



United States Department of Agriculture



ANTIMICROBIAL USE AND RESISTANCE INITIATIVES OF USDA-APHIS NAHMS

KATHE E. BJORK, DVM, MSPH, PHD

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES

NATIONAL INSTITUTE FOR ANIMAL AGRICULTURE
NOVEMBER 2, 2016

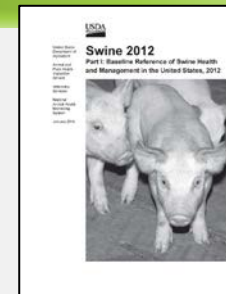
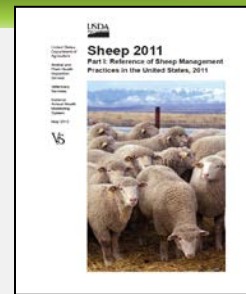
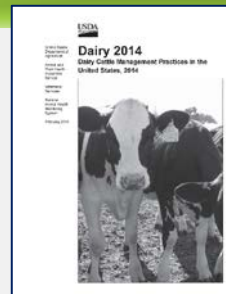
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Overview

USDA AMR Action Plan and U.S. National Action Plan (CARB)

Traditional data collection efforts

Proposed data collection initiatives



Traditional NAHMS Commodity Studies

General farm management and veterinary practices

- Based on stakeholder needs assessment
- Antimicrobial use data collected at approximately 5-year intervals

Biological sampling

- Serosurveys
- Bacterial isolation, antimicrobial susceptibility

Rotate 5-10 years, depending on species

- Cross-sectional



Year	Study
2016	Equine (2015–16)
	Goat and Kid Death Loss
	Cattle and Calves Death Loss
2017	Beef Cow-calf
	Antibiotic Use (Feedlot and Swine)
2018	Goats
2019	Aquaculture

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 Info Sheet
 April 2016

Commensal Enterococcus on U.S. Swine Sites: Prevalence and Antimicrobial Drug Susceptibility

Background
 Enterococci are normal inhabitants of human and animal gastrointestinal tracts. However, enterococci are also a common cause of health-care associated infections in humans, especially in hospitalized patients. Two species of enterococci, *Enterococcus faecalis* and *Enterococcus faecium*, are responsible for most human disease caused by enterococci. Enterococci resistant to antimicrobials can be found in livestock, such as pigs. There are concerns that resistant enterococci, or bacteria that acquire resistance genes from them, could be transferred to humans through food and result in resistant infections. It is possible that foodborne transmission of enterococci could play a role in human illness. However, the extent of any contribution to human illness from enterococci of livestock origin is not well understood.

Enterococcus on U.S. swine sites

In 2012, USDA's National Animal Health Monitoring System (NAHMS) conducted a study and management practices from a sample of swine production sites. States represented about 91 percent of U.S. inventory and 89 percent of U.S. 100 or more pigs. Data were collected from a subset of pig producers, and a subset of pig producers participated in the collection of pig feces. Overall, 111 production sites participated in the first phase of the study through August 16, 2012. On 111 production sites, fecal samples were collected, up to 15 fecal samples per site, for *Enterococcus*. From October 1, 2012, through October 1, 2013, 1,720 specimens were collected from all but one site.

¹ S. E. Hoot, MS, PhD
 Carolina, Oklahoma

Abstract

When considering the development of antimicrobial resistance in food animals, comparing gross use estimates of different antimicrobials is of little value due to differences in potencies, duration of activity, relative effect on target and commensal bacteria, and mechanisms of resistance. However, it may be valuable to understand quantities of different antimicrobials used in different ages of swine and for what applications. Therefore, the objective of this project was to construct an estimate of antimicrobial use through the feed in swine production in the United States. Estimates were based on data from the National Animal Health Monitoring System (NAHMS) Swine 2006 Study and from a 2009 survey of swine-exclusive practitioners. Inputs consisted of number of pigs in a production phase, feed intake per day, dose of the antimicrobial in the feed, and duration of administration. Calculations were performed for a total of 102 combinations of antimicrobials ($n=17$), production phases ($n=2$), and reasons for use ($n=3$). Calculations were first conducted on farm-level data, and then extrapolated to the U.S. swine population. Among the nursery phase estimates, chlortetracycline had the largest estimate of use, followed by oxytetracycline and tilmicosin. In the grower/finisher phase, chlortetracycline also had the largest use estimate, followed by tylosin and oxytetracycline. As an annual industry estimate for all phases, chlortetracycline had the highest estimated use at 533,973 kg. The second and third highest estimates were tylosin and oxytetracycline with estimated annual uses of 165,803 kg and 154,956 kg, respectively. The estimates presented here were constructed to accurately reflect available data related to production practices, and to provide an example of a scientific approach to estimate use of antimicrobials in production animals.

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Escherichia coli on U.S. Swine Sites: Prevalence and Antimicrobial Drug Susceptibility

Table 1. Percent herds, by Escherichia coli species
 Species
 E. coli
 E. faecalis
 E. faecium
 E. duroni
 E. casseliflavus
 E. sp.

Use Estimates of In-Feed Antimicrobials in Swine Production in the United States

Michael D. Apley,¹ Eric J. Bush,² Robert B. Morrison,³ Randall S. Singer,⁴ and Harry Shelton⁵

Use of antimicrobials on US dairy operations

J. E. Lombard¹, C. P. Fossler¹, A. E. Adams^{1,2,3}, C. A. Kopral¹
¹USDA-APHIS-VS Center for Epidemiology and Animal Health, Fort Collins, CO, USA
²Colorado State University, Fort Collins, CO, USA
³Morrisville State College, Morrisville, NY, USA

World Buiatrics Congress
 Dublin, Ireland
 July 7, 2016
 Safeguarding Animal Health

At least one sample was found culture positive for *E. coli* on every site and in 99.3 percent of the 608 pens sampled. Additionally, 93.9 percent of the 1,719 specimens were culture positive for *E. coli*.

Antimicrobial susceptibility

Of the 1,614 *E. coli* isolates, 1,433 were tested for resistance to a panel of 14 antimicrobial drugs.² Resistance break points used by the National Antimicrobial Resistance Monitoring System (NARMS) were used to classify isolates as susceptible, intermediate, or resistant.

Table 1 on the following page depicts the percentage of isolates resistant to the 14 antimicrobial drugs tested. Resistance to tetracycline was most common (91.2 percent of isolates). About one-third of isolates were resistant to sulfisoxazole. Less than 2 percent of isolates were resistant to amoxicillin/clavulanic acid, ceftiofur, ceftiofur, ceftriaxone, naladixic acid, ciprofloxacin, and azithromycin.

Annual Antimicrobial Use Surveys

Request data on previous year's antimicrobial use, focusing on feed and water uses

Stewardship

Administered under CIPSEA protection, so confidentiality of respondents is assured

USDA has no regulatory authority over use of antimicrobials



Annual Antimicrobial Use Surveys

Initial contact with operation via NASS

- Voluntary participant information provided to VS

APHIS-VS collects and controls data

- VS field veterinarian visits operation/site
- Works with producers to collect appropriate data
- Personal information removed
- NAHMS: data entry, validation, analysis, reporting



Longitudinal Antimicrobial Use and Resistance Studies

- Repeated data collection on farms over longer period can help measure effectiveness of policies and interventions
- Coupled with other data, such as those from slaughter plants and retail meat, can evaluate microbial and gene flow in food production system and the influence of on-farm antimicrobial use on bacterial susceptibility