



Mixed crop-suckler cattle farming systems: economies of scale or economies of scope?

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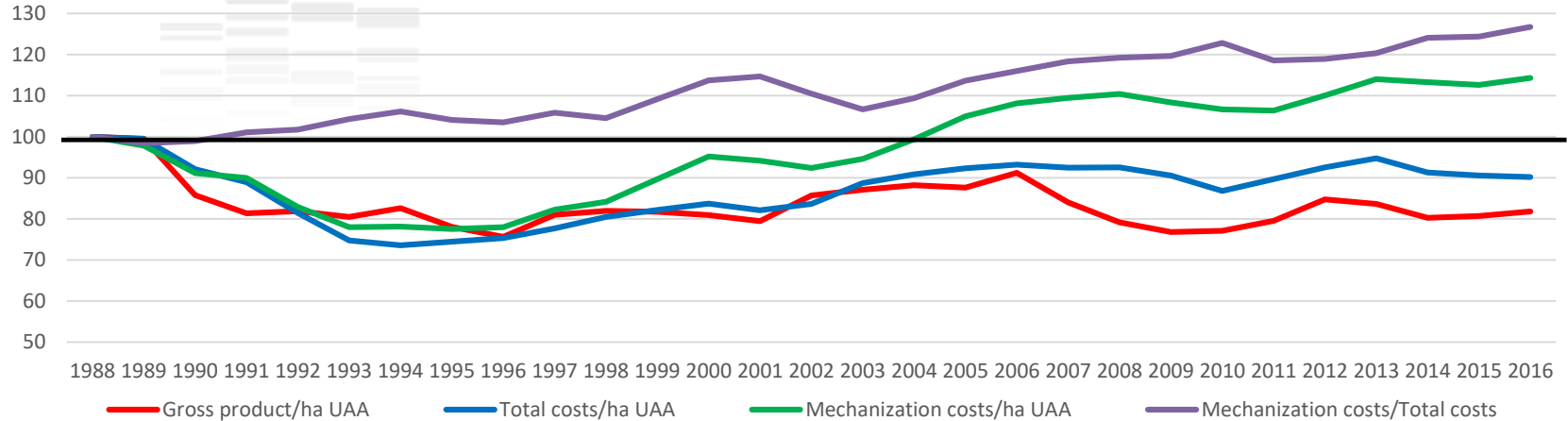
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Context

- ❖ **For decades, agricultural productivity growth led by changes in:**
 - ✓ The structure of agriculture (land, labour, markets, policies...)
 - ✓ Technology: genetic, mechanisation
- ❖ **Livestock farms' development based on:**
 - ✓ Specialisation and scale enlargement → economies of scale
 - ✓ Labour productivity
 - ✓ Substitution labour/capital
- ❖ **Expansion of suckler cattle farms' size led to:**
 - ✓ Simplification of practices and lower use of on-farm resources
 - ✓ Decrease in production system efficiency
- ❖ **Diversified farming systems:**
 - ✓ Source of complementarities → ecosystem productivity
 - ✓ Limit risks and uncertainty (prices, weather, pest damages...)
 - ✓ Presence of economies of scope

Questions and objectives



❖ FADN France - Beef Cattle 1988-2016 – Farms' size x2

- ✓ Total costs/ha but less than gross product/ha
- ✓ Mechanisation costs/ha
- ✓ Share of mechanisation costs in total costs

❖ Is there a link between the production costs, the mechanization costs, the specialisation of the farm?

- ✓ Mixed crop-beef-cattle farms vs beef-cattle farms

Material and method

❖ **Charolais suckler cattle farms' network**

- ✓ 66 farms constant sample from 2012 to 2016
- ✓ Farm size: 65 ha → 470 ha
- ✓ Crop area: 0 → 74%, 0 → 277 ha

❖ **Relationship between diversification and costs**

- ✓ Sorting of farms according to the area under annual crops, 4 classes: 0 ha, 0-20 ha, 20-60 ha, >60 ha
- ✓ Comparative results of each class: structure and economics (Kruskall-Wallis)

❖ **Relationship between diversification, size, costs and income**

- ✓ Correlation coefficients (Spearman) at the beef unit level and at the farm level

Charolais suckler cattle farms: structures

Average 2012-2016	TOTAL	AREA UNDER ANNUAL CROPS			
		0 ha N=6	0-20 ha N=19	20-60 ha N=26	>60 ha N=15
No. Workers	1.92	1.71 ^a	1.64 ^a	1.82 ^a	2.51 ^a
Agricultural Area (AA) ha	179	173 ^a	133 ^a	162 ^a	271^b
Fodder area ha	140	173^a	122^a	134^a	161^a
Annual crops ha	43	0 ^a	11 ^b	33 ^c	119 ^d
Annual crops % UAA		0 ^a	9 ^b	21 ^c	43^d
Livestock Units	167	187 ^{ab}	136 ^a	157 ^{ab}	214 ^b
T live-weight produced	52,3	58,8^{ab}	41,7 ^a	49,9^{ab}	67,3^b

❖ **Mixed crop-livestock farms are larger than grassland farms with the almost same number of LUs**

- ✓ Diversification + enlargement
- ✓ Almost the same fodder area, kg beef produced, but more annual crops

Charolais suckler cattle farms: economics

Average 2012-2016	TOTAL	AREA UNDER ANNUAL CROPS			
		0 ha N=6	0-20 ha N=19	20-60 ha N=26	>60 ha N=15
Mechanization costs €/haAA	257	195 ^a	228 ^{ab}	257 ^b	306 ^c
Incl. fuel	52	37 ^a	42 ^a	55 ^a	68 ^b
Incl. depreciation	105	77 ^a	99 ^a	109 ^a	119 ^a
Total fixed costs €/ha AA	628	676 ^a	597 ^a	617 ^a	666 ^a
Gross farm income €/ha AA	436	350 ^a	463 ^a	444 ^a	423 ^a
Farm net income €/ha AA	235	175 ^a	279 ^a	238 ^a	199 ^a
Farm net income k€/worker	20.9	17.1 ^a	22.5 ^a	20.9 ^a	20.4 ^a

- ❖ Diversification/size increases fuel consumption
- ❖ Diversification/size does not limit the depreciation and total fixed costs
- ❖ Diversification/size does not improve farm income /ha and /worker

Diversification and beef costs of production

Spearman (p-values<0.05)	No. Workers	UAA ha	Annual crop area ha	Annual crop area % UAA
Annual crop area ha	0,461	0,642	1	0,956
Total variable costs €/kgLW			0,356	0,404
Total fixed costs (excl. Labour) €/kgLW				
Mechanisation costs €/kgLW	0,259	0,263	0,340	0,325
Labour costs €/kgLW		-0,301		
Bovine Gross Margin €/LU		-0,322	-0,312	-0,297

- ❖ Ha of annual crops and % of annual crops are very strongly linked
- ❖ Diversification (crop-livestock) is strongly correlated with the size
- ❖ Diversification/size is positively correlated with variable costs and mechanization costs of the beef production
- ❖ Diversification/size is negatively correlated with the bovine gross margin

Diversification/size and farm economics

Spearman (p-values<0.05)	No. Workers	UAA ha	Annual crops area ha	Annual crop area % UAA
No. Workers	1	0,743	0,461	0,326
UAA ha	0,743	1	0,642	0,441
Crop gross margin €/ha		0,270	0,349	0,306
Mechanisation costs €/ha UAA	0,318	0,367	0,595	0,647
Total fixed costs €/ha UAA				
Net farm income €/ha UAA				
Net farm income €/worker				

- ❖ **The crop gross margin is positively correlated with the importance of the crop unit in the farm**
- ❖ **Diversification/size is positively correlated with mechanization costs per ha**
- ❖ **No correlation between diversification/size and farm income**

Discussion, conclusion

- ❖ **Mixed crop-livestock farms are larger than grassland specialized farms**
 - ✓ In farms networks and in FADN, impossible to compare specialized and diversified beef farms with the same size
- ❖ **The beef unit have the same size in specialized beef farms and in mixed crop-livestock farms, but:**
 - ✓ Beef production is less efficient in mixed farms
 - ✓ Costs of production of beef lw are higher in mixed farms
- ❖ **Mechanization and fixed costs are higher in large mixed farms**
- ❖ **Farm income per ha and per worker are the same in specialized grassland farms than in large mixed crop-livestock farms**

Discussion, conclusion

❖ Economies of scale and economies of scope

- ✓ No economies of scales
- ✓ And/or no economies of scope
- ✓ And/or an economic advantage is offset by an economic disadvantage

❖ Enlargement AND complex farming systems

- ✓ High labour productivity, heavy workload, combination of skills
 - **Incompatible with efficiency and sustainability**

❖ Which model for the agroecological transition?

- ✓ Encouraging “small” farms in the family farming framework?
- ✓ Encouraging large specialized farms?
- ✓ Specialization of the farms and diversification of the territory?
- ✓ Encouraging exchanges between farms in a territory?
- ✓ Role of the market and public policies?