The responsible use of antibiotics

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Treatment of specific bacterial infections in both human and veterinary medicine may become more complicated due to increased resistance.

The basic question for food animal production sector is:

- Can transfer of antibiotic resistance to humans or other animals increase the risk for failure of antibiotic therapy?

The answer is clear: “Yes, for specific ‘drug/bug’ combinations, but relevance and quantification of impact and a defining a solution is difficult ➔ What to do to limit the risk?”
The discovery of the antibiotic penicillin was a major milestone:—changing both human medicine and veterinary medicine but—dissemination of resistance is the natural consequence of use.

“If a specific antibiotic is frequently applied, selection of resistant individuals among the target bacteria will normally result.”

“If a bacterium develops resistance against a specific antibiotic, other antibiotics of the same class with a similar mode of action may also lose their effectiveness (cross resistance)”

Sir Alexander Fleming, Nobel Prize for Medicine, 1945
Motives for the debate

The basic question: “Can antimicrobial resistance (AMR) occurring in animals transfer to man or other animals and increase the risk of future treatment failure and if so, what can be done to control this?”, is discussed broadly by:

– Science
– Politics
– Authorities
– Industry
– Stakeholders
– Media
– Society

Today’s list of major causes of death in the Western World differs substantially from the list a little more than a century ago.
Relevance of antimicrobials: A life without antibiotics?

Penicillin increased the chance of survival from 10% to 90%.

Relevance of antimicrobials: Modern medicine is built on access to effective antibiotics

Hip replacement
Organ transplants
Cancer chemotherapy
Care of preterm babies

Impact of resistance: shared uses

**Human use:**
- Treatment
- Prevention
- Disinfection

**Non-human use:**
- **Animals**
  - Treatment
  - Prevention
  - *Efficiency production (01.01.2006. banned in EU)*
- **Crop protection**
- **Food conservation**

Note that all these uses represent a selection pressure and share ecosystems.
Antimicrobial resistance
- Is an acquired quality
- Is ancient
- Determined as:
  - MIC
  - CBP
  - ECV
- Dissemination is a natural consequence of use

For each antimicrobial mode of action nature provides a mechanism for resistance. Whether the resistance mechanisms come to the surface in a specific bacterial population depends on the selection pressures exerted by the use of the corresponding antimicrobial.
The impact of resistance: interpretation of data

Data on use of antimicrobials for both human and animal use and prevalence of resistance are collected and reported at the level of the European Community and individual Member States.

• Interpret with care! Differences in
  • data collection and antimicrobials used
  • geographical and demographical characteristics, like differences in human and animal populations
  • husbandry practices
  • etc

• Correlation ≠ causal relation
• Availability of new, improved technologies do change previous opinions
• Considerable variations in use of antimicrobials and prevalence of antimicrobial resistance can be observed
The impact of resistance: animal use data – ESVAC report 2011 data

Figure 9. Sales for food-producing species, including horses, in mg/PCU, of the various veterinary antimicrobial classes, by country¹, for 25 countries in 2011 and for 20 countries in 2010

¹ Differences between countries can partly be explained by differences in animal demographics, in the selection of antimicrobial agents and in dosage regimes, among other factors. * Amphenicols, cephalosporins, other quinolones and other antibacterials (classified as such in the ATCvet system).
Transfer of specific resistant strains or resistance genes between the human and the animal reservoir and vice versa has been documented. Several recent studies, using modern ‘tracking’ technologies indicate that impact animal use on efficacy human antimicrobial therapy is lower as previously thought ➔ avoid complacency. Future efficacy of antimicrobial therapy in human and veterinary medicine is a shared responsibility.
Understanding the complexity

• Many stakeholders involved ➔ all need to accept their responsibility

• The impact of this complexity is enhanced by:
  • Disconnect rural and urban society ➔ concerns driven by lack of knowledge and information
  • Science has lost its mandate to politics
What can we learn from history?

✓ Acceleration of the issue ➔ crisis
✓ The debate on the use of antibiotics in food animal production is part of the bigger debate on the role, interpretation and impact of food animal production nationally, European and global
✓ Science lost the leading mandate
✓ Adequate research, education and communication required
✓ Role and impact of the different stakeholders / actors was underestimated
✓ Debates nationally and internationally interlinked
✓ Antibiotic innovation came to a stand-still.

Note:
• Looking back with the knowledge of today is an easier task that looking forward and trying to forecast
Current status
Europe, Denmark, The Netherlands and UK

• Two dimensions: European Community and national
• Debate started on a national level
• Due to specific national situations and experiences gained so far, differences can be observed both in human and veterinary medicine for both use and AMR
• In general a clear trend towards convergence,
• 2011 EC ‘Action Plan against the rising threats from Antimicrobial Resistance’

TIP: Univ Ghent developed a website where you can quickly and easily calculate your antibiotic use through a scientific based method. It is even possible to compare your score with others, free of charge, unconditional and confidential. www.abcheck.ugent.be
EPRUMA – promoting Responsible Use

- Multi-stakeholder platform

- EPRUMA Best-practice framework for the use of antimicrobials in food-producing animals in the EU (In Czech, Dutch, English, French, German, Hungarian, Italian, Polish, Portugese, Spanish, Turkish and Romanian, more are in translation.)
- EPRUMA Factsheet on the cascade procedure
- Decision tree ‘Veterinary Use of Antibiotics’
EPRUMA Communication materials

Spain launches Responsible Use guidelines for beekeeping

18 October 2013: VetEurope, the Spanish Platform for the Responsible Use of Medicines in Animals, has published a guidance document for the Responsible Use of veterinary medicines in beekeeping, a strategically important sector of agriculture.

The guidance document, which is now available on

News & Events

October 17, 2013
Spain launches Responsible Use guidelines for beekeeping

October 16, 2013
EPRUMA welcomes BGVP as a new member

October 8, 2013
UK Responsible Use alliance appoints Gaynor Jones as Chairman
Current status Denmark

- First to develop/implementing strategy for the use of antimicrobials in food animals
- Data collection and reporting infrastructure via Vetstat and DANMAP

DANMAP 2012 data for DADD (Defined Animal Daily Doses) showed an increase of 6% versus 2011.
Current status The Netherlands

- 1997 VRE
- 2008 Covenant food animal sector on antimicrobial resistance
- 2009 Reduction targets min Agri
- 2009 reaction:
  - voluntary data collection
  - veterinary guidelines
- 2013 policy objective achieved in 2012
- Major research effort on AMR along the production and processing chain and impact efficacy human therapy ➔ occurrence animal-human jumps may need a revision
Current status  UK

- 1997: establishment of RUMA - The Responsible Use of Medicines in Agriculture Alliance

- Moderate and still declining use levels
- RUMA is a valuable concept ➔ limited contribution veterinary use to resistance in human isolates
Expectations and recommendations

- Current drivers for debate will remain / intensify.
- Antimicrobials remain an essential component of the veterinary toolbox.
- Innovation process for antibiotics needs revitalization, resources and time.
- Qualification and quantification required for prioritization actions.
- Sufficient knowledge to make an appropriate start.
- Sharing experiences / best practices is an effective and efficient approach, but requires harmonization of data collection and analysis to be optimal.
Conclusions / take home messages

• Responsible Use is the way forward:
  ✓ Biosecurity and infection control
  ✓ Husbandry practices, like housing, ventilation, hygiene and nutrition
  ✓ Monitoring of health and welfare and herd health plans
  ✓ Adequate and accurate implementation and maintenance of vaccination schedules.
    ✓ A shared responsibility of all stakeholders, in both veterinary and human medicine
    ✓ Adequate and accurate data collection and analysis of antimicrobial use and antimicrobial resistance
    ✓ “As little as possible and as much as necessary”
• Start a national EPRUMA platform
Conclusions / take home messages

- Interpretation of data on use and linking to AMR can be done only with harmonized definitions and caution.  
  (Recent publications tend towards a considerably lower impact of the veterinary use of antimicrobials on efficacy of human antimicrobial therapy than initially thought)

- Ignoring the complexity of the issue may prove contra-productive long term. Reduction targets should not become competitive tools,

- Communication and education are elementary to create and maintain understanding and commitment.

- The common goal should be to protect public health, animal health and welfare and to ensure that antibiotics are effective now and in the future for relevant indications in all species (IFAH-Europe 2013).