High output farming systems in Europe: 
the French case

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High output dairy farming systems: France?

- Introduction
- Source of the data
- The huge diversity of bovine dairy production systems in France
- French dairy systems aim for self sufficiency, not productivity per hectare
- Avoiding negative outputs (environmental effects) by limiting inputs
- Discussion and Conclusion
Today’s topic = bovine dairy farming systems in France
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Introduction

What is a high output dairy farming system?
- Not an issue in France: should we accept this presentation?

Diversity over the territory: climate, soils, altitude, combinaisons of productions
- Variations in productivity, average far below our neighbours

Environmental regulations in major dairy areas:
- Limiting milk produced per hectare

Added value
Self sufficiency
Ecological services
High output dairy farming systems: France?

Introduction

Source of the data

The huge diversity of bovine dairy production systems in France

French dairy systems aim for self sufficiency, not productivity per hectare

Avoiding negative outputs (environmental effects) by limiting inputs

Discussion and Conclusion
Origin of the data used to describe current situation

- General Agricultural Census RGA 2010
- National Farm Network and IFCN
- FranceAgriMer (quota management till 31/3/2015)
- FNSAFER for land prices
- European projects such as Dairyman...

See references
Contact the authors

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Dairy sector in France

- 2013/14: 23.29 Millions l milk
- 68,224 farms (341,000 l per farm)
- 70% plains / 30% mountains and piedmonts

Huge diversity in production systems

geography

history

sociology

classification
3 main dairy production areas

Lowland dairy areas
34,300 farms (45%)
49% of milk references

Grassland areas: 3,800 farms
Mixed grass-maize areas: 6,000
West: 24,500

Brittany

Crops-Livestock areas
22,000 farms (29%)
32% of milk references

Intensive crops-livestock area: 10,300
With permanent grasslands constraints: 6,900

Nord Pas-de-Calais

2010: 76,600 dairy farms

# dairy farms per small agricultural region:

- Dark blue: 2,000
- Medium blue: 1,000
- Light blue: 200

Crops-Livestock areas with low dairy density: 3,500
Crops-Livestock areas, dry hills of South-West: 2,500

Other areas
28,800 farms (46%)
33% of references

Mountains and piedmonts areas
17,400 farms (23%)
16% of references

Source: Agrasie agricultural census, 2010 – Analyzed by Institut de l’Élevage

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## The lowland dairy areas (LDA)

<table>
<thead>
<tr>
<th>Zone</th>
<th># farms</th>
<th>Agr. area (ha)</th>
<th>Forage area (FA, %)</th>
<th>Maize silage % FA</th>
<th>Stocking rate (LU per ha)</th>
<th># cows</th>
<th>Quota per farm (*1,000 l)</th>
<th>Quota per cow (l)</th>
<th>Quota per ha AA (l)</th>
<th>Quota per ha FA (l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowlands dairy areas</td>
<td>34,369</td>
<td>89</td>
<td>74</td>
<td>30</td>
<td>1.6</td>
<td>54</td>
<td>351</td>
<td>6,500</td>
<td>3,900</td>
<td>6,600</td>
</tr>
</tbody>
</table>
The Crop+Livestock areas (CLA)

<table>
<thead>
<tr>
<th>zone</th>
<th># farms</th>
<th>Agr.area (ha)</th>
<th>Forage area (FA, %)</th>
<th>Maize silage % FA</th>
<th>Stocking rate (LU per ha)</th>
<th># cows</th>
<th>Quota per farm (*1,000 l)</th>
<th>Quota per cow (l)</th>
<th>Quota per ha AA (l)</th>
<th>Quota per ha FA (l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops+livestock areas</td>
<td>22,044</td>
<td>119</td>
<td>51</td>
<td>28</td>
<td>1.6</td>
<td>51</td>
<td>361</td>
<td>7,100</td>
<td>3,000</td>
<td>7,400</td>
</tr>
</tbody>
</table>
### The mountain+piedmonts areas (MPA)

<table>
<thead>
<tr>
<th>Zone</th>
<th># farms</th>
<th>Agr.area (ha)</th>
<th>Forage area (FA, %)</th>
<th>Maize silage % FA</th>
<th>Stocking rate (LU per ha)</th>
<th># cows</th>
<th>Quota per farm (*1,000 l)</th>
<th>Quota per cow (l)</th>
<th>Quota per ha AA (l)</th>
<th>Quota per ha FA (l)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mountains +piedmonts</strong></td>
<td>17,444</td>
<td>75</td>
<td>91</td>
<td>5</td>
<td>1,0</td>
<td>38</td>
<td>221</td>
<td>5,800</td>
<td>2,900</td>
<td>3,700</td>
</tr>
</tbody>
</table>

Source: Agrarte agro territorial zones, 2015 - Analyzed by Institut de l'Elevage.
Main characteristics of the 3 dairy "Frances"

<table>
<thead>
<tr>
<th>LDA</th>
<th>CLA</th>
<th>MPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small farms: pig+poultry as complement</td>
<td>High quality of soils CROPS</td>
<td>Lower deliveries per farm</td>
</tr>
<tr>
<td>High farm density</td>
<td>Low farm density</td>
<td>Moderate farm density</td>
</tr>
<tr>
<td>Grass+ maize N surpluses, nitrates in water, strong regulations</td>
<td>Maize silage, high productivity of animals</td>
<td>High added value cheese (PDOs) Grass based (hay)</td>
</tr>
</tbody>
</table>

In average: 3,400 l milk produced per ha Agric. Area, 5,800 l per ha Forage Area
Intensification levels

Stocking rates and milk per hectare of Agr. area – even Forage area- much below other dairy areas
# Intensification levels of some EU regions

<table>
<thead>
<tr>
<th>Region Dairyman</th>
<th>Belgium, Flanders</th>
<th>Belgium, Wallonia</th>
<th>France, Brittany</th>
<th>France, Nord Pas de Calais</th>
<th>Germany, Baden-Württemberg</th>
<th>UK, Northern Ireland</th>
<th>Republic of Ireland</th>
<th>Luxemburg</th>
<th>The Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocking rate</td>
<td>2.6</td>
<td>1.9</td>
<td>1.4</td>
<td>2.0</td>
<td>1.7</td>
<td>2.1</td>
<td>2.3</td>
<td>1.3</td>
<td>3.0</td>
</tr>
<tr>
<td>(LU per ha)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk per ha</td>
<td>15,803</td>
<td>9,948</td>
<td>7,224</td>
<td>10,736</td>
<td>10,061</td>
<td>11,958</td>
<td>8,480</td>
<td>6,519</td>
<td>19,735</td>
</tr>
<tr>
<td>forage area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk per ha</td>
<td>13,979</td>
<td>5,870</td>
<td>5,884</td>
<td>5,291</td>
<td>7,078</td>
<td>10,743</td>
<td>7,501</td>
<td>3,821</td>
<td>19,733</td>
</tr>
<tr>
<td>agricultural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>area (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N min input per</td>
<td>120</td>
<td>95</td>
<td>41</td>
<td>121</td>
<td>79</td>
<td>145</td>
<td>183</td>
<td>86</td>
<td>105</td>
</tr>
<tr>
<td>ha AA (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intensification level per hectare of specialized dairy farms in some European dairy basins, data for the 128 pilot farms of Dairyman project
Intensification levels

Source: IFCN data, 2013
Average cost: 5,750 € per ha in 2013.
- 2,350 € in mountains, up to 12,340 in Nord-Picardie (CLA)
- Farming has always been a tool for land management and jobs in France: the state has a real agricultural policy
- Strong link between quota and land till 31/3/2015. No quota market, no leasing, no renting possible.
Thus the target is NOT to maximise milk produced per hectare but

- maximise milk produced from home grown forages+crops,
- increase self sufficiency and the link between territories and dairy products.
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A strong link to the ground

High self sufficiency in forages; high quality

- Large resort to **maize silage** (except in mountains) 46%
- ......and grass (all forms) 29% of the diet of a dairy cow.
- Forages = 78% DM intake of French dairy cows (6,9 t DM per yr)
- ~90% of dairy cows "grazing"

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97% self sufficiency for forages (in weight)

18% concentrates in diet (LDA and MPA), 21% in CLA

Weak point: self sufficiency in protein concentrate at farm level (but at national level: rapeseed limiting resort to soya)

<table>
<thead>
<tr>
<th>System</th>
<th>Dry matter self sufficiency (%)</th>
<th>Energy self sufficiency (%)</th>
<th>Protein self sufficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total diet</td>
<td>Concentr.</td>
<td>total diet</td>
</tr>
<tr>
<td>Lowlands, maize</td>
<td>81.6</td>
<td>12.0</td>
<td>79.8</td>
</tr>
<tr>
<td>Mixed crops+dairy, maize</td>
<td>79.0</td>
<td>11.9</td>
<td>77.4</td>
</tr>
<tr>
<td>Mountains, grasslands</td>
<td>84.4</td>
<td>26.3</td>
<td>82.0</td>
</tr>
</tbody>
</table>
High feeding self sufficiency levels compared to neighbours

IFCN-IDF comparisons: France in group of high sufficiency countries for feeding of dairy cows

Countries below 80% of self sufficiency

Countries over 80% of self sufficiency

- self suff. Conc
- self suff. Forage
- self suff tot diet
A Competitiveness asset for dairy producers

- High levels of self sufficiency in good quality forages (maize, grass)
- Possibility in plains to grow energy concentrates (cereals)
- Relatively high availability of land at low price
- The best way to limit feeding cost – production cost

Milk produced from forages per hectare or autonomous milk per hectare rather than "milk per hectare"
Which factors are correlated to low levels of self sufficiency?

- High share of maize silage: requires high levels of protein concentrates (French rapeseed, oversea soya)
- Keep the right balance between grass and maize in system
- Negative correlation between self sufficiency in DM and proteins and:
  - stocking rate, production per cow and concentrate per cow
  - But also N inputs, N mineral balance, impacts on environment
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Discussion and Conclusion
Avoiding environmental negative outputs

68,000 dairy farms use 20% of French territory: major role towards environment
- Limit pollution risks to air and water
- Preservation of biodiversity

Eutrophication potential due to N leaching and P run-off (inputs of organic and mineral fertiliser)
- In many LPA: max of 170 kg organic N per ha, 210 kg tot N per ha
- More restriction in green algae basins (Brittany): 140 to 160 kg tot N per ha
- No derogation to apply more N on grasslands
Before 2013 average cow officially producing 85 kg N per year (now: from 95 to 110)
Followed by 0.3 replacement LU
Stocking rates automatically limited to
\[
\frac{170}{(85 \times 1.3)} = 1.54 \text{ LU per ha}
\]
Stocking rates limited by potential and grants system (<1.3 LU per ha)
Limiting N inputs and stocking rates to limit negative outputs

First mitigation targeted in 1990’s: N leaching.
- Low levels of N inputs per hectare in French farms
- Low N balances and limited risks of leaching

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</tr>
</thead>
<tbody>
<tr>
<td>Concent. per kg milk (g)</td>
<td>170</td>
<td>247</td>
<td>121</td>
<td>216</td>
<td>245</td>
<td>302</td>
<td>155</td>
<td>216</td>
<td>232</td>
</tr>
<tr>
<td>N min input per ha AA (kg)</td>
<td>120</td>
<td>95</td>
<td>41</td>
<td>121</td>
<td>79</td>
<td>145</td>
<td>183</td>
<td>86</td>
<td>105</td>
</tr>
<tr>
<td>N Balance per ha (kg)</td>
<td>186</td>
<td>141</td>
<td>98</td>
<td>145</td>
<td>140</td>
<td>243</td>
<td>179</td>
<td>112</td>
<td>194</td>
</tr>
</tbody>
</table>
Aim: a low mineral balance

French authorities limit N inputs to reduce N balance and thus impacts on water

Less N inputs means a lower N balance
Aim: a low mineral balance
- Moderate level of milk per ha and stocking rate
- But also low level of grass valorization (average: 4 to 6 t DM per ha)
- A limit to development of "high output production" systems

Less N input and balance mean less milk per hectare
Agricultural practices impact biodiversity and landscape

- Dairy farming monitoring areas with agro ecological services
- French state support through low stocking rates
- Other services provided: landscape, limitation of snow avalanche risks, maintenance of ski slopes and tracks...

Production services per hectare limited (milk) but more jobs created in less intensive areas

- Franche Comté: 1 farm job creates 7 other jobs in dairy chain through PDO cheese chain
- Highest farms replacement rate in France (1/2 compared to 1/4 or 1/7)
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French production systems keep a strong link between land and dairy production

- Low levels of inputs and outputs per hectare: land widely available, moderate price, environmental regulations

Production systems based on home grown forages and crops  SELF SUFFICIENCY

- Maintenance of high added value products in piedmonts and mountains.
- Resilience of forage based production systems to face economic hazards
- Economic and environmental efficiencies in lowlands (low feeding cost)
French weaknesses

- No proper land management (one county disappearing every 10 years)
- Quota system with link quota-land has kept milk in 92% of French communities but created land fragmentation at farm level: problem for grazing
- Under use of production potential of grass
- No N derogation in western France limits milk increase after quota
Does France have "high output dairy systems"?
Moderate levels of milk per hectare due to:

- Environmental regulations where high soils potentials (Western France)
- Limited production potentials in mountains (Franche Comté)
- High share of non forage area in mixed crops+livestock areas
Conclusion

- France has a high potential to increase outputs of dairy production
- Not only milk production per hectare but also other services
- Main risk: lack of dairy farmers
Thank you for your attention

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