The Transition to Biological Dairy Farming

Final Presentation

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We will discuss the following topics

**Agenda**

Problem recap

Findings

Calculating the true price of milk

Policy recommendations for the banks and the government
We will discuss the following topics

**Problem recap**

Findings

Calculating the true price of milk

Policy recommendations for the banks and the government
Banks ignore the effects of externalities in their financing decisions; would financing decisions change when these externalities are included?

**The problem**

<table>
<thead>
<tr>
<th>The problem centres around the following points</th>
<th>To draw a conclusion, we looked at five different cases</th>
<th>Financed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks primarily focus on the current and projected financial performance of the farm when making lending decisions.</td>
<td>1 Case A</td>
<td>✔️</td>
</tr>
<tr>
<td>Banks may not finance the transition due to negative short-term profitability</td>
<td>2 Case B</td>
<td>✔️</td>
</tr>
<tr>
<td>The true cost of the farmer to produce milk are not known to the bank</td>
<td>3 Case C</td>
<td>✗</td>
</tr>
<tr>
<td>Potential hidden risk in the loan portfolio</td>
<td>4 Case D</td>
<td>✔️</td>
</tr>
<tr>
<td>Pricing externalities highlights the currently hidden value of biological farming</td>
<td>5 Case E</td>
<td>✔️</td>
</tr>
</tbody>
</table>
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Policy recommendations for the banks and the government
The current bank portfolio contains hidden risks due to non-priced externalities; quantifying these externalities could help banks reduce the risk of their portfolio.

**Conclusion**

We find that...

- There are significant hidden risks in the current bank portfolio.
- Organic farming significantly reduces the systematic risk of dairy products.
- There is a trade-off between revenue and profit margins.

The average margins before and after including externalities:

<table>
<thead>
<tr>
<th>Margin of traditional farming (including externalities)</th>
<th>Margin of organic farming (including externalities)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-48.8%</td>
<td>-29.0%</td>
</tr>
</tbody>
</table>

Given margin: 14.6%

The banks and the government should...

1. Perform research to fill the current lack of tools.
2. Focus on long-term orientation.
3. Analyse consumer behavior.
4. Inspect subsidies.
5. Think outside of the box to find financial support for the biological transition of the farmers.
We will discuss the following topics

**Agenda**

- Problem recap
- Findings

**Calculating the true price of milk**

- Policy recommendations for the banks and the government
To quantify the effect of externalities we first calculated the true price for both traditional and biological farming; next we compared profit margins to draw conclusions.

**The process of finding the true price**

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**What do we mean with the true price?**

The true price of milk includes negative externalities, such as the amount of greenhouse emissions and the effect of farming on biodiversity.

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**Focus of today's presentation**

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**Calculate the cost per 100 kg of milk excluding externalities**

**Find the true cost for both traditional and biological farming**

**Compare profitability and draw conclusions**

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**We incorporated:**
- Cost of greenhouse emissions
- Cost of biodiversity loss
- Cost of regional fodder (biological farming)
- Cost of land (biological farming)

**We included:**
- Imputed costs
- Unallocated costs

**We calculated the true price**

**We compared the profit margins**
First, we will discuss how we calculated the true price for both traditional and biological farming.

**The process of finding the true price**

**What do we mean with the true price?**

The true price of milk includes negative externalities, such as the amount of greenhouse emissions and the effect of farming on biodiversity.

**The process of finding the true price**

We incorporated:
- Cost of greenhouse emissions
- Cost of biodiversity loss
- Cost of regional fodder (biological farming)
- Cost of land (biological farming)

See excel for detailed calculations.

Focus of today’s presentation:

- Find the true cost for both traditional and biological farming
- Compare profitability and draw conclusions

We included:
- Imputed costs
- Unallocated costs

We calculated the true price
- We compared the profit margins
The following inputs were used to calculate the true price of milk for traditional farming:

<table>
<thead>
<tr>
<th>Externality</th>
<th>How does it arise?</th>
<th>Price range (€/kg milk)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Greenhouse emissions</strong></td>
<td>・ CO₂ is emitted during the production of fertilizer and fodder</td>
<td>Min. 0.03</td>
</tr>
<tr>
<td></td>
<td>・ Methane is emitted directly from the cows as a result of intestinal fermentation</td>
<td></td>
</tr>
<tr>
<td><strong>2 Biodiversity loss</strong></td>
<td>・ By using the land as grassland for the cows, the overall biodiversity is reduced</td>
<td>Min. 0.04</td>
</tr>
<tr>
<td></td>
<td>・ Conversion of land for the production of fodder, both in the region and abroad (South America)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>・ The urine and feces of the cows include large amounts of nitrogen, which evaporates and ends up in the environment</td>
<td>Min. 0.02</td>
</tr>
</tbody>
</table>

Sources: Vakblad V-Focus; Blonk et al (2011); van Reijs et al (2014); van Duursen en van Leeuwen (2016); Monetisation of true pricing (2020); EPA (2015); de Bruyn et al. (2010); Moore & Diaz (2015)
Including the negative externalities increases the cost of milk with 67% on average; this will have considerable effects on profits.

To determine the true cost, we included the following externalities (as discussed):

1. **Greenhouse emissions**
   - CO₂
   - Methane

2. **Loss of biodiversity**
   - Land usage by cows
   - Land conversion
   - Nitrogen

The cost per 100 kg of milk increases with approximately 67%.

Sources: Vakblad V-Focus; Blonk et al (2011); van Reijs et al (2014); van Duursen en van Leeuwen (2016); Monetisation of true pricing (2020); EPA (2015); de Bruyn et al. (2010); Moore & Diaz (2015)
The following additional costs were included to calculate the true price of milk for **biological farming**

### Additional costs of biological farming; the additional cost of regional fodder and land

<table>
<thead>
<tr>
<th>Additional costs</th>
<th>How does it arise?</th>
<th>Price range (€/100 kg milk)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regional fodder</strong></td>
<td>In order to get the Skal certification, at least 60% of the biological feed has to come from the farm itself or from the region (Europe)</td>
<td>0.30 0.60 1.00</td>
</tr>
<tr>
<td><strong>Land</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of new land</td>
<td>The costs of acquiring new land to keep the ratio of cows per ha within the regulations of biological farming</td>
<td>0.00 1.73 4.15</td>
</tr>
<tr>
<td>Rent and redemptions</td>
<td>The interest as well as the principal repayments per year that are associated with the purchase of the land</td>
<td></td>
</tr>
<tr>
<td>Disposal of cattle slurry</td>
<td>The disposal costs per ton of cattle slurry</td>
<td></td>
</tr>
</tbody>
</table>

Sources: CLM Onderzoek en Advies
To calculate the true price of **biological farming** we had to adjust some of the externalities; overall, we find a slight reduction in the costs associated with the externalities.

### True cost of biological farming: the cost of greenhouse emissions and biodiversity loss

<table>
<thead>
<tr>
<th>Externalities</th>
<th>Assumptions externalities biological farming</th>
<th>Price range (€/kg milk)</th>
<th>Reduced?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1  Greenhouse emissions</strong></td>
<td>• Since biological farming uses biological fodder, we assumed the CO₂ emissions to decrease</td>
<td>Min. 0.03 Max. 0.25 Avg. 0.14</td>
<td>✓</td>
</tr>
<tr>
<td>- CO₂</td>
<td>• The methane emission per kg of milk remains equal as we assume less cows, but also less milk to be produced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Methane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2  Biodiversity loss</strong></td>
<td>• We keep the land constant. We assume that farmers do not buy additional land, but instead produce less milk with less cows</td>
<td>Min. 0.04 Max. 0.04 Avg. 0.04</td>
<td>▼</td>
</tr>
<tr>
<td>- Land usage by cows</td>
<td>• The emission of nitrogen decreases due to the use of biological fodder and no use of fertilizers</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>- Nitrogen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Sources:** Vakblad V-Focus; Blonk et al (2011); van Reijs et al (2014); van Duursen en van Leeuwen (2016); Monetisation of true pricing (2020); EPA (2015); de Bruyn et al. (2010); Moore & Diaz (2015)

**Reduction of:** 8.3%
Switching to **biological farming** also increases the cost of milk significantly, namely with **59%**; however, a higher selling price will partially reduce the impact of the transition.

### True cost of biological farming

To find the true cost of biological farming we incorporated the following additional costs:

1. Regional fodder
2. Land

Next, we included the costs of the negative externalities:

1. Greenhouse emissions
2. Loss of biodiversity

### The cost per 100 kg of biological milk increases with approximately **59%**

<table>
<thead>
<tr>
<th>Additional costs related to biological dairy farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost/100 kg of milk</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>€38.53</td>
</tr>
</tbody>
</table>

Sources: Vakblad V-Focus; Blonk et al (2011); van Reijs et al (2014); van Duursen en van Leeuwen (2016); Monetisation of true pricing (2020); EPA (2015); de Bruyn et al. (2010); Moore & Diaz (2015)
Next, we investigate the margin differences between traditional and biological farming to draw conclusions.

### The process of finding the true price

**What do we mean with the true price?**

The true price of milk includes negative externalities, such as the amount of greenhouse emissions and the effect of farming on biodiversity.

**Focus of today’s presentation**

- We calculated the true price
- We compared the profit margins

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We incorporated:
- Cost of greenhouse emissions
- Cost of biodiversity loss
- Cost of regional fodder (biological farming)
- Cost of land (biological farming)

We included:
- Imputed costs
- Unallocated costs

Calculate the cost per 100 kg of milk excluding externalities

Find the true cost for both traditional and biological farming

Compare profitability and draw conclusions
Detailed analysis of the profit margin development of the business cases

Comparing the profit margins of the traditional and biological farming cases

<table>
<thead>
<tr>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
<th>Case D</th>
<th>Case E</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Green Circle]  +20%</td>
<td>![Green Circle]  +19%</td>
<td>![Green Circle]  +19%</td>
<td>![Green Circle]  +18%</td>
<td>![Green Circle]  +23%</td>
</tr>
<tr>
<td>-58% margin</td>
<td>-52% margin</td>
<td>-34% margin</td>
<td>-30% margin</td>
<td>-70% margin</td>
</tr>
</tbody>
</table>

Overall findings

- There are significant hidden risks in the current bank portfolio
- Organic farming significantly reduces the systematic risk of dairy products
- There is a tradeoff between revenue and profit margins
We will discuss the following topics

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## Policy recommendations for the banks and the government

### Recommendations for the banks

1. **Long-term orientation**
   - Transition to sustainable dairy farming could reduce future potential liabilities
   - In the long-run banks want to reduce risks; the transition is one path
   - However, in the short-run, biological farming might not yet be a viable business option for all farmers

2. **Banks’ responsibility**
   - Are banks the institution to finance the transition to sustainability?
     - If a business case is not viable in the short-term, banks will not finance the transition
     - Private banks need to assess their risks and only have a limited responsibility in financing these projects
     - Environmental value needs to be assessed. However, there needs to be a business case for the transition which includes impact and economic considerations

3. **Who should finance the transition?**
   - If a transition does not make economic sense to a financial institution like a bank, they will not finance the transition
   - Who should?
     - Government
     - Crowdfunding: receive products as a return
     - Banks with government subsidies

### Recommendations for the government

1. **Lack of tools**
   - Offer frameworks for a transformation to sustainable dairy farming
     - 1) Assess on defining a true price of milk
     - 2) Make use of the true price (framework without an integration strategy is not helpful)

2. **Consumer behavior**
   - Problem is deeply rooted in consumer behavior
     - Consumers need to be aware of the “true price”
     - Possible solution: compulsory transparent labeling of products regarding the production and costs of milk production
     - Best-in-practice: Oatly (similar industry) is successfully realizing this strategy of being transparent by labeling their products
     - Incentivize a shift of awareness of consumers

3. **Subsidies**
   - The dairy industry is currently directly and indirectly being subsidized by the government
   - Governments should quantify and assess future liabilities if no transition is happening
   - Offer subsidies for banks to finance transition; if intrinsic business motivation for banks is not given, they need a guarantee from another institution
   - Government should focus more on subsidizing the transition to organic farming
     - Price floor for organic milk to reduce risk of dumping prices