MINAS
– the Dutch MINeral Accounting System

For the California Department of Food and Agriculture

August 2013, Krijn J. Poppe
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Content of the presentation

- A short introduction to Dutch agriculture
- MINAS: a profit an loss account on nutrients
  - That is auditable
- The rise and fall of MINAS as a Dutch policy instrument
- Concluding remarks
Location of the dairy farms and industry
Location of intensive livestock complex
Agricultural land use, 1.9 mln. ha.

- Grassland: 53%
- Arable land: 42%
- Vegetables & fruit: 5%
- Flowers, ornamentals, and seeds: 2%

Overproduction of manure in pigs & poultry (+ some dairy)
Due to excessive imports of feed from overseas
MINAS: P & L in minerals (nutrients)

- Nitrogen, Phosphate and Potassium can enter a farm in different forms e.g.: 
  - Feed
  - Fertilizer
  - Young animals reared elsewhere
- And leave the farm in different forms, e.g. 
  - Milk
  - Live or dead animals
  - Manure etc.
- A flow statement (a profit and loss account) gives the full information (“a mineral balance”).
Example: 55 ha farm (20 ha grass, 50 cows)

<table>
<thead>
<tr>
<th>USE of Nutrients (kg/year)</th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young animals</td>
<td>2281</td>
<td>448</td>
<td>207</td>
</tr>
<tr>
<td>Seeds and plants</td>
<td>50</td>
<td>8</td>
<td>62</td>
</tr>
<tr>
<td>Compound feed</td>
<td>60545</td>
<td>11350</td>
<td>19369</td>
</tr>
<tr>
<td>Roughage</td>
<td>432</td>
<td>75</td>
<td>450</td>
</tr>
<tr>
<td>Fertilizer and manure</td>
<td>11810</td>
<td>954</td>
<td>3166</td>
</tr>
<tr>
<td>Environmental supply (peat, rain)</td>
<td>2695</td>
<td>50</td>
<td>226</td>
</tr>
<tr>
<td>Others (a.o. straw)</td>
<td>98</td>
<td>14</td>
<td>112</td>
</tr>
<tr>
<td><strong>TOTAL INPUT</strong></td>
<td><strong>77911</strong></td>
<td><strong>12899</strong></td>
<td><strong>23592</strong></td>
</tr>
</tbody>
</table>
Example: output and surplus

<table>
<thead>
<tr>
<th>Output of Nutrients (kg/year)</th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>24370</td>
<td>4557</td>
<td>1647</td>
</tr>
<tr>
<td>Milk</td>
<td>1909</td>
<td>315</td>
<td>525</td>
</tr>
<tr>
<td>Plant products</td>
<td>3600</td>
<td>630</td>
<td>5420</td>
</tr>
<tr>
<td>Manure</td>
<td>28150</td>
<td>5911</td>
<td>14666</td>
</tr>
<tr>
<td>Others (e.g. garbage)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>TOTAL OUTPUT</td>
<td>58029</td>
<td>11413</td>
<td>20258</td>
</tr>
<tr>
<td>TOTAL INPUT</td>
<td>77911</td>
<td>12899</td>
<td>23592</td>
</tr>
</tbody>
</table>

Per HA

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>361</td>
<td>27</td>
<td>61</td>
</tr>
</tbody>
</table>
Calculation methods

- Like profit and loss account: based on the physical units (kg milk etc.) on invoices (or delivery reports)
- With norms for all types of inputs and outputs
  - set rather high / low to promote use of real laboratory results on N / P content of products
- Feed companies started to provide invoices and yearly delivery reports with the N / P content of the feed for each farm
- Manure often tested (laboratory) on request buyer (arable farms)
- Separate software (excel), or integrated in management information system or (fiscal) accounting system
In MINAS the data are auditable

- Due to integration with the fiscal profit and loss account (that is for tax reasons obliged on every farm)
- An input you want to cheat with and not declare in your Mineral Account (e.g. fertilizer), you would like to include in your P&L as a deductible cost.
- This principle does not work if manure prices are very negative (extreme surplus in the region)
  - And you have to make sure the manure is really transported (e.g. by obligation to register/announce manure transport)
- Therefore the agricultural accounting offices integrated the calculation in their work and signed the accounts off.
The rise and fall of MINAS

- 1984: Interim law that made new (extra) buildings illegal: stop the growth

- 1987: Mandate on maximum application rates of manure in kg Phosphate (P\textsubscript{2}O\textsubscript{5}) per ha
  - “Manure bookkeeping”
  - Decreasing from 350 to 90 (silage maize) between 1997 and 1996

- MINAS developed as a management tool around 1990 by an agri-environmental consultancy of farmers (CLM)
  - Big advantage: full substitution between different inputs (or outputs) gives insight in management options and farm comparison (benchmarking) supported
The rise and fall of MINAS

- 1993: consensus between government and farmers to base the environmental policy on an economic instrument in stead of physical mandates: MINAS as a policy instrument

- Large project on introduction:
  - Map data flows, add new ones for audit reasons or to make accounting easier
  - Develop and test audit-procedures
  - Adapt software
  - Extension: introduction with farmers, farm study groups
The rise and fall of MINAS

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1998: full scale introduction (after 2 years political delay)
The rise and fall (and re-rise) of MINAS

- 1998 introduced for farms with more than 2.5 animals per ha, later for all farms (including arable)
  - Surplus per ha is indicator for efficiency
  - Certain level is unavoidable (e.g. a loss rate of 5 kg)
  - The remaining surplus was taxed (prohibitively)
- 2003: EU Court of Justice (NL vs. Eur. Commission) ruled out MINAS as being incompatible with N-directive:
  - Loss rates / ha incompatible with use-rates of manure
  - Too high loss rates were “only” taxed, not forbidden
- 2006: Back to manure application and max. livestock / ha
- 2015: end of quota. Introduction “P-Cycle Manager”
Nitrogen reduction in %/year (per ha)

Decrease in use of N and P

Clear substitution in arable farming and dairy farming: more use of manure, replacing fertilizers

Source: OECD
Concluding remarks

- Great management tool
- **Economic instrument (improves manure market)** that gives farmers insight and more options for farm specific measures (like substitution fertilizer/manure) than a mandate/maximum animals per ha.
- But administrative burden for everybody in the chain
- And enforcement can be complex
- It does not punish high efficient farms, and forces inefficient ones to change
- It works if the manure market between livestock farms and arable land is in balance. Not if production has to be cut back considerably (too high negative manure price)
Thank you for your attention

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