Antimicrobial usage in the livestock sector: history, lessons learned and perspectives

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Antimicrobial veterinary medicinal products sales data 1999-2014 in kg in the Netherlands

Reduction in kg since reference year 2009 58.1%
The wider perspective ....

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<td>1963–1965</td>
<td>Epidemic of resistant <em>Salmonella typhimurium</em> in UK</td>
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<td>1969</td>
<td>Swann Committee in UK recommends that antimicrobials for animals be divided into two groups: feed additives used without a prescription and therapeutic agents used with a prescription; recommends restricting use of antimicrobial growth promoters.</td>
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<td>1972–1974</td>
<td>European bans on use of tetracycline, penicillin, and streptomycin for growth promotion</td>
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<td>1986</td>
<td>Sweden bans use of antibiotics for growth-promotion in agriculture, as requested by Federation of Swedish Farmers.</td>
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<td>1988</td>
<td>Sweden stops use of all general prophylactic medications.</td>
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<td>1993</td>
<td>Vancomycin-resistant enterococci (VRE) is reported in food animals in the UK.</td>
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<td>1994</td>
<td>Denmark restricts direct sale of therapeutic antimicrobials from veterinarians and limits veterinary profits from antimicrobial sales. Denmark bans routine prophylactic use of antimicrobials.</td>
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<td>1995</td>
<td>Denmark bans the use of avoparcin for all purposes in agriculture. DANMAP (Danish Integrated Antimicrobial Resistance Monitoring and Research Program) is initiated.</td>
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<td>1996</td>
<td>Sweden and Finland join the European Union and lobby for EU-wide ban on agricultural growth promoters (AGPs).</td>
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<td>1997</td>
<td>Germany bans use of avoparcin. EU bans use of avoparcin. Netherlands bans use of olaquindox and carbadox. WHO Berlin meeting, “The medical impact of the use of antibiotics in food animals,” concludes that use of medically important antimicrobials as growth promoters should be stopped.</td>
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<td>1999</td>
<td>Scientific Steering Committee of the European Commission recommends phasing out antimicrobial growth promoters that are medically important and implementing disease-preventive methods. EU bans olaquindox and carbadox; suspends authorization of bacitracin, tylosin, spiramycin, and virginiamycin. EARSS (European Antimicrobial Resistance Surveillance System) established.</td>
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<td>2001</td>
<td>Sweden bans use of remaining AGPs: flavophospholipol and avilamycin. UK’s Advisory Committee on the Microbiological Safety of Food issues a report recommending improved veterinary training and surveillance of resistance.</td>
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<td>2006</td>
<td>EU ban on all AGPs.</td>
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<td>2008</td>
<td>ESVAC (European Surveillance of Veterinary Antimicrobial Consumption Project): European Commission asks the European Medicines Agency to harmonize surveillance programs collecting data on antimicrobial sales and usage.</td>
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From Cogliani, Goossens and Greko. Microbe 2011
A more pressing public health agenda ... turned veterinary practice in an urgent public health issue

Dutch patients, retail chicken meat and poultry share the same ESBL genes, plasmids and strains

M. A. Leverstein-van Hall1,2, C. M. Dieriks3, J. Cohen Stuart1, G. M. Voets1, M. P. van den Munkhof1, A. van Essen-Zandbergen1, T. Platteel1,4, A. C. Fluik1, N. van de Sande-Bruinisma1, J. Scharinga1, M. J. M. Bonten1,5 and D. J. Mevius1,4; on behalf of the national ESBL surveillance group*

1) Department of Medical Microbiology, University Medical Centre Utrecht, Utrecht, 2) Centre for Infectious Disease Control, National Institute for Public Health and the Environment (RIVM), Bilthoven, 3) Department of Bacteriology and TSEs, Central Veterinary Institute of Wageningen UR, Lelystad, 4) SALTR, Primary Health Care Laboratory, Utrecht, 5) Julius Centre for Health Sciences and Primary Care, University Medical Centre, Utrecht and 6) Department of Infectious Diseases & Immunology, Faculty of Veterinary Medicine, Utrecht University, Utrecht, the Netherlands.
MONITORING ON THE LEVEL OF SECTORS IS CRITICAL
Long term trends in antimicrobial usage, combination of LEI WUR (from MARAN) data (sample) and SDa data (complete coverage, with smaller confidence intervals): $\text{DDDA}_{\text{NAT}}$ (SDa 2015)

Reductions in $\text{DDDA}_{\text{NAT}}$ since 2009:

Veal calves  37.4%
Poultry      57.1%
Sows/piglets 56.2%
Finisher pigs 49.9%
Dairy cattle  n.a.
Managing Critically Important Antimicrobials is vital and highly effective

Separated animal and human use for some critical antibiotics: Cephalosporins and fluoroquinolones

Benchmark value in principle 0 for use in veterinary practice
Benchmarking farms is a next phase, but requires refined monitoring systems: good infrastructure for complete coverage, high quality data, sector product quality systems, etc.

Incentives?
Pragmatic – scientific basis
Benchmarking veterinarians (Bos et al., JAC 2015)

veal calves (a), cattle (b), pigs (c) and broilers (d)

Depending on the livestock sector 2-30 fold differences exist in prescription pattern SDa 2015 data DDDAVET

WHAT DOES PRUDENT USE MEAN?
The effect ... in resistance monitoring (MARAN 2015)
Low hanging fruit disappeared

• Structural changes unavoidable
  – Open/closed
  – Management
  – Biosecurity
  – Breeding (robust species)

• Broader animal health/infectious disease prevention and innovation agenda

• Longer term approaches
Important phases in managing antimicrobials

- Separating prophylactic and therapeutic use (Antimicrobial Growth Promotors)
- Monitoring (contributes to transparency even on a moderate scale)
- Managing CIA
- Pragmatic Benchmarking/ ‘Resistance Informed Benchmarking’
- Structural changes in livestock industry

- (Veterinary) Antimicrobial usage management is an international issue (animal import and export, level playing field for industry)

- Collaboration between government, industry and veterinary authorities (public health perspective, specific goals and approaches)