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)
National projects
2005-2012

Farms from 30 Veterinary practices
also one environmental project group
1-10 dairymen each

Some groups guided, other not

- Total 94 farms

In: J. Dairy Science 99: 1632-1648
ON FARM LEVEL
INDICATION OF MEDICINE USE
No. daily dosages
Reflects exposure to antibiotics
Definition ADDD

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
Daily dosages on anual basis

Average: 5.84
Trend in number daily dosages per cow per year
Trends of guided and not guided groups in period 2005-2012

Guided project farms
Not guided project farms
Environmental project farms
Split up daily dosages in health categories (avg. 8 years)

- **Mastitis**: 1.352; 23%
- **Others**: 1.599; 27%
- **Uturus**: 0.058; 1%
- **Calving**: 0.112; 2%
- **Dry-off**: 2.562; 44%
- **Calves**: 0.162; 3%
Split up daily dosages for group of farms
(average over 8 years)
Restrictive use 3-4th generation antibiotics

Fluoroquinolones;
3-4th gen Cephalosporines

from 2011 on

3-4th generation 2005-2010 19%
2011 17%
2012 1%
Netherlands Veterinary Authority
2010
Execution of national policies;
Board and expert team independent;
Data from all farms are collected;
They assign benchmarks; advised to focus on reduction of antimicrobial resistance in stead of reduction in use
Goal: - 50% use in 2013 compared to 2009
Three groups of antibiotics:
- for animal use
- restricted use
- No, unless
Communication

Signaling threshold and action threshold values
- on cow herd level

Communication via Dairy companies’ milk quality scheme
- on veterinarian level

One-to-one relation
Communication via Veterinary organisations’ quality system
First overview of veterinarian applications in 2014

<table>
<thead>
<tr>
<th></th>
<th>Number veterinarians</th>
<th>Mean use</th>
<th>P90</th>
<th>P90/P10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veal calves</td>
<td>135</td>
<td>12.3</td>
<td>25.4</td>
<td>33</td>
</tr>
<tr>
<td>Pigs</td>
<td>285</td>
<td>7.0</td>
<td>12.1</td>
<td>7</td>
</tr>
<tr>
<td>Broilers</td>
<td>89</td>
<td>12.2</td>
<td>25.7</td>
<td>-</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>790</td>
<td>2.3</td>
<td>3.1</td>
<td>2.4</td>
</tr>
</tbody>
</table>
# Reductions achieved

<table>
<thead>
<tr>
<th></th>
<th>Reduction in use (ADDD) 2015/2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veal calves</td>
<td>35%</td>
</tr>
<tr>
<td>Pigs</td>
<td>56%</td>
</tr>
<tr>
<td>Broilers</td>
<td>60%</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>47%</td>
</tr>
</tbody>
</table>
Study:
Farms increasing and decreasing in use

<table>
<thead>
<tr>
<th>Farms</th>
<th>2005 - 2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>decreasing</td>
<td>7.23</td>
<td>5.09</td>
<td>4.30</td>
</tr>
<tr>
<td>increasing</td>
<td>4.72</td>
<td>5.89</td>
<td>5.72</td>
</tr>
</tbody>
</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>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number daily dosages</td>
<td>Quota</td>
<td>+</td>
<td>0.39</td>
</tr>
<tr>
<td>total</td>
<td>Cell count</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health status</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Daily dosages mastitis</td>
<td>Number of cows</td>
<td>–</td>
<td>0.28</td>
</tr>
<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>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>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% cows</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% cows removed</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- Wide variation in use
- More than 65% of antibiotics to udder
- Trade off between level cell count and level antibiotics use
- Antibiotics use partly explained by farm characteristics
- Awareness raising of farmer and veterinarian succesful in lowering use
- Policies and regulation affected use also significantly
Total sales NL and other countries (EMA, 2011)

Note the differences in the scales.
### 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>
</thead>
<tbody>
<tr>
<td>Number daily dosages total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily dosages mastitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
</tr>
</tbody>
</table>
Trend daily dosages per cow year in veterinary practice Oosterwolde
Daily dosages mastitis split up in active substance (2005-2011)
Daily dosages dry-off split up in active substance (2005-2011)

- pen. Smal: 52%
- procaïnepen. Combi: 35%
- pen. Comb: 12%
- cefolasporines 3/4 generatie: 1%
Daily dosages other split up in active substance (2005-2011)

- **Macroliden**: 5%
- **Trim/sulfa’s**: 7%
- **Tetracyclinen**: 15%
- **Pen. Combi**: 20%
- **Pen. Smal**: 4%
- **Rest**: 15%
- **Fluoroquinolonen**: 3%
- **Cefalasporinen 3/4 generatie**: 31%