FARM ANTIBIOTIC-USE DATA IN EUROPE
Beginnings of farm antibiotic data collection in Europe

- In 1980, Sweden began publishing annual data on its farm antibiotic use.

- In the 1990s, six more European countries (Denmark, Finland, France, Netherlands, Norway and UK) began publishing data on the sales of farm antibiotics.

- Even from this small number of countries it was clear that some countries – France, Netherlands and UK – were using far more antibiotics per animal than others – Denmark, Finland, Norway and Sweden.
Limitations of data being collected

1) Most European countries were not collecting any data.

2) Different European countries sometimes used different methodologies for calculating the weight of active ingredient.

3) Most data was sales data, not use data, collected from pharmaceutical companies or veterinary wholesalers. It was not known in which animal species they were being used.

4) In some countries (e.g. UK) the reporting of sales data to the authorities was voluntary and unreliable.

5) Some countries had more pigs, others more cows, others more chickens, etc. How should comparisons be made?
In 2011, the European Medicines Agency (EMA) published the first ESVAC report on the sales of farm antibiotics, using harmonised methodology.

Only 9 countries provided data for first report, but 30 provided data for latest report.
EMA methodology

- Sales data are collected in each country, usually from pharmaceutical companies or from veterinary wholesalers. Data is in weight of active ingredient.

- Sales-data reporting is now mandatory in 26 of 30 countries, making the data much more reliable.

- The EMA introduced a new unit, the “Population Correction Unit” (PCU), for measuring the size of the animal populations.

- Same methodology can be used to compare use in veterinary and human medicine.

  Human and veterinary antibiotic use and resistance data is now published in Joint Interagency Antimicrobial Consumption and Resistance Analysis (JIACRA) reports.
Population Correction Unit (PCU)

- The PCU is a technical unit which estimates the average weight of animals at the time of treatment.

- PCU weight is usually less than slaughter weight. The PCU of a chicken is 1kg, whereas weight at slaughter is over 2kg in Europe.

- PCU does not cover “minor” species, e.g. goats, ducks, geese, etc.

### Estimated weight at time of treatment

<table>
<thead>
<tr>
<th>Animal</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaughter cows</td>
<td>425</td>
</tr>
<tr>
<td>Slaughter heifers</td>
<td>200</td>
</tr>
<tr>
<td>Slaughter bullocks and bulls</td>
<td>425</td>
</tr>
<tr>
<td>Slaughter calves &amp; young cattle</td>
<td>140</td>
</tr>
<tr>
<td>Imported/exported cattle for slaughter</td>
<td>425</td>
</tr>
<tr>
<td>Imported/exported for fattening</td>
<td>140</td>
</tr>
<tr>
<td>Livestock dairy cows</td>
<td>425</td>
</tr>
<tr>
<td>Slaughter pigs</td>
<td>65</td>
</tr>
<tr>
<td>Imported/exported pigs for slaughter</td>
<td>65</td>
</tr>
<tr>
<td>Imported/exported pigs for fattening</td>
<td>25</td>
</tr>
<tr>
<td>Livestock sows</td>
<td>240</td>
</tr>
<tr>
<td>Slaughter broilers</td>
<td>1</td>
</tr>
<tr>
<td>Slaughter turkeys</td>
<td>6.5</td>
</tr>
<tr>
<td>Imported/exported poultry for slaughter</td>
<td>1</td>
</tr>
<tr>
<td>Slaughter sheep &amp; goats</td>
<td>20</td>
</tr>
<tr>
<td>Imported/exported sheep &amp; goats for slaughter</td>
<td>20</td>
</tr>
<tr>
<td>Livestock sheep</td>
<td>75</td>
</tr>
<tr>
<td>Living horses</td>
<td>400</td>
</tr>
<tr>
<td>Slaughtered fish based on liveweight</td>
<td>- -</td>
</tr>
<tr>
<td>Slaughter rabbits</td>
<td>1.4</td>
</tr>
</tbody>
</table>
What does European antibiotic-use data tell us?

What further data do we need?
Lesson 1

About 65% of antibiotic use in Europe is in farm animals, not humans!

Varies from just 11-12% in Sweden and Norway, up to 85-90% in Spain and Cyprus.

(see JIACRA report 2017)
Farm antibiotic use as a percentage of total antibiotic use by European country in 2015

* These five countries have some data missing for human antibiotic use
Lesson 2

Growth promotion has been banned since 2006, but group treatments in feed or drinking water still account for 90% of European farm antibiotic use.

There are large differences between countries.

Group treatments in Iceland, Sweden and Norway are just 5-10% of total use, but about 95% of use in Spain, Cyprus and Hungary.
Group treatments as a percentage of total farm antibiotic use by European country, 2016

Data from ESVAC 2018
Lesson 3

There are huge differences in usage between different European countries.

This suggests that some countries are greatly overusing antibiotics in livestock, and that there is enormous potential for reducing use.

Countries with stricter regulations and/or less intensive production have lower use (e.g. Iceland, Norway and Sweden).
Human antibiotic use 2014 (mg per kg of biomass)

Median = 118
Average = 123.7

Netherlands = 49.9
Romania = 181.7

highest user/lowest user = 3.6
average user/lowest user = 2.5

Data from EU JIACRA report, 2017
Farm antibiotic sales in Europe 2016 (mg per kg of PCU)

Norway = 2.9
Cyprus = 453.4

average user/lowest users = about 25 – 40

highest user/lowest users = about 100 – 150

Data from EU ESVAC report, 2018
Lesson 4

Large differences in antibiotic use between different European countries have led to large differences in antibiotic resistance in farm animals between these countries.
Huge differences in antibiotic resistance of E. coli from pigs 2017 (harmonised Europe-wide testing with 11 antibiotic classes)

N: total number of isolates tested for susceptibility against the whole harmonised set of antimicrobials for *Escherichia coli*; sus: susceptible to all antimicrobial classes of the harmonised set for *E. coli*; res1-res9: resistance to 1 up to 11 antimicrobial classes of the harmonised set for *E. coli*.

ECDC and EFSA 2019
Huge differences in antibiotic resistance of E. coli from chickens 2016 (harmonised Europe-wide testing with 11 antibiotic classes)

N: total number of isolates tested for susceptibility against the whole harmonised set of antimicrobials for Escherichia coli; sus: susceptible to all antimicrobial classes of the harmonised set for E. coli; res1-res9: resistance to 1 up to 11 antimicrobial classes of the harmonised set for E. coli.

ECDC and EFSA 2018
Lesson 5

Resistance to certain antibiotics in some human infections is statistically significantly related to farm antibiotic use and not to human antibiotic use.

Example: fluoroquinolone resistance in human Salmonella and Campylobacter infections.

(see JIACRA report 2017)
European data that is still needed

1) Antibiotic-use data by species.

Denmark, Netherlands, Austria and France have species data and Sweden and the UK have partial species data.

EMA wants countries to start collecting species data, but progress is slow.

2) Antibiotic-use data by farming system, e.g. intensive, free-range and organic.
Organic and non-organic pig farms in Denmark

<table>
<thead>
<tr>
<th></th>
<th>Organic pigs</th>
<th>Non-organic pigs</th>
<th>Non-organic/organic ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of doses per</strong></td>
<td>Number of doses per 1,000 animal days in 2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sows and piglets</strong></td>
<td>4.1</td>
<td>23.5</td>
<td>5.7</td>
</tr>
<tr>
<td><strong>Weaning piglets</strong></td>
<td>4.6</td>
<td>94.4</td>
<td>20</td>
</tr>
<tr>
<td><strong>Slaughter pigs</strong></td>
<td>5.1</td>
<td>18</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>All pigs</strong></td>
<td>4.8</td>
<td>51</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Minimum weaning age is much later in organic farming in Europe:

- 21 days minimum for non-organic piglets
- 40 days minimum for organic piglets.
Slower-growing chickens need fewer antibiotics

- Growth rate of broilers has quadrupled since 1950s.
- Standard broilers are now slaughtered aged 32-40 days.
- Most of welfare problems in broilers are caused by genetic factors linked to fast growth (EFSA).
- Slower-growing breeds are used for free-range (min 56 days) and organic production (min 81 days).
- These breeds are used outdoors because they are less susceptible to disease.

Antibiotic use in Dutch boilers 2017
(daily doses per animal year)
Dutch Animal Health Service data

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Antibiotic use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard broilers</td>
<td>13</td>
</tr>
<tr>
<td>Slower-growing broilers (45-49 days)</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Slower-growing birds in Netherlands are also kept with lower stocking density.
Antibiotic-use data is helping to cut European farm antibiotic use

- Has exposed large differences in usage between countries, creating pressure on high-using countries to cut their use.

- Antibiotic-use data, and particularly species data, enables countries to set targets for reducing use, by sector or even by farm – see e.g. Norway, Netherlands, Denmark, France, UK and Belgium.

- More precise data, by species or farming system, can show where use is highest (e.g. after piglets are weaned) and how management can be improved to reduce use.

- Antibiotic-use data has shown that banning growth promotion in 2006 did not result in large reductions in use. This is because routine preventative use is still permitted in most of Europe.
New EU legislation

- Voted for by over 97% of European Parliament and will come into force on 28 January 2022.
- Will ban purely preventative antibiotic group treatments.
- Will restrict all antibiotic treatments, including metaphylaxis, to non-routine treatments.
- Will allow European Commission to establish list of antibiotics that cannot be used in farming at all.
Farm antibiotic use in Europe is now falling

<table>
<thead>
<tr>
<th>Country</th>
<th>% Change</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>-20%</td>
<td>(2014-16)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>-68%</td>
<td>(2007-17)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>-64%</td>
<td>(2008-17)</td>
</tr>
<tr>
<td>France</td>
<td>-62%</td>
<td>(2007-17)</td>
</tr>
<tr>
<td>Germany</td>
<td>-57%</td>
<td>(2011-17)</td>
</tr>
<tr>
<td>UK</td>
<td>-40%</td>
<td>(2014-17)</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>-39%</td>
<td>(2010-16)</td>
</tr>
<tr>
<td>Italy</td>
<td>-37%</td>
<td>(2010-16)</td>
</tr>
</tbody>
</table>
Animal biomass: an estimate of liveweight of animals slaughtered plus weight of breeding animals.
OIE Animal Biomass gives larger value than European PCU, which reduces usage statistics in terms of mg/kg.
Usefulness of OIE data?

- OIE does not publish data by country, only regional averages. European experience shows a regional average can hide huge differences by country.

- Data collection may be very unreliable if carried out on a voluntary basis. Data collection in most of Europe is now mandatory and less prone to revisions.

- Data is needed by different sectors, so that we can understand where and why antibiotics are being overused.
Conclusions

- Good farm-antibiotic use data helps understand where and why antibiotics are being used in livestock. This can help reduce unnecessary use.

- Better data on use by species and by production system is urgently needed.

- Less intensive, outdoor production generally has much lower use, but more and better data is needed to show this.

- OIE should publish sales data by country.

- Countries that have data on their own farm antibiotic use/sales should publish it.