

## Antimicrobial use in wean to market pigs in the United States assessed via voluntary sharing of proprietary data

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### Key Points:

- Obtained data on antimicrobial use in the US swine industry through voluntary and confidential sharing of proprietary data
- First substantial description of antimicrobial use in US swine beyond FDA sales and distribution data
- Critically important classes were only 5% of use, and fluoroquinilones and ceftiofur (drugs of most concern) were <1%
- The project is ongoing and seeking further participation from interested systems for 2018 to 2020. For further information contact Dr. Peter Davies ([davie001@umn.edu](mailto:davie001@umn.edu))

Antimicrobial resistance is now a crisis in human medicine. This has rightly brought scrutiny of how antimicrobials are used across all prescribing professions, along with efforts to define ‘best practices’ for antimicrobial use. It is generally accepted that negative consequences of antimicrobial use in animals may relate to both animal health and human health due to transmission of resistant organisms from animals to people. However, the extent of the impact of antimicrobial use in animals on human health remains unresolved. The absence of a ‘gold standard’ metric for antimicrobial use remains an obstacle to harmonization that would be necessary for meaningful comparison of antimicrobial use in different geographical and industry settings. There is a direct relationship between the cost and difficulty of acquiring data and the granularity and scope of the data collected. National sales data for antimicrobials in animals are relatively easily acquired but have recognized limitations. Sales data lack granularity, and few nations can accurately parse these data at species or sector (e.g. beef vs. dairy) level. The Center for Veterinary Medicine (CVM) of the Food and Drug Administration (FDA) has published annual summaries of the amounts of antimicrobial drugs sold or distributed for food-producing species since 2009. The data are described by antimicrobial class, category of medical importance and route of administration, but to date have not included a defined denominator for population size. This study, funded by FDA, evaluated the possibility of obtaining more granular data via voluntary participation of production systems and described those data for 2016 and 2017.

### Methods

Nine large systems, collectively producing over 20 million market pigs annually, voluntarily provided data on antimicrobial use for the 2016 and 2017 calendar years. The scope of the study was limited to growing pigs, and the granularity of data varied across the systems. Data were summarized both qualitatively and quantitatively by antimicrobial class, active ingredient and route of administration (injection, water, and feed). Data on the purpose of administration, doses, and durations of administration were not available, but some information was provided by the responsible veterinarians.

### Results and Discussion

Antimicrobial use (by weight) was dominated by tetracyclines (approximately 60% of total use). Antimicrobials in classes categorized as critically important constituted 4.5% and 5.3% of total use in 2016 and 2017, respectively. In both years, fluoroquinolones and 3<sup>rd</sup> generation cephalosporins together accounted for <1% of total use. Administration was predominantly oral in feed and water, and injection comprised approximately 2% of use overall.

There was considerable variability among systems in patterns of antimicrobial use. Although some substantial changes were evident between years within individual systems for particular antimicrobials, the summary data were generally similar in 2016 and 2017 both qualitatively and quantitatively. The three medically important antimicrobials with the greatest absolute reductions in mean use across the nine systems were chlortetracycline, lincomycin, and tylosin. There were several communications where veterinarians stated that changes observed within systems between the years were attributable to strategic decisions taken to combat specific diseases. Tetracyclines appear to remain clinically valuable and widely used, even in herds where tetracycline resistance genes are abundant across the microbiome.

Meaningful interpretation of antimicrobial use data demands, at a minimum, detailed comprehension of the metrics used to quantify antimicrobial amounts, estimate population denominators, and define the period for collection. The greatest value for promoting antimicrobial stewardship will come from information that is focused on specific industries and environments. Information of high specificity but perhaps minimal generalizability, will best support education and stewardship in any given context. The origin and implementation of this project reflect recognition of the need to advance antimicrobial stewardship in the US swine industry. The general support, even without immediate participation, of most systems approached is a foundation for expansion of the project to obtain representative information across the industry based on voluntary participation and confidential sharing of data. Collection and analysis of data for 2018 to 2020 is now underway, and inquiries about possible participation are welcome.



Figure 1: Relative use of antimicrobial classes among production systems (A through I) in 2016 and 2017