

## Raising Pigs Without Antibiotics

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### Disclaimer

- Not a “how-to”!
- What are antibiotics and antibiotic resistance?
- What is the concern about antimicrobial use?
- What has happened in other countries?
- What is the status in the US today?

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### What are antimicrobials?

- Chemical substances
  - Produced by microorganisms OR
  - Manufactured synthetically
- Inhibit or kill other organisms
- Used to treat infections of humans, animals, plants

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## Antimicrobial resistance

- Public Health Implications
- Estimated to cost \$0.15-3 billion yearly
  - Human health costs
- Human usage a predominant contributor
- BUT---what about non-human use?
  - Veterinary
  - Aquaculture
  - Horticulture
  - Household

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## AR as a Public Health Risk

- Perceived Zoonotic Pathway



Does antimicrobial use in animals affect public health?

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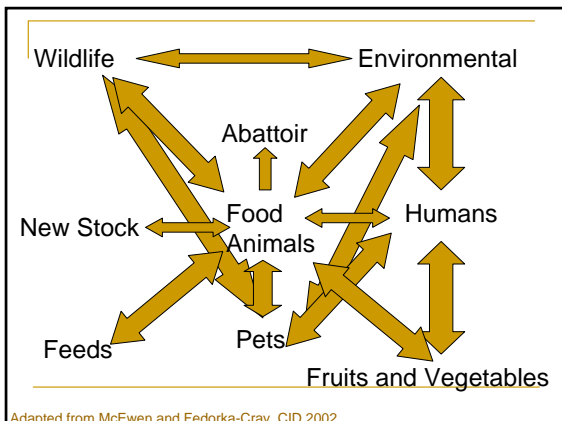
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Adapted from McEwen and Fedorka-Cray, CID 2002

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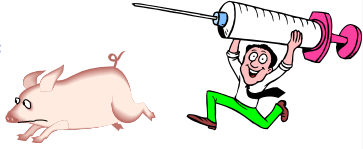
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## Antibiotic use in veterinary medicine

- Therapeutic
- Metaphylactic
- Prophylactic
- Growth promotion



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## Why metaphylaxis?

- Prevent expected spread of outbreak
- Decreased labor
- Decreased animal stress

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Antibiotic use in veterinary medicine

- Therapeutic
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A horizontal timeline with a black arrow pointing to the right. The numbers -7, 0, and 21 are marked along the axis. A purple rectangular box labeled "Pulmotil." is positioned above the axis, with a yellow arrow pointing down to the number 0. A red starburst shape with the word "outbreak" written inside is also centered at the number 0.

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Antibiotic use in veterinary medicine

- Therapeutic
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A simple cartoon illustration of a pink pig with a curly tail, facing right.

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Antibiotic use in veterinary medicine

- Therapeutic
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- Growth promotion

A vertical yellow arrow pointing downwards. The word "dosage" is written vertically inside the arrow. The word "high" is written above the top of the arrow, and the word "low" is written below the bottom of the arrow.

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## Critically important antimicrobials

- Trimethoprim/Sulfa
  - Tribissen®
  - "SMX"
- Third generation cephalosporins
  - Cefiofur (Naxcel®, Excenel®, Excede™)
- Fluoroquinolones
  - Baytril®
- Macrolides
  - Tylosin (Tylan®)
  - Erythromycin (Gallimycin®)

<http://www.fda.gov/cvm/guidance/fguide152.pdf>

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## So, where is the evidence?

- Antimicrobial resistant zoonotic pathogens
  - *Salmonella* Typhimurium DT104
  - MDR *Salmonella* Newport
    - (third generation cephalosporin resistant)
  - *Campylobacter jejuni*
    - Fluoroquinolone resistance
    - FDA withdrawal of feed additives

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## *Enterococcus spp.*

- Gram positive commensal of GI tract
- *E. faecalis* usually predominates in humans
  - Both as commensal and pathogen
- Considered an emerging pathogen of humans
  - Community and hospital acquired infections
- Transfer among people well demonstrated
- Reservoir for antimicrobial resistance

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## *Enterococcus* and veterinary antimicrobials

- Avoparcin use in animals and vancomycin resistance (not in US!)
- Emergence of vancomycin resistant Enterococci
  - (VRE)
  - Demonstration of same strains from turkeys and farmers
  - Demonstration of similar VRE clusters from animals and man

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## Evidence of transfer to humans

- Healthy volunteers drank animal VRE
- Could isolate for up to 14 days after!

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## Status in the US

- FDA Guidance Document #152
- “Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern”
- Recommends an approach for assessing the safety of antimicrobial **new** animal drugs with regard to their microbiological effects on bacteria of human health concern.

<http://www.fda.gov/cvm/guidance/fguide152.pdf>

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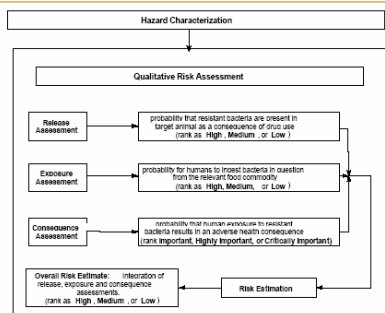


Figure 1: Components of a qualitative antimicrobial resistance risk assessment

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## Draft Risk Assessment

Risk Assessment of Streptogramin  
Resistance in *Enterococcus faecium*  
Attributable to the  
Use of Streptogramins in Animals

"Virginiamycin Risk Assessment"



[http://www.fda.gov/cvm/antimicrobial/SREF\\_RA\\_FinalDraft.pdf](http://www.fda.gov/cvm/antimicrobial/SREF_RA_FinalDraft.pdf)

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## Danish Pork Production – January 2005 Study Trip

Liz Wagstrom, DVM, MS, DACVPM  
Assistant Vice President, Veterinary Science  
National Pork Board



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## Objectives

- 1) Evaluate the Danish swine industry production responses to removal of antibiotic growth promoters in 2000, and the efficacy of these changes at farm level;
- 2) Evaluate current and prospective food safety initiatives in the Danish swine industry related to bacterial and parasitic agents in pork; and
- 3) Examine the human health impacts of the above programs through evaluation of DANMAP data and interviews with public health and industry experts.

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## Participants

- Jim McKean, ISU, Extension Veterinarian
- Jill Appell, Illinois Producer
- Bob Dykhuis, Michigan Producer
- Craig Rowles, Iowa Producer/Veterinarian
- Marlin Pankratz, Minnesota Producer
- John Waddell, President, AASV
- Scott Hurd, ISU, Veterinary Epidemiologist
- Peter Davies, U of MN Veterinary Epidemiologist
- Jeff Bender, U of MN, Public Health Vet
- Dermott Hayes, ISU, Ag Economist
- Harry Snelson, NPPC
- Liz Wagstrom, Porkboard
- Angela Demirjyn, Porkboard

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## Danish Study Trip

- Serum Staten Institute
  - State Public Health Department
- Danish Zoonosis Center
  - Monitoring and Surveillance
- Danish Bacon and Meat Council
  - Analogous to National Pork Board
- Farm Visits
- Visits with Veterinarians and Producers

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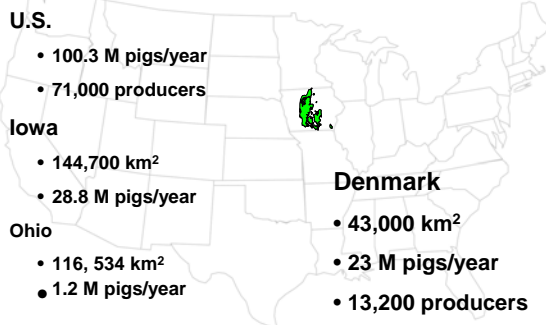
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## Demographics – Denmark versus U.S.




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## Marketing Differences

### Denmark

#### ■ Cooperative market

- Prices cooperatively negotiated
- 2 companies in cooperative with producers
- Dividends a major source of producer income

### U.S.

#### ■ Competitive market

- Bidding for pigs
- 9 major companies

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## Significant Events

- 1995 – Veterinarians restricted from dispensing animal health products
  - All antibiotics via prescription – distributed through pharmacies
  - This rule written due to the “yellow powder” problem (generic Tetracycline used in large quantities)
- 1995 – Monthly herd health visits required to be able to purchase animal health products

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## Significant Events

- 1995 – Ban on Avoparcin
- 1998 – Ban on Virginiamcin
- 1998 – “Voluntary” ban on the use of antibiotic growth promoters in finishing pigs (National tax on the use of growth promotants)
- 2000 – VetStat initiated - required reporting of all sales and prescriptions for antibiotics
- 2000 – “Voluntary” ban on the use of antibiotic growth promoters in weaned pigs

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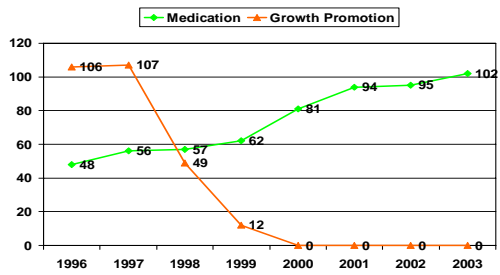
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## Danish Total Animal Antibiotic Use




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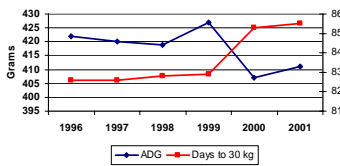
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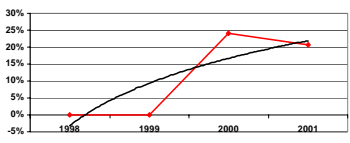
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Nursery ADG and Days to 30 kg



Percent Change Nursery Mortality v. 1998 Baseline




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## Producers and Practitioners

### ■ Hans – Producer

“The ban changed my personal life”

### ■ Heinrich – Practitioner

“I hope that we have a pig industry in 10 – 15 years, but I have my doubts”

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## Production Changes Summary

- Wean Age
- Nursery Management
  - Feed
    - Fiber
    - Protein
    - Acids
  - *Lawsonia* in nursery
  - Pulse Dosing
  - Size - not AIAO
- Finishing
  - Acids
  - Liquid Feeding
  - Little impact on production
  - Extended marketing time
- Sow Herd
  - Nurse sows
  - 4 sows inventoried per crate
  - Welfare regulations

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## Production Changes Summary

- More labor
- Increased cost of production
- More antibiotic use in weaned pigs

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## TakeCare-Use Antibiotics Responsibly™

A Producer's Guide to Using Antimicrobials Responsibly



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## Take Care™ Responsible Use Principles

1. Take steps to decrease the need for antibiotics
2. Assess the advantages and disadvantages of all antibiotics
3. Use antibiotics only when they provide measurable benefits
4. Complete PQA®
5. Follow the TakeCare Responsible Use Guidelines

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### 1. Take steps to decrease the need for antibiotics

- Monitoring herd health
  - Know where you are!
- Establishing preventive measures
  - Vaccination, biosecurity, hygiene, pig flow, etc.
- Establishing genetic, nutritional, environmental programs
  - Animal Scientists: geneticists, nutritionists, agricultural engineers

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### 2. Assess the advantages and disadvantages of all antibiotics

- Other management strategies
  - Welfare
  - Environmental
  - Food Safety
  - Economic Impact
  - Consideration of antibiotic resistance and animal and /or human health impact
- Antibiotics may not always be the most effective strategy

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2. Assess the advantages and disadvantages of all antibiotics

- Treat only for as long as needed for response
  - Dose and Duration of therapy
  - Consult label instructions
  - Use of antibiotics in chronic, non-responsive cases may not be effective
  - Withdrawal times must always be considered

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2. Assess the advantages and disadvantages of all antibiotics

- Consider impacts in addition to animal health
  - Antibiotics utilized for nutritional efficiency (growth promotion) reduce waste outputs

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2. Assess the advantages and disadvantages of all antibiotics

- Assess the need for preventive antibiotics
  - Are other management strategies available?
  - Is the condition still present?
  - Don't let it become routine so that antibiotics are used when no longer needed.

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3. Use antibiotics only when they provide measurable benefits

- Potential benefits
  - Reduced illness, death
  - Improved performance
  - Reduced waste
  
- Evaluating nutritional efficiency benefit
  - Journals, university publications, and clinical trials
  - Research suggests increasing health status results in decreased benefits

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4. Complete the PQA®

- Implement the Good Production Practices
  
- Accurate treatment AND OUTCOME records should be used to evaluate effectiveness
  
- Written records are essential!

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5. Follow the TakeCare™ Responsible Use Guidelines

- Use veterinary input for all medication decision-making
  - Veterinary Client-Patient Relationship
  
  - Over the Counter Use
    - Any use not indicated on the label can only occur under the direction of a veterinarian (EXTRA-LABEL USE)
    - Extra-label use is prohibited for some drugs
      - Consult with your veterinarian

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5. Follow the TakeCare™ Responsible Use Guidelines

- Antibiotics used only for appropriate diagnosis
  - Clinical signs, necropsy, lab tests, herd history
  - Culture and sensitivity
  
- Limit antibiotic treatment to ill or at risk animals
  - Treat the fewest animals as indicated
  - Prophylaxis/metaphylaxis can be responsible

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5. Follow the TakeCare™ Responsible Use Guidelines

- Antibiotics important to human medicine
  - Careful review and reasonable justification
  
- Mixing together injectable or water medications by producers is ILLEGAL
  - Veterinarians may mix some compounds
  - Compounding
  
- NO ONE may mix or use feed medications other than according to label instructions

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5. Follow the TakeCare™ Responsible Use Guidelines

- Minimize environmental exposure to antibiotics
  - Adjust feeders and waterers appropriately
  
  - Proper handling and disposal of outdated/unused products
    - No regulatory guidance
    - Incineration preferable

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