Prescription based surveillance of antimicrobial use in animals

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In Denmark, all antimicrobial agents used for animals are available by prescription only and all prescription details are used for surveillance. Capturing data at the user-end in combination with meta-data, increases the precision of the data and allows for surveillance of specific age groups, individual veterinarians, farms and in some cases production type

Background: In Denmark, all antimicrobial agents used for treatment in animals are available on prescription only. The electronic registration of prescriptions at pharmacies and drug trading companies is linked to the billing process and stock accounts. Veterinarians are required by law to report all use of antibiotics for production animals monthly to the national database VetStat, a process normally automated by their billing system.

Data capture: VetStat stores information from every prescription: date of sale, ID of prescribing veterinarian, package identity code and amount, animal species, age group, disease category and farm-id. The package code relates information to the product incl. concentration of active compounds, package size/volume a.o. Vetstat also contains information on every package codes and recommend daily doses for all market authorisations in Denmark.

Interpretation: Capture of prescription-based information enables surveillance of antimicrobial use:

- At every farm and at individual veterinarian level
- In different animals species: pigs, cattle, poultry, horses, sheep/goats, pets
- In different age groups, mainly for pigs and cattle
- For each diagnosis/indication for use
- Over different time intervals
- Accounting for changes in populations e.g. increased export
- Evaluating compliance with national and industry action plans

Metrics:

DADD - Defined animal daily doses is set as mg active compound per kg treated animal harmonised for each combination of antimicrobial agent, administration route and animal species. Usages is reported at the number of DADD kg doses or as average number of treated animals per day (assuming an average body weight).

Live biomass at risk is reported as: 'biomass days (in 1000's)' and is the biomass (in tonnes) of all live animals in a population (or age group) summarised for each of the 365 days in a year.

DAPD - Treatment proportion is a statistical measure that estimates the proportion of animals treated daily with a particular antimicrobial agent.
DAPD = total DADD kg doses / total biomass (tonnes).

In DANMAP, the DAPDs are presented as 'DADD per 1000 animals per day'. 10 DAPDs means that approx. 1% of the population, on average, receives a certain treatment on a given day. In principle, DAPD also allows comparisons with the antimicrobial consumption with the human antimicrobial use, which is measured in defined daily dose per 1,000 inhabitants per day (DID).

Figure 1. Amount of antimicrobial agents (tonnes active compound) prescribed for animals as recorded in VetStat from 2004 to 2017, Denmark.

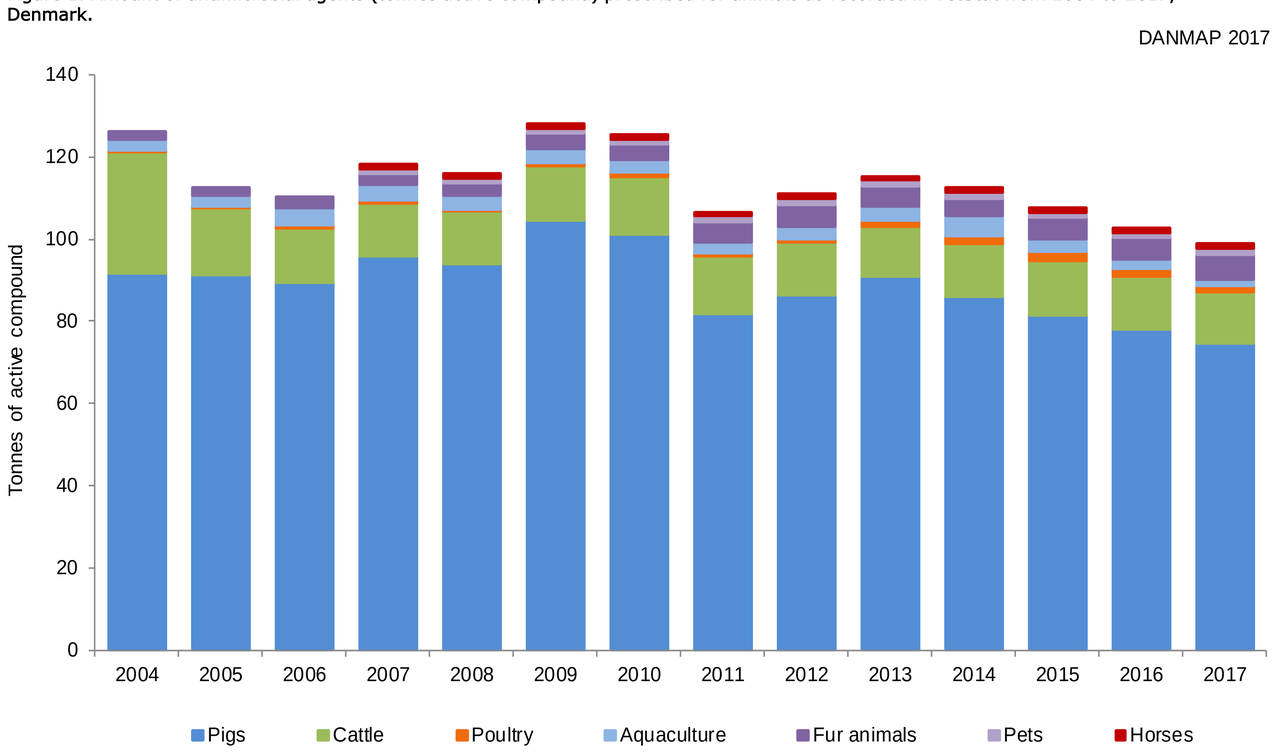


Figure 2. Amount of antimicrobial agents (tonnes active compound) prescribed for cattle as recorded in VetStat from 2004 to 2017, Denmark.

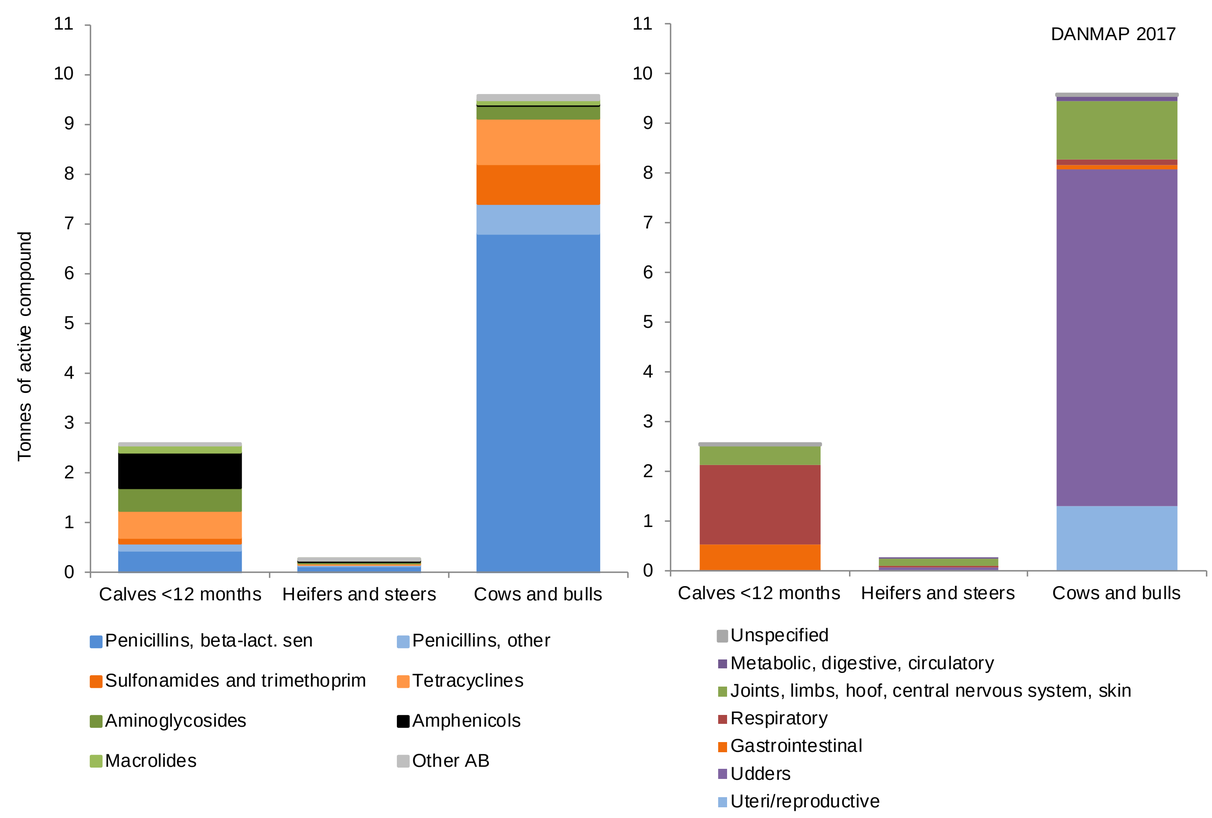
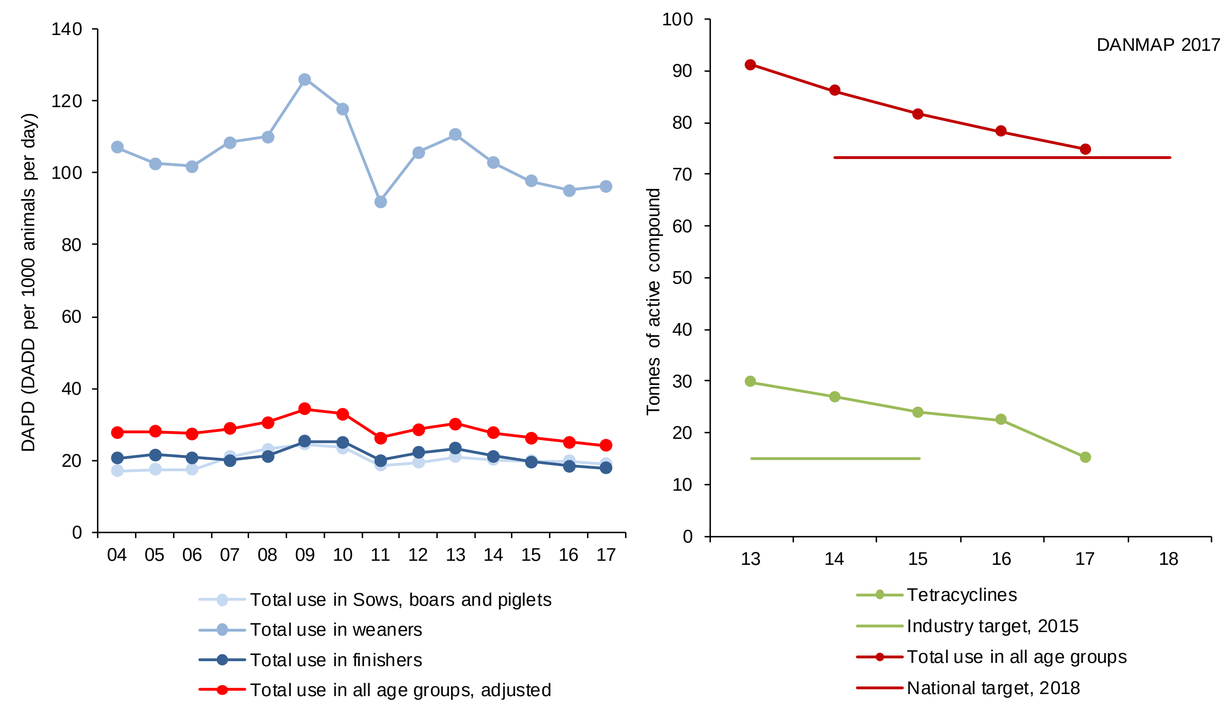


Figure 3. Antimicrobial use in the pig production, and the distribution on age groups, Denmark 2004-2017. The category "all age groups" is adjusted for the increasing export of pigs at 30 kg. Industry target was to reduce the use of tetracycline for pigs by 50% from 2013 to 2015, and the National target is to reduce total use in pigs by 15% from 2014 to 2018.



Discussion: In most countries, data on annual sales from the pharmaceutical industry is the only information available for monitoring antimicrobial use. However, some products are approved for several animal species, which generates high uncertainty when stratifying on different production systems.

Another advantage of the prescription-based reporting is the ability to attribute use of specific antimicrobial agents to specific animal production systems or farms, to identify where interventions are needed. Ex: *VetStat is used by the authorities to benchmark pig herds according to antimicrobial use and impose specific interventions at exceedance.*

Another advantage is the ability to monitor the impact of the many national and industry interventions implemented over the years, despite changes in national animal populations by accounting for their actual age distributions. Ex*: The pig industry continues to grow in Denmark, but at the same time weaners an increasing proportion of weaners are exported.*

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The VetStat database is hosted and maintained by the Danish Veterinary and Food Administration

Annual reports on www.DANMAP.org

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