Antimicrobial resistance surveillance in food animals: Learnings from DANMAP

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DANMAP objectives

- Monitor antimicrobial resistance in
  - Zoonotic bacteria
  - Indicator bacteria (E. coli/ enterococci)
  - Animal pathogens
  from production animals and meat (Danish and imported)

- Monitor resistance in bacteria fra humans
  - Zoonotic bacteria (domestic/travel associated)
  - Human pathogens

- Monitor antimicrobial usage in production animals and in humans

- Explore association between antimicrobial usage and resistance
DANMAP – sample collection for AMR

- Sampling of food animals is done at slaughter plants
  - stratified random sample
  - covers 90-95 % of Danish farms
    - representative measures of level of resistance in the animal populations
  - testing of bacterial isolates using microbroth dilution
  - results published in annual reports: www.DANMAP.org

- Caveats
  - Procedure OK for monitoring trends
  - Basis for determining transfer of AMR between animals and humans
  - Sensitivity for detection of new AMR phenotypes is low

- The future
  - Whole community sequencing to detect ALL resistance genes?
VetStat – herd level monitoring of antimicrobial use

Objectives

• to obtain data to inform prudent use strategies and for risk management

• to contribute to clarification of the complex epidemiology of resistance through investigations on the relationship between use of antibiotic and resistance.

• to inform veterinarians in their choice of treatment strategies
Key premises – monitoring consumption

- The **legal** infrastructure is important

  - All antibiotics are prescription only

  - Danish veterinarians do not have a significant income from selling medicine

  - Sale of antimicrobials from wholesalers only to licensed pharmacies

  - All sale to end-users exclusively from licensed pharmacy or similar organisation (dealers), excep. medicated feed

  - 94% of all antibiotics for production animals are being sold directly from pharmacies to farmer
The European approach to monitoring antimicrobial consumption

- Carried out by European Medicines Agency
  - the ESVAC project

- Data based on reporting from wholesalers or holders of marketing authorisations

- Denominator information – the population correction unit – PCU
  - the number of animals $\times$ the weight at time most likely of treatment
  - $1 \text{ PCU} = 1 \text{ kg of animal treated}$
ESVAC – monitoring animal consumption in Europe

Figure 8. Sales for food-producing species, in mg/PCU, of the various veterinary antimicrobial classes, for 29 European countries, in 2014.
Use of DANMAP data by risk managers

• Data on consumption of antimicrobials are used
  – to inform prudent use guidelines
  – for setting of targets

• Herd level monitoring allows the veterinary authorities to target farms with high consumption of antimicrobials
  – farmers are required to implement preventive disease measures in collaboration with their veterinary practitioner
  – Carrot and stick: if a herd stays below a set threshold it is free to use prescription medicines with a minimum of vet supervision; if not, stricter supervision is mandatory, driving up expenses
Animal use of AB: the dilemma

![Graph showing DAPD (DADD per 1000 animals per day) over years for different categories: Sows and piglets, Weaners, Finishers, and Total, adjusted. The graph indicates fluctuations in DAPD across the years.]
Cephalosporin use 2005-15, kg. active comp.
Resistance in Campylobacter jejuni
In summary

• We face a global pandemic of resistance genes, caused by indiscriminate use of antimicrobials in animals, but also in humans and in plant protection

• All countries must work to eliminate overuse – antimicrobials should not be used in lieu of good hygiene and adequate biosecurity

• A legal infrastructure – with necessary follow-up – on permitted usage is highly necessary to curb excess consumption

• It is necessary to cultivate an understanding by all in the society that antimicrobial resistance is a serious issue that threatens human life and welfare

• The dilemma: **economic** sustainability vs. **societal** sustainability
Thank you for your attention

Useful links

- EU harmonized monitoring of AMR

- Antimicrobial growth promoters

- ESVAC reports and strategies

- Biosecurity on broiler farms
  [www.camcon-eu.net](http://www.camcon-eu.net)