Analysis antibiotic use in dairy sector in The Netherlands

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Pharmaceutical Industry

Sales of pharmaceuticals in 2010 in the Netherlands

Drugs for human use total: € 6 billion
Comprising 6% antibiotics (€ 360 million)

Veterinary drugs total: € 250 million
Comprising 35% antibiotics (€ 87.5 million)
(>99% for food producing animals)
Total sales NL and other countries (EMA, 2011)

Note the differences in the scales.
ON FARM LEVEL
INDICATION OF MEDICINE USE

No. daily dosages
Reflects exposure to antibiotics
Definition

Number of daily dosages per cow per year indicates how many days per year an average cow in the herd under treatment of antibiotics is

Based on veterinary invoices
Youngstock is included
National project
2008-2010

6 Veterinary practices

6-10 dairymen each
guided

- 3 Veterinary practices
  plus experimental farms and other
  not guided

- 84 farms + 30 FADN farms + 13 Environmental
  project farms
Daily dosages on an annual basis

![Graph showing daily dosages per cow per year with an average of 5.84.](image)
Trend daily dosages per cow year in veterinary practice Oosterwolde
Trend and average usage per farm

Trend in daily dosages plus/minus

Project farms

FADN

Avg. daily dosages per farm over 5 years
average 5.80

Stichting Agro Management Tools

Trend and average usage per farm
Split up daily dosages in health categories (avg. 8 years)

- **Dry-off**: 2.562; 44%
- **Mastitis**: 1.352; 23%
- **Others**: 1.599; 27%
- **Uturus**: 0.058; 1%
- **Calving**: 0.112; 2%
- **Calves**: 0.162; 3%
Trend in number daily dosages per cow per year

- Mastitis
- Dry cow therapy
- Other
- Total

No. daily dosages per cow per year

Split up daily dosages for group of farms
(average over 8 years)
Daily dosages mastitis split up in active substance (2005-2011)

- aminoglycosiden en linco: 3%
- amx/clavulaanzuur: 26%
- cefalosporin 3/4 generatie: 32%
- cefalosporinen 1/2 generatie: 1%
- pen. Smal: 17%
- procainepen. Combi: 9%
- pen. Comb: 2%
- lincosamiden: 1%
Daily dosages dry-off split up in active substance (2005-2011)

- Cefola sporines 3/4 generation: 1%
- Procaine pen. comb: 35%
- Pen. comb: 12%
- Pen. Smal: 52%
Daily dosages other split up in active substance (2005-2011)

- **Macroliden**: 5%
- **Trim/sulfa's**: 7%
- **Fluoroquinolonen**: 3%
- **Pen. Smal**: 4%
- **Pen. Combi**: 20%
- **Tetracyclinen**: 15%
- **Cefolasporinen 3/4 generatie**: 31%
- **Rest**: 15%
Restrictive use 3-4\textsuperscript{th} generation antibiotics from 2011 on

3-4\textsuperscript{th} generation 2005-2010 19%
2011 17%
2012 1%
Trends of guided and not guided groups in period 2005-2012

- Guided project farms
- Not guided project farms
- Environmental project farms

No. daily dosages per cow per year

Year

2005 2006 2007 2008 2009 2010 2011 2012
Average daily dosages per farm in 2012 and trend in use over last 8 years

Trend in use
plus/minus daily dosages per year

No. daily dosages per cowyear per farm
(compared to project average of 5.80)

Lager dan gemiddeld maar stijgend verbruik

Hoger dan gemiddeld en stijgend verbruik

Lager dan gemiddeld en dalend verbruik

Hoger dan gemiddeld maar dalend verbruik

Project farms
Increasing farms
Decreasing farms
## Increase and decrease in use

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>decreasing</td>
<td>7.23</td>
<td>5.09</td>
<td>4.30</td>
<td></td>
</tr>
<tr>
<td>increasing</td>
<td>4.72</td>
<td>5.89</td>
<td>5.72</td>
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</table>
Do farm and farmer characteristics influence the amount of antibiotics used?

Data collected:

Farm and herd: 28 characteristics
- Production level; health; cell count; grazing

Farmer: socio-economic factors
- relation to veterinarian, to others
- attitude towards treatment of cow health problems
## Influence of farm technical indicators (59 farms)

<table>
<thead>
<tr>
<th>Antibiotics indicator</th>
<th>Farm factors of influence</th>
<th>Relation</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number daily dosages total</td>
<td>Quota</td>
<td>+</td>
<td>0.39</td>
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<tr>
<td></td>
<td>Cell count</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health status</td>
<td>+</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily dosages mastitis</td>
<td>Number of cows</td>
<td>-</td>
<td>0.28</td>
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<tr>
<td></td>
<td>Quota</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to pasture</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily dosages dry-off</td>
<td>Cell count</td>
<td>-</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>Calving interval</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health status</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily dosages other</td>
<td>Quota</td>
<td>+</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Milk cows</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Young stock/10 mk</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% cows removed</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
Higher Education

Younger Farmer

Higher Antibiotic Use

Higher Health Status Herd

Higher Milk Return Per Cow

Lower Celcount
### Influence social-economic factors (39 farms)

<table>
<thead>
<tr>
<th>Antibiotics indicator</th>
<th>SO factors of influence</th>
<th>Relation</th>
<th>R²</th>
</tr>
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<tbody>
<tr>
<td>Number daily dosages total</td>
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</tr>
<tr>
<td>Daily dosages mastitis</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Daily dosages dry-off</td>
<td>Relation to veterinarian</td>
<td>+</td>
<td>0.5-0.6</td>
</tr>
<tr>
<td>Daily dosages other</td>
<td></td>
<td></td>
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Conclusions

- Daily dosages useful as policy tool to gain a global view of antibiotics use
- Wide variation; should be based on more years to give a fair impression
- More than 65% of antibiotics to udder
- Trade off between level cell count and level antibiotics use
- Antibiotics use partly explained by farm characteristics
- Mindset of farmer and veterinarian more important
- Policies and regulation affected use significantly