Establishing a monitoring system for the use of antibiotics at animal level in Austria

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Use of antibiotics is increasingly important to consumers

EMA's response to antimicrobial resistance – infographic 2016
Use of antibiotics is increasingly important to consumers

"The antibiotic usage in food animals is indeed becoming a global issue associated with food safety and public health. All countries in the world should use the antibiotics in food animals more prudently and rationally. ..." (J. Shen quoted from O’Neill, 2016)
Evidence to support limiting use of antibiotics

Surveillance of antimicrobial consumption in Europe

Sales data for food-producing species in mg/PCU in 2013 (ESVAC 2013)
Surveillance of antimicrobial consumption in Austria

- **ESVAC** European Surveillance of Veterinary Antimicrobial Consumption (European Medicines Agency)

- Pharmaceutical industry, wholesale pharmacies: **mass flows of antimicrobials** used in veterinary medicine (regulation 2014, ministry of health)

- Veterinary practices: **mass flows of antimicrobials** used in veterinary medicine (regulation 2015, ministry of health)
Health monitoring system for cattle in Austria

Recording diagnoses and return of information

**Farmer**
- genetic evaluation for health traits
- health reports

**Veterinarian**
- treatment by the veterinarian
- receipt (application/delivery of drugs)
- encoding of the diagnoses
- **electronic data transfer (veterinarian)**
- recording to central cattle database
- health reports with agreement of the farmer

**breeding values for direct health traits**
optimisation of **herd management**
consultancy in **disease avoidance**

**treatment by the veterinarian**

**health reports**

**with agreement of the farmer**
# diagnoses determined as of June 26, 2016

<table>
<thead>
<tr>
<th>Code</th>
<th>diagnosis</th>
<th>number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>acute mastitis</td>
<td>148,009</td>
<td>17.8</td>
</tr>
<tr>
<td>42</td>
<td>silent heat, anestrus</td>
<td>95,362</td>
<td>11.4</td>
</tr>
<tr>
<td>43</td>
<td>ovarian cysts</td>
<td>89,827</td>
<td>10.7</td>
</tr>
<tr>
<td>52</td>
<td>chronic mastitis</td>
<td>67,165</td>
<td>8.0</td>
</tr>
<tr>
<td>48</td>
<td>retained fetal membranes</td>
<td>44,160</td>
<td>5.3</td>
</tr>
<tr>
<td>16</td>
<td>diarrhoea in newborn calves</td>
<td>16,196</td>
<td>1.9</td>
</tr>
<tr>
<td>21</td>
<td>diarrhoea</td>
<td>14,455</td>
<td>1.7</td>
</tr>
<tr>
<td>71</td>
<td>other diseases of the respiratory tract</td>
<td>13,835</td>
<td>1.6</td>
</tr>
<tr>
<td>62</td>
<td>sole ulcer</td>
<td>11,696</td>
<td>1.4</td>
</tr>
<tr>
<td>33</td>
<td>clinical ketosis</td>
<td>11,324</td>
<td>1.3</td>
</tr>
<tr>
<td>55</td>
<td>other udder diseases</td>
<td>10,187</td>
<td>1.2</td>
</tr>
<tr>
<td>90</td>
<td>systemic diseases</td>
<td>8,463</td>
<td>1.0</td>
</tr>
<tr>
<td>03</td>
<td>fever, feverish systemic diseases</td>
<td>8,457</td>
<td>1.0</td>
</tr>
<tr>
<td>94</td>
<td>diseases of the horns</td>
<td>7,374</td>
<td>0.9</td>
</tr>
<tr>
<td>41</td>
<td>endometritis</td>
<td>38,741</td>
<td>4.6</td>
</tr>
<tr>
<td>31</td>
<td>milk fever (hypocalcemia)</td>
<td>38,044</td>
<td>4.5</td>
</tr>
<tr>
<td>93</td>
<td>scabies and other infectious skin diseases</td>
<td>6,193</td>
<td>0.7</td>
</tr>
<tr>
<td>46</td>
<td>dystocia</td>
<td>5,614</td>
<td>0.7</td>
</tr>
<tr>
<td>11</td>
<td>umbilical inflammation</td>
<td>5,546</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>839,564</td>
<td></td>
</tr>
</tbody>
</table>

## Diagnoses entered by electronic interface

![Diagrams showing diagnoses entered by electronic interface from 2007 to 2016](image-url)

### Health monitoring system for cattle in Austria

- **Acute mastitis**: 148,009 cases (17.8%)
- **Silent heat, anestrus**: 95,362 cases (11.4%)
- **Ovarian cysts**: 89,827 cases (10.7%)
- **Chronic mastitis**: 67,165 cases (8.0%)
- **Retained fetal membranes**: 44,160 cases (5.3%)
- **Diarrhoea**: 14,455 cases (1.7%)
- **Other respiratory tract diseases**: 13,835 cases (1.6%)
- **Sole ulcer**: 11,696 cases (1.4%)
- **Clinical ketosis**: 11,324 cases (1.3%)
- **Other udder diseases**: 10,187 cases (1.2%)
- **Systemic diseases**: 8,463 cases (1.0%)
- **Fever, feverish systemic diseases**: 8,457 cases (1.0%)
- **Diseases of the horns**: 7,374 cases (0.9%)
- **Endometritis**: 38,741 cases (4.6%)
- **Milk fever (hypocalcemia)**: 38,044 cases (4.5%)
- **Scabies and other infectious skin diseases**: 6,193 cases (0.7%)
- **Dystocia**: 5,614 cases (0.7%)
- **Umbilical inflammation**: 5,546 cases (0.7%)

Total diagnoses entered as of June 26, 2016: 839,564 cases.
Monitoring system for health & drug use for cattle in Austria

standardized list of pharmaceuticals which is updated daily
Monitoring system for health & drug use for cattle in Austria

<table>
<thead>
<tr>
<th>Name</th>
<th>Documents</th>
<th>MA number</th>
<th>holder</th>
<th>ATC code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEFIXET 25 mg/ml Injektionssuspension für Rinder</td>
<td>Package Leaflet (national translation); SmPC (national translation)</td>
<td>811130</td>
<td>Emdoxa Bvba, John Upenstrass 16, 2321 Hoogstraten, Belgium</td>
<td>Q3J1E01</td>
</tr>
<tr>
<td>Cefixam DC 150 mg - Salbe zur intramammären Gabe</td>
<td>Package Leaflet (national translation); SmPC (national translation)</td>
<td>813580</td>
<td>Norbrook Laboratories Ltd. Station Works, BT35 AIP Merry, County Down, Northern Ireland</td>
<td>Q3J1E01</td>
</tr>
<tr>
<td>Cefixam LC, 73 mg Salbe zur intramammärer Anwendung</td>
<td>Package Leaflet (national translation); SmPC (national translation)</td>
<td>813570</td>
<td>Norbrook Laboratories Ltd. Station Works, BT35 AIP Merry, County Down, Northern Ireland</td>
<td>Q3J1E01</td>
</tr>
<tr>
<td>Cefixam DC 150 mg - Salbe zur intramammären Gabe</td>
<td>Package Leaflet (national translation); SmPC (national translation)</td>
<td>813581</td>
<td>Norbrook Laboratories Ltd. Station Works, BT35 AIP Merry, County Down, Northern Ireland</td>
<td>Q3J1E01</td>
</tr>
</tbody>
</table>

- product name
- SmPC
- package leaflet
- MA number
- MA date
- active substances
- ATC<sub>v</sub> code
- drug unit
- dosage
- administration type
- withdrawal period
- supply status
- domain
- animal species
- holder
Monitoring system for health & drug use for cattle in Austria

Recording diagnoses and return of information

- **Farmer**
  - Log-book (medicinal products)
  - health reports

- **Veterinarian**
  - Log-book (medicinal products)
  - health reports

Breeding values for direct health traits
Optimisation of herd management
Consultancy in disease avoidance
Improved responsible use of antibiotics

Treatment by the veterinarian
Receipt (application/delivery of drugs)
Encoding of the diagnoses & medicinal products
Electronic data transfer (interface „EMED“)
Recording to central cattle database

With agreement of the farmer

- **prime**
Monitoring system for health & drug use for cattle in Austria

Data recording – interface „EMED“

- ID veterinarian
- ID vet pharmacy
- ID herd
- date of treatment
- ID cattle
- code of diagnosis
- marketing authorisation number of medicinal product used
- batch of product
- applied / dispensed
- amount of drug used / dispensed
- drug unit
- dosage, treatment duration
- product name (if no authorized drug)
Monitoring system for health & drug use for cattle in Austria

EMED data (.csv) → data recording – interface „EMED“

- bug-file to sender
- plausibility errors

EMED interface → import of diagnoses & medications → central cattle database

- filter medications
- X = depending on approval for use of data

- mandatory reporting AM mass flow
- EMED Log-book
- health database
**Veterinarian´s & Farmer´s View**

**Monitoring system for drug use – electronic receipt**

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Vet.</th>
<th>Diagnosis</th>
<th>Type</th>
<th>Amount Applied/Delivered</th>
<th>Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>22731</td>
<td>14.01.2015</td>
<td>Fritz Testier</td>
<td>Lungentzündung</td>
<td>AT 392.491.928</td>
<td>12.0 ml, 12.0 ml, 0.0 ml</td>
<td>112915</td>
</tr>
<tr>
<td>22622</td>
<td>30.12.2014</td>
<td>Fritz Testier</td>
<td>Lungentzündung</td>
<td>Novasul</td>
<td>8.0 ml, 8.0 ml, 0.0 ml</td>
<td>000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lungentzündung</td>
<td>Oxsulfa</td>
<td>12000.0 g, 0.0 g, 35.0 g</td>
<td>8002141/01</td>
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</tbody>
</table>

**Withdrawal period:**
- Fleisch Milch 3T
- Fleisch Milch 3T
- Fleisch Milch 8T

**ID-animal:** AT 392.491.928

**Drug, amount applied/delivered, batch:**
- AT 392.491.928
- AT 392.491.928
- AT 392.491.928
**Monitoring system for drug use – Log book**

**Veterinarian´s View**

<table>
<thead>
<tr>
<th>ID-animal</th>
<th>date administered, dispensed</th>
<th>date administered by farmer (dispensed by vet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLIPS1</td>
<td>AT 080.070.317</td>
<td>30.04.2016</td>
</tr>
<tr>
<td>FREI</td>
<td>AT 839.120.516</td>
<td>30.04.2016</td>
</tr>
<tr>
<td>AT 507.328.729</td>
<td>12.05.2016</td>
<td>12.05.2016</td>
</tr>
<tr>
<td>AT 507.328.729</td>
<td>12.05.2016</td>
<td>12.05.2016</td>
</tr>
<tr>
<td>AT 507.328.729</td>
<td>12.05.2016</td>
<td>12.05.2016</td>
</tr>
</tbody>
</table>

**Drug, amount, dosage, duration**

- **Permacyl**: 36.0 ml, 8.0 ml, 0 ml, 0 ml
- **Rikelton**: 10.0 ml, 10.0 ml, 0 ml, 0 ml
- **Novosol**: 5.0 ml, 5.0 ml, 0 ml, 0 ml
- **Vitasol**: 5.0 ml, 5.0 ml, 0 ml, 0 ml
- **Estromate**: 2.0 ml, 2.0 ml, 0 ml, 0 ml
- **Tierart 2255**: 30.04.2016
- **Tierart 6393**: 12.05.2016
Monitoring system for drug use – Log book

Farmer’s View

- Tiere behandeln

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>19.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>2,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>13.06.2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>19.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>2,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>13.06.2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
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<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
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<tr>
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<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
<td></td>
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<tr>
<td>14</td>
<td>FREDCHEN</td>
<td>AT 890.925.718</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>4,0 Stuck</td>
<td>4,0 Stuck</td>
<td>1,0 Stuck</td>
<td>4 Tage</td>
<td>1,0 Stuck</td>
<td>Mustermann</td>
<td>15.06.2015</td>
<td></td>
</tr>
</tbody>
</table>

- Drug, amount delivered, dosage, duration (vet)

- ID-animal

- Date dispensed

- Amount and date administered (by farmer)
**Monitoring system for drug use – Log book**

### Farmer’s View

#### Tiere mit Wartezeit

<table>
<thead>
<tr>
<th>St.Nr.</th>
<th>Name</th>
<th>ID</th>
<th>Datum</th>
<th>Arzneimittel</th>
<th>Anw.Menge</th>
<th>Behandelnder</th>
<th>Behandl. Datum</th>
<th>Abgeschl.?</th>
<th>Fleisch</th>
<th>Milch</th>
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<tbody>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>23746</td>
<td>15.06.2015</td>
<td>Kanamycin</td>
<td>Tierarzt 2255</td>
<td>15.06.2015</td>
<td>Ja</td>
<td>30.07.2015</td>
<td>18.06.2015</td>
</tr>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>23746</td>
<td>15.06.2015</td>
<td>Rifin</td>
<td>Tierarzt 2255</td>
<td>15.06.2015</td>
<td>Ja</td>
<td>19.06.2015</td>
<td>15.06.2015</td>
</tr>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>23746</td>
<td>15.06.2015</td>
<td>Ubrolexin</td>
<td>Mustermann</td>
<td>16.06.2015</td>
<td>Nein</td>
<td>&gt;= 26.06.2015</td>
<td>&gt;= 21.06.2015</td>
</tr>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>23725</td>
<td>14.06.2015</td>
<td>Tylan</td>
<td>Tierarzt 2255</td>
<td>14.06.2015</td>
<td>Ja</td>
<td>05.07.2015</td>
<td>18.06.2015</td>
</tr>
<tr>
<td>4</td>
<td>SISSI</td>
<td>AT 850.387.217</td>
<td>23725</td>
<td>14.06.2015</td>
<td>Kanamycin</td>
<td>Tierarzt 2255</td>
<td>14.06.2015</td>
<td>Ja</td>
<td>29.07.2015</td>
<td>17.06.2015</td>
</tr>
</tbody>
</table>

**Note:**

*Bei Fehlern setzen Sie sich mit Ihrem zuständigen Kontrollverband in Verbindung. Beachten Sie den Halteverzug von bis zu 14 Tagen.*
Monitoring system for drug use for cattle in Austria

Analysis of antibiotic use - observational study

- Use of antibiotics in dairy herds with special emphasis on mastitis:
  - Which antimicrobials? Extent of treatment density (#TD)?

\[
# TD_{100} = \sum_{i=1}^{n} \frac{\text{amount } AS_i \text{ in period } P (mg)}{\text{DDD}A_i \text{ (mg/kg/day)} \times \# \text{ animal} \times \text{days in period } P \text{ (days)} \times \text{standard weight (kg)}} \times 100
\]

- Modelling links between mastitis and environment/management
  - Survey data; data of milk performance recording; regression analysis

- Modelling links between use of antibiotics in mastitis therapy and antimicrobial resistance (AMR)
  - Epidemiological cut-off (ECOFF) values
Monitoring system for drug use for cattle in Austria

Analysis of antibiotic use - observational study

- 255 dairy farms (under performance recording)
  - 14,223 cattle
  - 6,729 cows
- 18 veterinary practices
  - 7 different practice-management software programs
- 10 commercial milk buyer companies
Monitoring system for drug use for cattle in Austria

Summary

- Observational study – experiences
  - Implementation of a recording/monitoring system for drug use in dairy farms
  - Evaluation of management practices regarding the use of antibiotics

- Detailed information on the current situation of medication use in dairy farms
  - Continued development of dairy cattle specific guidelines for the prudent use of antibiotics
  - Continued development of concepts to reduce antimicrobial resistance (AMR)

- Nationwide infrastructure for monitoring the use of antibiotics at animal level is being established for cattle in Austria
Acknowledgements

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Thank you for your attention!