An LC inventory based on representative and coherent farm types

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Soy bean production (Argentina)

Fertiliser production

1 kg milk from farmgate
Objectives

• To present a method for establishing a typology of 28 farm models based on representative data for the Danish agricultural sector.

• To discuss problems and advantages in using the representative data.
Method for establishing LCI for farm types

• Step 1: Modelling farm types
• Step 2: Modelling emissions
Step 1: Modelling farm types

- Starting point: Representative data (e.g. land use, crop yields, livestock) from farm accounts.
- Soy meal and feed
- Nitrogen fertiliser
- Sold products (milk, grain, rape seed, sugar beet etc)
- Coherent farm types!
Step 1: Modelling farm types

An example: Farm type 18, Dairy farm, high stocking rate, 48 hectares, 75 milking cows

Inputs per year
Feed grain: 224 tons
Soy meal: 256 tons
Fertiliser: 2821 kg N
Mineral feed: 1565 kg
Electricity: 37 MWh
Etc.

Products per year
Milk: 538 tons
Wheat: 8,4 tons
Sugar beet: 44,9 tons
Beef meat: 23,9 tons
Manure: 1,9 tons N
Farm type 18 represent 330 Danish dairy farms

Upscaling……..

330 * 48 hectares = 15,840 hectares
330 * 75 milking cows = 24,750 milking cows
Comparing typology of farm models with national statistics

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<table>
<thead>
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<tbody>
<tr>
<td>Agricultural area</td>
<td>0%</td>
</tr>
<tr>
<td>Milking cows</td>
<td>-4%</td>
</tr>
<tr>
<td>Slaughtering pigs produced</td>
<td>-1%</td>
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<tr>
<td>Soy meal</td>
<td>-7%</td>
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<tr>
<td>Fertiliser, Nitrogen</td>
<td>-11%</td>
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Step 2: Modelling emissions

- Methane and nitrous oxides (Standards from IPCC)
- CO\textsubscript{2} (estimated from use of fossil fuel)
- Ammonia (Standards from NERI)
- Nitrate = N\textsubscript{input} - N\textsubscript{output} - N\textsubscript{NH3-loss} - N\textsubscript{denitrifikation}
- Phosphate = P\textsubscript{input} - P\textsubscript{output}
Step 2: Modelling emissions

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Inputs per year
Feed grain: 224 tons
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Products per year
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Wheat: 8.4 tons
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Beef meat: 23.9 tons
Manure: 1.9 tons N

834 kg N₂O
3439 kg NH₃
16.0 tons CH₄
26.8 tons NO₃
CO₂
## Comparing typology of farm models with national statistics

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<tbody>
<tr>
<td>CO₂ equivalents</td>
<td>-11%</td>
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<tr>
<td>Nitrous oxides</td>
<td>-11%</td>
</tr>
<tr>
<td>Methane</td>
<td>6%</td>
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<tr>
<td>Ammonia</td>
<td>-14%</td>
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Method for establishing LCI for farm types

• Step 1: Modelling farm types
• Step 2: Modelling emissions
Problems

• Differences within farm types due to farmers’ management is not reflected
• Use of correction factor
Advantages

• The typology accounts for most input and output of the Danish agricultural production
• The farm types are representative and coherent
• The farm types allow for LCA of agricultural products, by use of system expansion
• Relatively easily updated with data for the subsequent years
Conclusion

- Possible to establish typology of 28 farm models
- Farm types are,
  - Representative
  - Coherent