Antibiotic stewardship in veterinary medicine

The Danish history of interventions and their effectiveness in food animal production

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Importance of the food animal reservoir

- Different estimates ranging from
  - Almost zero (AHI and IFAH)
  - 1,518 extra deaths and an associated increase of 67,236 days of hospital admissions in Europe as a result of cephalosporin use in chickens alone (Collignon et al. 2013)
Definition of antimicrobial stewardship

Antimicrobial stewardship is a coordinated program that:
- promotes the appropriate use of antimicrobials, right agent, right dose, appropriate duration
- improves patient outcomes,
- reduces microbial resistance,
- and decreases the spread of infections

- Veterinary medicine
  - As little as possible, but as often as necessary

  Also includes
  spread to humans
Stewardship in veterinary medicine

New antibiotic solutions

Hygiene
Limiting spread

Better health,
Reducing need

Restrictions on antibiotics used for humans
Spread

Production animals

Prevention of diseases

Correct diagnostics and treatment

Reduced use

Critical important antibiotics

Improved hygiene

Choice of product

Hygiene

Food products

Population

Abbatoirs
Novel classes of antibiotics

Decade

1940 1960 1980 2000

10 8 6 4 2 0
Control transmission

- Better hygiene
  - Been of value in numerous studies (known since ancient times)

- Stop for trade with live animals
  - Unknown effect

- Criteria for sales of meat
  - Unknown effect
Reducing consumption

- Prescription – non-prescription
- Approval (extra-label use)
- Banning
- Prescriber behavior
- Restrictions on use of certain classes
- Limiting profit
- Price and taxation
- Preventive veterinary strategies
Prevention disease

The story on using vaccines in salmon production in Norway
Figure 1. Antimicrobial Usage vs Salmon and Trout Production in Norway

Vaccine introduced
mg/kg produced meat


- No sales profit
- Avoparcin ban
- Virginiamycin ban
- AGP stop
  - slaughter pigs
- AGP stop
  - piglets
- Antibiotic policy
- yellow card

† AGR [Treatment]

DTU Food, Technical University of Denmark
Macrolide resistance among *Campylobacter coli* from pigs
Targeted control
Canberra and Copenhagen Expert Reports

Most critical:
- Quinolones
- 3rd gen. cephalosporins
- Macrolides

CRITICALLY IMPORTANT ANTIBACTERIAL AGENTS FOR HUMAN MEDICINE FOR RISK MANAGEMENT STRATEGIES OF NON-HUMAN USE

Report of a WHO working group consultation
15 - 18 February 2005
Canberra, Australia


http://www.who.int/foodborne_disease/resistance/antimicrobials_human.pdf

DTU Food, Technical University of Denmark
Agersø & Aarestrup, JAC accepted
Danish actions

- **Animals**
  - No profit (1995)
  - Restrictions on usage of FQ (2002)
  - Antibiotic policy (2005)
  - Voluntary ban on cephalosporins (2010)
  - Yellow card (2010)

- **Food**
  - DT104 zero-tolerance (1998)
  - Case-by-case evaluation of food (2006)

- **Humans**
  - EPI-NEWS
    - Increased occurrence of macrolide resistant S. pneumococcus
    - Increased usage of broad spectrum antibiotics
    - Increased usage of antibiotics in the community
    - Increased usage of FQ
    - Increased occurrence of MRSA
    - Increased occurrence of ESBL
  - MRSA notifiable (2006)
Negative consequences ??
Effects on productivity
A GP stops weaners.

Graph showing daily gain (g/day) and weaner mortality over the years 1991-92 to 2007-08.

- **Daily gain (weaners)**
  - Linear trend from 1991-92 to 1998-99
  - Increase from 1998-99 to 2002-03
  - Decline from 2002-03 to 2007-08

- **Weaner mortality**
  - Increase from 1998-99 to 2002-03
  - Decline from 2002-03 to 2007-08

The graph indicates a peak in both daily gain and weaner mortality around 2002-03, with a notable drop in mortality post AGP stop.
Broiler production

Mean monthly kg broilers produced per m²
(Nov. 1995 - June 2002)

Data: Danish Poultry Council
Broiler production

Percent dead broilers (Nov. 1995 - June 2002)

Data: Danish Poultry Council
Effect on productivity

• Increased production

• Reduced mortality
Surveillance is the basis for everything

- Relative importance of pathogens
  - Targeted interventions

- Relative importance of sources
  - Targeted interventions

- Baseline
  - Setting targets for control

- Changes over time
  - Effect of interventions

- Detection of novel problems

- Further studies
Conclusions

• **Actions that works**
  – No profit
  – Restrictions
  – Control based on consumption

• **Communication** – communication
• **Documentation** – documentation

• **Future**
  – Target the worst antimicrobials
  – Prevent diseases
  – Always surveillance in combination with interventions!!
GUIDELINES ON GOOD ANTIBIOTIC PRACTICE

- As little as possible, but as often as necessary

2013

Developed by the industry themselves