Findings at slaughter following a reduction in antimicrobial use

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Acknowledgement
All the contributing veterinarians and farmers

Mette Fertner,
National Veterinary Institute, Technical University of Denmark
Background

Increased concern towards antimicrobial (AM) resistance

Focus on veterinary AM use
Background

Increased concern towards antimicrobial (AM) resistance

Focus on veterinary AM use

"Yellow Card program"
Brief facts on Denmark
Brief facts on Denmark

- National herd register
Brief facts on Denmark

- National herd register

- Data on all veterinary medicine
Why pig herds?
8.8 grams

3.8 grams
Produced pigs (mio.)

Antimicrobials (tonnes)

2009 2010 2011

Produced pigs (mio.)

Antimicrobial consumption (tonnes)
Aim of study

Did this decrease affect animal welfare?
Aim of study

Did this decrease affect animal welfare?

Objectives:

• Changes in the prevalence of pathological findings at slaughter

• Changes in the dispersion lean meat percentage at slaughter
Materials and methods – selection of herds

Study design
Retrospective, observational study in randomly chosen Danish finisher herds

Finishers = 30-120 kg pigs
Materials and methods – selection of herds

Study design
Retrospective, observational study in randomly chosen Danish finisher herds

Finishers = 30-120 kg pigs

Study period
1st of June 2009 – 31st of May 2011
Materials and methods – *selection of herds*

**Inclusion criteria**
- >3.5 kg active compound AM consumed in the year before June 2010
- >10% reduction in AM consumption the following year
- ≥500 registered pen places for finishers
- Same slaughter facility during study period
Materials and methods – selection of herds

Inclusion criteria
• >3.5 kg active compound AM consumed in the year before June 2010
• >10% reduction in AM consumption the following year
• ≥500 registered pen places for finishers
• Same slaughter facility during study period

Exclusion criteria
• Organic and outdoor herds
• Performed eradication programs
• New vet
• New herd owner
• New buildings
Materials and methods – data collection

Data collection

• AM consumption – Vetstat
**Materials and methods – data collection**

**Data collection**

- AM consumption – *Vetstat*
- Number of pen places – *Central Husbandry Register*
Materials and methods – data collection

Data collection

• AM consumption – Vetstat

• Number of pen places – Central Husbandry Register

• Pigs produced, pathological findings and lean meat percent at slaughter – IT based reports from slaughterhouses
Materials and methods – data collection

Data collection

- AM consumption – Vetstat
- Number of pen places – Central Husbandry Register
- Management and production – questionnaires
- Pigs produced, pathological findings and lean meat percentage at slaughter – IT based reports from slaughterhouses
Materials and methods – calculation routines

Quantifying AM consumption

• Gram active compound per pen place per year
**Materials and methods – calculation routines**

**Quantifying AM consumption**

- Gram active compound per pen place per year
- Percentage animals treated per day/ADD per 100 animals per day
  - Calculated using Vetstat standard procedures
Materials and methods – *calculation routines*

Pathological findings at slaughter

- Prevalence for the year before and after June 2010
  - Abcesses
  - Tail bites
  - Osteomyelitis
  - Chronic pneumonitis
  - Chronic pleuritis
Materials and methods – calculation routines

Pathological findings at slaughter

• Prevalence for the year before and after June 2010
  • Abcesses
  • Tail bites
  • Osteomyelitis
  • Chronic pneumonitis
  • Chronic pleuritis

Lean meat percent

• Weighted average and standard deviation for the year before and after June 2010
Materials and methods – calculation routines

Pathological findings at slaughter

- Prevalence for the year before and after June 2010
  - Abcesses
  - Tail bites
  - Osteomyelitis
  - Chronic pneumonitis
  - Chronic pleuritis

Lean meat percent

- Weighted average and standard deviation for the year before and after June 2010

Statistics

- $X^2$-test and paired t-test used to test for significant differences between years
  - Significance level: $P=0.05$
Results

- 65 participating herds - pen places 1600 (530; 5000)
Results

- 65 participating herds - pen places 1600 (530; 5000)

![Graph showing AM consumption before and after the Yellow Card, with a decrease in consumption after the card.]
Results

Prevalence of abscesses

Before Yellow Card

After Yellow Card

%
Results

Prevalence of abscesses

%  
5  4  3  2  1  0

Before Yellow Card  After Yellow Card

P<0.001
Results

Prevalence of ostemyelitis

%  

0.6 0.5 0.4 0.3 0.2 0.1 0  

Before Yellow Card  After Yellow Card
Results

Prevalence of osteomyelitis

P < 0.001
Discussion

- More welfare parameters might have been prudent
Discussion

- More welfare parameters might have been prudent

- Increase in abscesses and osteomyelitis
  - Changed administration route?
Discussion – “ADD per 100 animals per day”

Deviations between

• Actual dosage given and standard dosage value in database

• Number of pen places

• Average weight at treatment
Discussion – “ADD per 100 animals per day”

Deviations between

• Actual dosage given and standard dosage value in database

• Number of pen places

• Average weight at treatment

Misinterpretation of “percentage animals treated per day”

• Pen places NOT number of produced animals
Discussion – “ADD per 100 animals per day”

Deviations between

• Actual dosage given and standard dosage value in database
• Number of pen places
• Average weight at treatment

Misinterpretation of “percentage animals treated per day”

• Pen places NOT number of produced animals

Penalizing herds with high pig production?
Conclusions

• 52% significant increase in abscesses and 67% increase in prevalence of osteomyelitis at slaughter

• No significant change in lean meat percent
Take home message

• May be welfare-related consequences of lowering AM consumption

• Biological context when introducing restrictive legislation

• Consider how to pinpoint high-consuming herds
Take home message

• May be welfare-related consequences of lowering AM consumption
• Biological context when introducing restrictive legislation
• Consider how to pinpoint high-consuming herds

Thank you for your attention
Results

Initial population: 650 herds

Vets and herd owners interviewed by phone

- 18% no wish to participate
- 47% excluded
- 27% participated in similar study
- 8% included (53 herds)
Discussion

Misinterpretation of “percentage animals treated per day”

Deviations between
• Actual dosage given and standard dosage value in database (Jensen et al., 2004; Timmerman et al., 2006)
• Number of pen places
• Average weight at treatment
Results

Daily Weight Gain

- 46 herds

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Std. Dev between herds</th>
<th>Decrease (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>449 g/day</td>
<td>64 g/day</td>
<td>2.4</td>
<td>0.15</td>
</tr>
<tr>
<td>Period 2</td>
<td>438 g/day</td>
<td>66 g/day</td>
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<td></td>
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</table>
Results

- 53 participating herds

<table>
<thead>
<tr>
<th>Number of pen places</th>
<th>N</th>
<th>Average</th>
<th>Min.-max.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>53</td>
<td>2922</td>
<td>600-11,000</td>
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</table>

<table>
<thead>
<tr>
<th>Antimicrobial consumption</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Std. Dev</td>
<td>Reduction</td>
<td>P-value</td>
<td></td>
</tr>
<tr>
<td>Gram active compound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB/pen place/year</td>
<td>Period 1</td>
<td>13.2</td>
<td>7.9</td>
<td>52</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Period 2</td>
<td>6.3</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADD/100 animals/day</td>
<td>Period 1</td>
<td>19.6</td>
<td>12</td>
<td>51</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Period 2</td>
<td>9.6</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Only 21% of study herds had an AM consumption ≥25 ADD per 100 animals per day (11/53)


Results

Mortality

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Std. Dev</th>
<th>Increase (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>2.4%</td>
<td>1.1</td>
<td>25</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Period 2</td>
<td>3%</td>
<td>1.5</td>
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## Results

### Difference between high and low-consumer herds?

#### Antimicrobial consumption

<table>
<thead>
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<th></th>
<th>Average</th>
<th>Std. Dev</th>
<th>Decrease (%)</th>
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</thead>
<tbody>
<tr>
<td>Period 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 ADD</td>
<td>37.1</td>
<td>12.8</td>
<td>64%</td>
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<tr>
<td>Period 2</td>
<td>13.5</td>
<td>4.8</td>
<td></td>
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<tr>
<td>Period 1</td>
<td>15.1</td>
<td>5.9</td>
<td>43%</td>
</tr>
<tr>
<td>Period 2</td>
<td>8.6</td>
<td>4.2</td>
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</table>

#### Mortality

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Std. Dev</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥25 ADD</td>
<td>2.0</td>
<td>0.5</td>
<td>62.4</td>
</tr>
<tr>
<td>Period 2</td>
<td>3.2</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Period 1</td>
<td>2.4</td>
<td>1.2</td>
<td>26.6</td>
</tr>
<tr>
<td>Period 2</td>
<td>3.0</td>
<td>1.5</td>
<td></td>
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