A pilot antimicrobial use monitoring project in 22 U.S. beef feedyards

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Abstract

Research funded by an FDA Center for Veterinary Medicine cooperative agreement, describing antimicrobial use in beef feedyards, dairies, and swine, broiler, and turkey production systems, was published in November 2020 in an open access special edition of Zoonoses and Public Health. This presentation reviews the published data, related to a convenience sample of 22 U.S. beef feedyards, concerning antimicrobial use described by the metrics of mg of antimicrobial/kg of live weight sold (mg/kg-LW) and as regimens/animal year (Reg/AY). These metrics are further characterized by use category (in-feed, control of bovine respiratory disease, and individual animal therapy) and by antimicrobial class. Also discussed is a comparison of metric results based on use data vs. surveys as conducted in 18 feedyards. All methods and data discussed are presented in open access journal articles, and the reader is directed to these articles for in-depth coverage so that complete context of the data is maintained. Briefly, in-feed use was dominant as presented by either metric, with the macrolide and tetracycline classes represented in this category therefore representing the majority of use by either mg/kg-LW or Reg/AY. When antibiotic use metrics calculated from use records and from surveys were compared, the mean value across all feedyards was similar, but values for individual feedyards could be quite different, resulting in unreliable ranking of use by survey-derived data.

Key words: antibiotics, monitoring, feedlot

Introduction

Publications reporting antibiotic use in 22 U.S. beef feedlots, 29 U.S. dairies, 9 U.S. swine production systems, approximately 87.2% of U.S. broiler production (characterized in 2017, the last year reported), and 67.3% of U.S. turkey production (also in 2017) were published in a special edition of *Zoonoses and Public Health* in November 2020.[2,4,5,7-11] These publications resulted from a cooperative agreement funded by the FDA Center for Veterinary Medicine and involving faculty and graduate students at Kansas State University and the University of Minnesota. All publications are available as open access articles on the Zoonoses and Public Health website as part of a special issue, **https://onlinelibrary.wiley.com/toc/18632378/2020/67/S1.**

A paper in the 2020 proceedings of the American Association of Bovine Practitioners by this author reviews basic concepts in interpreting these use data.[1] In-depth reviews of antimicrobial use metrics used for beef and dairy cattle, comparing metrics used in these publications to metrics used globally, may be found in the literature reviews of the dissertations of Drs. Katie Hope and Nora Schrag, accessible on the K-State Research Exchange (K-Rex) site.[3,6]

Antibiotic use in 22 U.S. beef feedyards

This presentation draws from the feedyard publications resulting from the cooperative agreement with the FDA Center for Veterinary Medicine and the reader is referred to these open access publications for complete coverage of all information presented so that complete context of the data is maintained.[4,5] While commonly referred to as feedlots, the publications used the term "feedyards" to avoid confusion with the term "lots" referring to economic units of cattle moving through the feedyard. It is important to recognize that these data are not a statistical sample of U.S. feedyards and were derived from a sample of convenience to capture a wide array of record systems and approaches to using these systems. The data were derived from a project to demonstrate the challenges and opportunities encountered in collecting antimicrobial use data from disparate data systems, a goal reflected in all publications from the cooperative agreement.

The final beef feedlot and dairy publications from this agreement are slated for submission in 4th Quarter 2021.

Conclusion

Conclusions from each of the beef feedyard papers are presented in the context of the original open access articles. Briefly, in-feed use was dominant as presented by either metric, with the macrolide and tetracycline classes represented in this category therefore representing the majority of use by either mg/kg-LW or Reg/AY. When antibiotic use metrics calculated from use records and from surveys were compared, the mean value across all feedyards was similar, but values for individual feedyards could be quite different, resulting in unreliable ranking of use from survey-derived data.

References

1. Apley MD. Antibiotic Use Monitoring in Feedlots and Dairies: Eight Key Concepts to Help You Guide Your Clients. Proceedings of the 53rd Annual Conference, American Asssociation of Bovine practitioners, Louisville, KY 2020;138-141.

2. Davies PR, Singer RS. Antimicrobial use in wean to market pigs in the United States assessed via voluntary sharing of proprietary data. *Zoonoses Public Health* 2020;67 Suppl 1:6-21.

3. Hope KJ. Antimicrobial use in beef feedyard cattle in the United States. Veterinary Clnical Sciences. Kansas State University Research Exchange **https://krex.k-state.edu/dspace/handle/2097/40091**: Kansas State University, 2019.

4. Hope KJ, Apley MD, Schrag NFD, et al. Antimicrobial use in 22 U.S. beef feedyards: 2016-2017. *Zoonoses Public Health* 2020;67 Suppl 1:94-110.

5. Hope KJ, Apley MD, Schrag NFD, et al. Comparison of surveys and use records for quantifying medically important antimicrobial use in 18 U.S. Beef Feedyards. *Zoonoses Public Health* 2020;67 Suppl 1:111-123.

6. Schrag NFD. Measurements of antibiotic use in United States dairy systems. Veterniary clinical sciences. Kansas State University Research Exchange **https://krex.k-state.edu/dspace/handle/2097/40083:** Kansas State University, 2019.

7. Schrag NFD, Apley MD, Godden SM, et al. Antimicrobial use quantification in adult dairy cows - Part 1 - Standardized regimens as a method for describing antimicrobial use. *Zoonoses Public Health* 2020;67 Suppl 1:51-68.

8. Schrag NFD, Apley MD, Godden SM, et al. Antimicrobial use quantification in adult dairy cows - Part 2 - Developing a foundation for pharmacoepidemiology by comparing measurement methods. *Zoonoses Public Health* 2020;67 Suppl 1:69-81.

9. Schrag NFD, Godden SM, Apley MD, et al. Antimicrobial use quantification in adult dairy cows - Part 3 - Use measured by standardized regimens and grams on 29 dairies in the United States. *Zoonoses Public Health* 2020;67 Suppl 1:82-93.

10. Singer RS, Porter LJ, Schrag NFD, et al. Estimates of on-farm antimicrobial usage in broiler chicken production in the United States, 2013-2017. *Zoonoses Public Health* 2020;67 Suppl 1:22-35.

11. Singer RS, Porter LJ, Schrag NFD, et al. Estimates of on-farm antimicrobial usage in turkey production in the United States, 2013-2017. *Zoonoses Public Health* 2020;67 Suppl 1:36-50.