Reducing the use of antibiotics: from theory to practice

Manon St-Hilaire, D.M.V.
What is an antibiotic

- A molecule having the property killing (bactericide) or limiting the spread (bacteriostatic) of **bacteria**.

### Example of agents responsible for diseases in pigs

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Virus</th>
<th>Parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glasser’s disease</td>
<td>PRRS</td>
<td>Ascaride</td>
</tr>
<tr>
<td>Erysipelas</td>
<td>Influenza</td>
<td>Mange</td>
</tr>
<tr>
<td>Ileitis</td>
<td>Circovirus</td>
<td>Coccidiosis</td>
</tr>
<tr>
<td>Mycoplasma</td>
<td>Rotavirus</td>
<td></td>
</tr>
<tr>
<td>Strep suis</td>
<td></td>
<td></td>
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<tr>
<td>E. Coli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Categories in Human Medicine</td>
<td>Antimicrobial Types</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td><strong>I</strong> Highest Importance&lt;br&gt;(serious human infections AND scarcity/absence of effective products)</td>
<td>Baytril®&lt;br&gt;Excenel®, Excede®, Ceftioycl®</td>
<td></td>
</tr>
<tr>
<td><strong>II</strong> High Importance&lt;br&gt;(serious human infections but available alternatives)</td>
<td>Lincomycin® Lincomix®&lt;br&gt;Tylosine® Tylan®&lt;br&gt;Draxxin®&lt;br&gt;Trim-Sulfa: Trimodox® – Poten-sulf® – Uniprim®&lt;br&gt;Stafac® (virginiamycin 44®)&lt;br&gt;Pulmotil® Tilmovet®</td>
<td>Gentamycin® Apralan®&lt;br&gt;Aivlosin®&lt;br&gt;Amoxicillin: Paracillin®&lt;br&gt;Penicillin: Depocillin® – Pen Aqueous® - PenG®</td>
</tr>
<tr>
<td><strong>III</strong> Average Importance&lt;br&gt;(non-serious human infections and/or cat. II and cat. I are effective)</td>
<td>Tetracyclines: Aureomycin® - Chlor 100® - Onycin® - Liquamycin® - Oxy LA®&lt;br&gt;Néomed 325® Neomycin325®&lt;br&gt;Nuflor®&lt;br&gt;Sulfa with no trimethoprim: Sulfamed® 3-sulvit®</td>
<td>Spectinomycin: LS20® - LS100® - Lincomycin+spectinomycin 4,4%&lt;br&gt;BMD® Bacitracin® Albac®&lt;br&gt;Denagard® Tiamuline®</td>
</tr>
<tr>
<td><strong>IV</strong> Low Importance&lt;br&gt;(not used on humans)</td>
<td>Saccox (salinomycin)&lt;br&gt;Flavomycin (bambermycin)</td>
<td></td>
</tr>
</tbody>
</table>
Why must we reduce our use?

Antibiotic resistance

- Even if it is controversial
  - 80% of the volume of antibiotics are administered to animals
  - Zoonosis (i.e. salmonella)
  - Transfer of resistance

Animal bacteria ➔ Environment bacteria ➔ Human bacteria
Why must we reduce our use?

It’s in the air…

• Canada
  – Ban announced for growth factors I, II & III
  – Warnings for Class I products (extra-label, mass treatment & antibiogram)
• Quebec
  – Strategic plan by MAPAQ
  – Regulation published in Quebec’s official Gazette, but has not been approved
  – Monitoring project by AQINAC for antibiotics in feed
Why must we reduce our use?

It’s in the air...

- AVIA
  - Class I, II & III antibiotics should not be used as growth factors
  - Limit the use of Class I antibiotics to specific situations
  - Do not use Class I antibiotics as a preventive treatment
Why must we reduce our use?

It’s in the air...

- Organic trends and healthier products
Why must we reduce our use?

It’s in the air…

• We, the industry:
  – Be PROACTIVE, CONVINCED & CONVINCING
Why must we reduce our use?

It’s in the air…

- Not always the easiest solution
  - i.e Individual treatment vs. mass treatment
- Not always a success story
  - i.e PRRS control
- Not always the most economical solution
  - i.e E. Coli vaccine in nursery vs. treatment in water
Why must we reduce our use?

It’s in the air = A common will!
How can we reduce our use?

1. Improve our health status
2. Have a PERFECT management
3. Aim for prevention
4. Favor individual treatments
5. Use alternatives
How can we reduce our use?

1. Improve our health status
2. Have a PERFECT management

On farm, what do I do???
How can we reduce our use?

5 steps (with the help of your veterinarian)
1. Target antibiotics used in a preventive manner
2. Answer: "Why am I using it?"
3. Control and/or eradicate the disease
4. Remove the antibiotic or change Class
5. Measure… measure and measure
How can we reduce our use?

Bon Porc Farm

- System comprising of 3 sites
- Negative PRRS, but positive for mycoplasma
- Maternity
  - 1,000 sows all-in/all-out every 4 weeks
  - 2,000 piglets weaned all-in/all-out
- Nurseries
  - 2 nurseries with 2,000 places / 1 site
- Feeder barns
  - 5 feeder barns with 2,000 places
How can we reduce our use?

Bon Porc Farm

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- Negative PRRS, but positive for mycoplasma
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Nurseries

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- **Feeder barns**
  - 5 feeder barns with 2,000 places

A near perfect system!
How can we reduce our use?

COMPASS Software

- Data sheets
- On an annual basis
- Use according to purchases
How can we reduce our use?

Results

• Several ways to measure
• No perfect method
• Gram of antibiotic
• Dose according to certification
• Dose per day for 100 animals (Danish)
  • Curative vs. Preventive
  • Depending of the Drug Classes
How can we reduce our use?

Results

• Several ways to measure use
• No perfect method
• Gram of antibiotic
• Dose according to certification
• Dose per day for 100 animals (Danish)
  • Curative
  • Depending of the Drug Classes

MEASURE
ALWAYS USE THE SAME METHOD WITH THE HELP OF YOUR VETERINARIAN
1. Target antibiotics used in a preventive manner

- Injections in newborn piglets
  - Excede 100: 0.20 ml IM in the neck
  - Used for almost 4 years

More than half of farms inject antibiotics in piglets at birth or at castration (mini survey)
2. Why am I using it?
   • Not quite sure
     • Control diarrhea beneath the mothers associated with E. Coli
     • Prevent cases of lameness in piglets
     • Increase gain in smaller piglets
3. Control or eradicate the disease
   • E. Coli or lameness
     • Improve cleaning management of farrowing cages
     • Clean with soap (avoid delays)
     • Use hot water
     • Validate application, right dose for the room
     • Use a disinfectant (some are more efficient for certain problems)
     • Dry farrowing cages +++
3. Control or eradicate the disease

• E. Coli or lameness
  • Farrowing Management:
    • Scratching (at least 2 days before the date and 3 days after)
    • Use of carpets or cardboards or mistral-son combo
    • Infrared globe, hover
  • Ventilation Control: MAJOR POINT (75% of cases)
    • Avoid draughts
    • Avoid temperature gaps
3. Control or eradicate the disease
   • E. Coli or lameness
     • Adoption Management
       • Leave litters intact = even out the numbers only
       • Colostrum vs. Intubation vs. Incomplete suckling
       • No mixing of age groups

McRebel or Madec Principles, are good for all diseases
3. Control or eradicate the disease

- Mc Rebel
- Madec
  https://www.3trois3.com/map_et_circovirus/18-controle-du-pcv2-facteurs-de-risques_776/
3. Control or eradicate the disease

- **E. Coli or lameness**
  - Use of vaccines for sows at 5 and 2 weeks before farrowing
  - Commercial vaccines or autogenous
  - Vaccination against other pathogens: Rotavirus, Clostridium
  - Control of other pathogens: Coccidiosis

- **Equipment**
  - Piglet floors: repair and change (especially for lameness)
4. Remove antibiotic or change Class
   • Owner of Bon Porc Farm is nervous
     • Withdrawal of Excede 100 (Class 1)
     • Replaced with Nuflor (Class 3): 0.20ml IM in the neck at birth
Bon Porc Farm – Maternity

5. Measure, measure… measure
   • Owner of Bon Porc Farm had good success!
   • It’s normal to have to inject piglets
     • 2-3% of piglets (all-in/all-out)
     • 2-5 litters for diarrhea (all-in/all-out 180 sows)
Bon Porc Farm – Maternity

5. Measure, measure... measure

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Grams by Class</td>
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<tr>
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<td>0%</td>
<td>100%</td>
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Bon Porc Farm – Maternity

5. Measure, measure… measure

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**Before**

<table>
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<tr>
<td>Percentage Use by Drug Class</td>
<td>100%</td>
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**After**

<table>
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<th>4</th>
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<tbody>
<tr>
<td>Percentage Use by Drug Class</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>
1. Target antibiotics used in a preventive manner
   • Much more complicated in nursery
   • Use of preventive medicine for 8 weeks
   • Owner of Bon Porc Farm wants to target:
     • Chlortetracyclin in feed at end of nursery (3kg/MT or 660 PPM)
     • Neomycin (Neomed, Néomycine) used routinely in water upon arrival for Coli post weaning (20mg/kg for 5 days)
2. Why am I using it?

- Chlortetracycllin (CTC) at end of nursery:
  - We’ve always done this!
- Routine use of Neomycin:
  - Coli post weaning for 6 months
  - Antibiogram (laboratory submission)
3. Control or eradicate the disease

• Coli post-weaning
  • Empty completely – cleaning – disinfecting - drying
  • Apply soap carefully
  • Disinfectant – start with floors
  • Dry hoppers and water bowls
  • Clean red bowls
  • Clean loading and unloading docks
  • Inspect and sample with swabs (before and after)
3. Control or eradicate the disease
- Coli post-weaning
  - Controling water
    - Good adjustment of teat height
    - Have an appropriate ratio of teats or bowls
    - Have adequate teats for the piglets’ age
      - Even in the bowls (no sow teats)
      - Paint can cap trick
3. Control or eradicate the disease

- **Coli post-weaning**
  - Controling water
    - Validate water from the well and water at the end of the lines
      - Groups of bacteria
    - Clean water lines frequently
    - Chlorinate the water
    - Reduce the water’s pH
Bon Porc Farm – Nursery

3. **Control or eradicate the disease**
   • *Coli post weaning*
   • *Controling water*
   • *Validate water from the well and water at the end of the lines*
   • *Groups of bacteria*
   • *Clean water lines frequently*
   • *Chlorinate the water*
   • *Reduce the water’s pH*

### Chlorine efficiency vs. pH

<table>
<thead>
<tr>
<th>pH</th>
<th>% HOCL</th>
<th>% OCL</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>99.2</td>
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</tr>
<tr>
<td>5</td>
<td>99.5</td>
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<tr>
<td>6</td>
<td>96.2</td>
<td>3.8</td>
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<tr>
<td>6.5</td>
<td>88.8</td>
<td>11.2</td>
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<tr>
<td>7</td>
<td>71.5</td>
<td>28.5</td>
</tr>
<tr>
<td>7.5</td>
<td>44.3</td>
<td>55.7</td>
</tr>
<tr>
<td>8</td>
<td>20.1</td>
<td>79.9</td>
</tr>
<tr>
<td>8.5</td>
<td>7.4</td>
<td>92.6</td>
</tr>
<tr>
<td>9</td>
<td>2.5</td>
<td>97.6</td>
</tr>
</tbody>
</table>
3. Control or eradicate the disease

• Coli post-weaning
  • Measure, measure… measure (weekly, monthly)
    • Pool tester
    • pH meter: less than 6
    • ORP: between 650-750
    • Chlorine 1,5 PPM (strip)
    • Water meter
Bon Porc Farm – Nursery
3. Control or eradicate the disease

- Coli post-weaning
  - Controlling ventilation
    - Adequate temperature upon arrival
    - Avoid temperature gaps et draughts
    - Watch out for dirty floors
      (+++ for underfloor heating)
3. Control or eradicate the disease
   • Coli post-weaning
     • E. Coli oral vaccination
       • Measure before administering the vaccine via the medicator
       • Use a different medicator and a different pail for treatments
       • Awaken your bacteria (freeze-dried bacteria)
       • Neutralize or cut chlorine in water
       • Before & after 3 day rule for medication
       • Validate that the vaccine has adequately passed (min 4hrs – max 6hrs)
     • As soon as possible after weaning
3. Control or eradicate the disease
   • Coli post-weaning
     • Feeding
       • Distribute the right food for the appropriate weight, appropriate age
       • Fresh food
       • Distribute small amounts of mush often
       • Food quality: toxins, cubes, pellets
       • Alternatives: dried eggs, essential oils…
     • Think of a weaned baby…
Bon Porc Farm – Nursery
4. Remove antibiotic or change Class

- Remove routine use of Neomycin
- Change CTC in feed for the last 3 weeks in nursery for Salinonycin (Sacox, Bio-Cox) (Class 4)
- Rapidly inject piglets suffering from diarrhea with the appropriate antibiotic (review antibiogram)
4. Remove antibiotic or change Class

• Intervene in case of mortalities, decrease of water intake (easier to measure)
  • 0.33% in less than 24 hours (6 piglets)
  • 0.20% for 2 consecutive days (4 piglets)
  • 2% of injected piglets (40 piglets) / day
Bon Porc Farm – Nursery

4. Remove antibiotic or change Class

Objective:
Reduce, but do not eliminate completely
Measure what we do

2% of injected piglets (40 piglets) / day
Bon Porc Farm – Nursery

5. Measure, measure… measure

• Very good success rate, but not perfect
  • Diarrhea treatment in water in 1 of 2 lots
  • Treatment for cough or mortality around 5 weeks: 2 lots out of 6
Bon Porc Farm – Nursery

5. Measure, measure... measure

Before

<table>
<thead>
<tr>
<th>Preventative vs curative use</th>
<th>Preventive</th>
<th>Curative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grams by type</td>
<td>783731</td>
<td>0</td>
</tr>
<tr>
<td>Percent of total</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

After

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</tr>
</thead>
<tbody>
<tr>
<td>Grams by type</td>
<td>334100</td>
<td>26825</td>
</tr>
<tr>
<td>Percent of total</td>
<td>93%</td>
<td>7%</td>
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Bon Porc Farm – Nursery

5. Measure, measure… measure

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<tr>
<td>Treatments by type</td>
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<td>0%</td>
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</table>

ADD/100 animal days

<table>
<thead>
<tr>
<th>Sows</th>
<th>Piglets on sow</th>
<th>Post Wean</th>
<th>Finishers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>419.67</td>
<td>0.00</td>
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</table>

After

<table>
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<th>Curative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments by type</td>
<td>4.25129</td>
<td>0.80</td>
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<tr>
<td>Percent of total</td>
<td>84%</td>
<td>16%</td>
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</tbody>
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<tr>
<td>0.00</td>
<td>0.00</td>
<td>289.92</td>
<td>0.00</td>
</tr>
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</table>
1. Target antibiotics used in a preventive manner
   • Chlortetracycline (CTC) 220
     • At beginning of finishing
     • 3kg/MT or 660 PPM for 3 weeks
   • Tylosine 40 (Tylosine, Tylan)
     • For duration of finishing
     • 0.25kg/MT or 22 PPM
2. Why am I using it?

- **CTC:**
  - To control coughing upon arrival (due to what?)

- **Tylosine:**
  - To prevent iliitis (Lawsonia) and mycoplasma hyopneumoniae (enzootic pneumonia)
3. Control or eradicate the disease

- Cough upon arrival
  - Arrival in an empty and clean feedlot or room
  - Avoid lot crossings (especially end lots)
  - Do not forget to dry the facility
  - INSPECTION +++
  - Heating if necessary at beginning at least 2 degrees more than at end of nursery
  - Adequate control of all management points
  - Submission of pigs or samples in case of cough
3. Control or eradicate the disease
   • Cough: enzootic pneumonia
     • Have a good vaccination program in the nursery
       • 2 doses vs 1 dose
       • Good timing
     • Good control of Circovirus
       • 2 doses vs 1 dose
       • Vaccination and timing
       • Attention ½ dose and ¾ dose
       • Not necessarily clinical signs
     • Vaccination for PSSR / Influenza if necessary
3. Control or eradicate the disease
   • Cough: enzootic pneumonia
     • 2 doses vs 1 dose
     • Vaccination and timing
     • Attention ½ dose and ¾ dose
     • Not necessarily clinical signs
     • Vaccination for PSSR / Influenza if necessary

   Enzootic pneumonia can be contrôled adequately, but it can also be eradicated!
3. Control or eradicate the disease
   • Ileitis Lawsonia Intracellularis
     • Enterisol vaccination
       • Works 100%
       • Make sure to remove chlorine in water
       • Before & after 3 day rule (medication)
       • Use a different medicator and a different pail
       • Good timing
       • ½ dose or ¾ dose (do not attempt at first try)
4. Remove antibiotic or change Class
   • Removal of CTC in feed
   • Removal of Tylosine in feed
5. Measure, measure… measure

- Good success rate, but not complete
- Remove medication in summer lots
  - 1 lot out of 2 – treatments in water upon arrival for cough
  - Cough linked to SUIS bacteria
  - Start CTC again in October
- Vaccination for Lawsonia worked well
  - Removal of Tylosine for the rest of the year
Bon Porc Farm – Finishing

5. Measure, measure… measure

• It’s normal:
  - 20 pigs to inject/day
  - 3 mortalities and more/day for 2 days (0.3%)
  - 5 mortalities and more in one day (0.5%)

• Cough at arrival:
  - Trace: less than 5 pigs in 5 minutes
  - +: 5 pigs in 5 minutes
  - ++: 5 pigs in less than 1 minute
  - +++: several pigs at a time, non stop.
Bon Porc Farm – Finishing

5. Measure, measure... measure

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<tbody>
<tr>
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<tr>
<td>Percent of total</td>
<td>100%</td>
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Preventive vs Curative Use

![Preventive vs Curative Use Before]

ADD/100 animal days

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<tbody>
<tr>
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<td>0.00</td>
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<td>0.00</td>
<td>60.24</td>
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After

<table>
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<tbody>
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Preventive vs Curative Use

![Preventive vs Curative Use After]

ADD/100 animal days

<table>
<thead>
<tr>
<th></th>
<th>Sows</th>
<th>Piglets on sow</th>
<th>Post Wean</th>
<th>Finishers</th>
</tr>
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<tbody>
<tr>
<td>After</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>18.31</td>
</tr>
</tbody>
</table>
Points to remember

Pyramid Law

Maternity

Nursery

Finishing

Why?
Points to remember

• Dispel the idea: "I have everything" …

For than 50 strains of PRRS in KEY projects
APP – several serotypes
Salmonella – several serovars
Influenza – several types

…
Points to remember

First, improve maternity health

• **Maintain health status**
  • TOP BIOSECURITY
    • Limit TRAFIC around the farm (piglet transportation, culling, gilts, feed, manure spreading, visitors, maintenance, recuperation…)
    • Have an efficient Danish entry or shower
    • Control everything/everyone that enters the farm (gilts, semen, medication, material, employees, visitors, papers…)
    • Constant source of gilts, reduce entries, have a quarantine or an acclimatization
Points to remember

- Antibiotics are used in veterinary medicine to fight bacterial infections and must be chosen according to their efficiency towards the bacteria to tackle, which can be tested with an antibiogram.
  - Submit animals or tissues
  - Request an antibiogram
  - Adjust use of antibiotics
Points to remember

• It’s a team work!
Thank you!

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