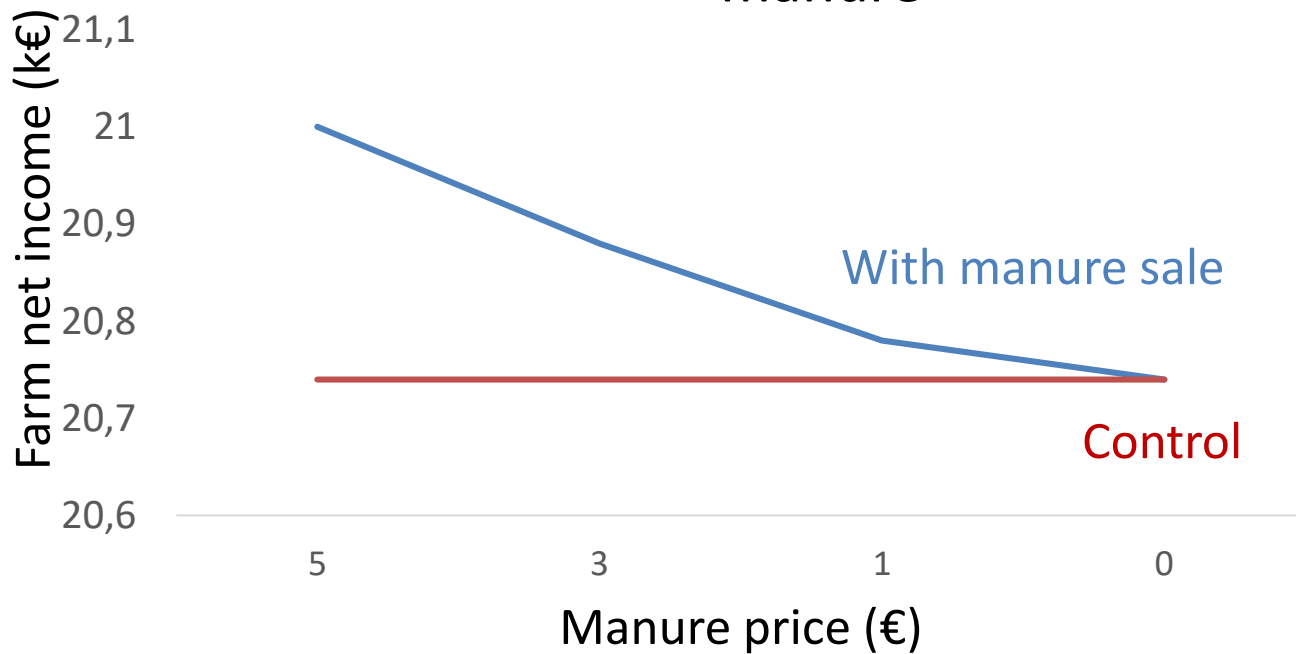
Evolution of farm net income according to manure price with organic fertilisation in the short and long-term and in the long-term with +10% variation of yield



Economic interest for the crop farmer to buy manure
 → Increasingly expensive price of interest with the increase in humus mineralization

Results

Evolution of farm net income according to manure price with conservation or sale of a part of own farm manure



Economic interest for the breeder **positive** but **weak**
 → Constraint on the amount of manure he can sell <20%

Conclusion

- **Manure interest (for crop farmer) from 10 to 17€/T**
 - Consideration of transaction costs related to the organization
→Transport
- **Partial consideration of the effects of manure**
 - Fertilizer value versus amendment value (*Haynes and Naidu, 1998*)
 - Manure risks, environmental interest
- **A local approach with the input of local actors**
- **Known exchanges but new organizational modes to be built**

Thank you for your attention



Results

Variability of the interest price of manure as a function of the variation in humus mineralization, N content, straw and mineral fertilizer prices

