

A black and white cow stands in a field, looking over a barbed wire fence. The background is a soft, golden sunset with trees silhouetted against the light. The scene is peaceful and rural.

ANTIMICROBIAL PRESCRIBING EDUCATION NEEDS

among US-based veterinarians



The Center for Infectious Disease Research and Policy Antimicrobial Stewardship Program (CIDRAP-ASP). Antimicrobial Prescribing Education Needs among US-based Veterinarians. CIDRAP, University of Minnesota. June 2024.

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INTRODUCTION

The Midwestern United States has long been associated with farming and livestock production. The US Department of Agriculture's 2022 Census of Agriculture found that more than 600,000 farms out of the more than 1.9 million farms in the country are located across Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. More than 168,000 of the farms in these 11 Midwestern states are led by new and beginning producers: people who have 10 years or less of farm or ranch operations experience (USDA 2022).

Four important federal regulations and guidance documents that have aimed to improve antimicrobial prescribing in US animal agriculture in the context of strengthening relationships between agricultural producers and veterinarians include: the Veterinary Feed Directive (VFD), the Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA), the US Food and Drug Administration (FDA) Guidance for Industry #263, and the FDA Draft Guidance for Industry #273 [See Figure 1].

New requirements for antimicrobial prescribing affect how large-animal veterinarians work with animal producers and patients to prevent and treat disease. In this evolving landscape, veterinarians must be able to confidently communicate the implications and importance of prescribing regulations, diagnose likely bacterial infections in different species, and choose and label the correct antimicrobials—including dosage and duration—when treatment is warranted.

It is crucial that educational opportunities not only help veterinarians understand how antimicrobial prescribing regulations and guidelines affect their practice, but also are realistic—imposing neither a burden nor a distraction in a workday often spent traveling between farms.

METHODS

In 2023, the [Center for Infectious Disease Research and Policy Antimicrobial Stewardship Program](#) (CIDRAP-ASP) and the [Antimicrobial Resistance Learning Site for Veterinary Science](#), with funding from the [Builders Initiative](#), released the open-source teaching module “[Judicious Use of Antimicrobials on a Dairy Operation](#).” The module comprises two case studies that walk veterinarians and veterinary students through the process of diagnosing and treating sick dairy cattle while educating producers about appropriate antibiotic use.

In 2024, CIDRAP-ASP, with funding from [Good Chaos](#) (formerly the Builders Initiative), developed a survey to assess the response to the teaching module and to gauge continuing education needs among food-animal veterinarians and veterinary students across 11 US states: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

The survey was designed to take less than 10 minutes to complete, and questions covered demographic information, antimicrobial prescribing knowledge and confidence for different species of farmed animals (i.e., beef cattle, dairy cattle, equines, poultry, sheep and goats, game birds, aquaculture, swine, and bees), familiarity with US animal antimicrobial prescribing regulations and ease of communicating about regulations with producers, and experience with and needs for veterinary continuing education. All questions were optional, with the exception of questions that required respondents to identify the US state in which they were located and whether they were a practicing veterinarian or veterinary student.

The survey was reviewed by two veterinarians—Jamie Umber, DVM, MPH, and Jeff Bender, DVM, MS—for accuracy and applicability to the needs of the target audience. The survey was disseminated via Qualtrics from March to May 2024. CIDRAP-ASP sent the survey, along with requests to distribute the survey to members, to the National Assembly of State Animal Health Officials, veterinary medical associations in the 11 states, and colleges of veterinary medicine in the 11 states. Several associations and colleges responded to say that they would include a link to the survey in newsletters sent to members or to veterinary medicine student listservs. The survey was also widely advertised across CIDRAP-ASP’s website, newsletter, and social media from March to May 2024.

RESULTS

The survey received 24 responses from March to May 2024. The small number of respondents can likely be attributed, in part, to increased demands on veterinarians during outbreaks of highly pathogenic avian influenza (HPAI) A(H5N1) in wild birds and dairy cattle occurring at the time of survey distribution. Eighteen of the responses came from practicing veterinarians, while six veterinary students took the survey. Only one veterinary student answered one question past the demographic section, so the results of the survey reflect only the experiences and perspectives of practicing veterinarians.

Most of the veterinarians (12 of the 14 who answered the question) had been in practice for 10 or more years and were working in California, Colorado, Hawaii, Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska, Ohio, Oklahoma, and Texas. Veterinarians worked in diverse environments, with five being self-employed, three working in a group or joint practice, three working in a government agency, two affiliated with colleges or universities, and one working in a swine production system.

Veterinarians reported regularly working with beef cattle, sheep and/or goats, equines, and swine. Only two veterinarians said that they worked regularly with the poultry sector, and only three veterinarians worked regularly with dairy cattle. No veterinarians reported working regularly with game birds, aquaculture, or bees.

Antimicrobial Prescribing Knowledge and Confidence

Antimicrobial prescribing knowledge and confidence varied widely across species among the eight respondents who answered the question. Overall, more respondents felt confident prescribing for beef and dairy cattle, sheep, and goats. No respondents reported feeling confident prescribing antimicrobials for aquaculture or bees [See Figures 2 and 3].

Familiarity with US Antimicrobial Prescribing Regulations

Familiarity with the VFD, AMDUCA, Guidance for Industry #263, and Draft Guidance for Industry #273 also varied widely, though most respondents felt fairly confident

having conversations with producers about antimicrobial prescribing requirements [See Figure 1]. Suggestions for desired tools that may help veterinarians save time and provide both education to producers and care for animals included newsletters, brochures, articles, a one-page fact sheet, and a website of reliable resources.

Needs for Veterinary Continuing Education

Respondents generally felt that the quantity and quality of antimicrobial stewardship information that they received during their formal veterinary education was “adequate” or “poor,” and no respondent ranked the quantity or quality of information about antimicrobial prescribing guidelines/regulations as “good.” Two respondents rated both the quantity and quality of education they had received on prudent antibiotic use, scenario-based antimicrobial therapy decision-making, and extra-label antimicrobial prescribing as “poor.”

All respondents also felt that currently available continuing education opportunities fail to thoroughly cover the topics that are most relevant to them, and respondents were largely unfamiliar with the Antimicrobial Resistance Learning Site online continuing education [modules](#).

DISCUSSION AND RECOMMENDATIONS

Unfortunately, dissemination of the survey coincided with widespread outbreaks of HPAI A(H5N1) in wild birds and dairy cattle that required an intensive response from food-animal and regulatory veterinarians across the United States. Despite ongoing outreach efforts and the building of relationships with veterinary medical societies and colleges of veterinary medicine in the 11 target Midwestern states, only 24 people took the survey, and thus the results cannot be generalized or viewed as representative of veterinarians or veterinary students.

Respondents, however, were generous with sharing their opinions and experiences on veterinary antimicrobial prescribing, and the fact that a public health emergency illuminated the myriad demands on the One Health workforce speaks to the urgency of improving resource access and relevance for veterinarians.

Based on the results of this survey, CIDRAP-ASP recommends:

- **Development of continuing education opportunities and collaborations** with university extension services to build knowledge and confidence in antimicrobial prescribing, including content related to poultry, aquaculture, and bees in the US Midwest;
- **Creation of educational tools**, such as fact sheets or pocket guides, on antimicrobial prescribing for different farmed-animal species, that can be used for reference or communication with producers/clients; and
- **Outreach to colleges of veterinary medicine** to explore partnerships that improve the quantity and quality of antimicrobial prescribing and antimicrobial resistance education during veterinary training.

Food-animal veterinarians, though often on the road or facing a full day of animal examinations, have a clear desire to learn more about appropriate antimicrobial prescribing and antimicrobial use regulations. As the difficulty in administering this survey demonstrates, it is imperative that public health professionals recognize that any outreach and education to veterinarians be delivered in a format that is realistic, not overly burdensome, and honors their stated needs and wishes.

CIDRAP-ASP is hopeful that the results of this survey will spur the development of accessible continuing education that respects the important role played by food-animal veterinarians in improving animal, human, and environmental health.

REFERENCE

United States Department of Agriculture (USDA) National Agricultural Statistics Service. Census of Agriculture: 2022 Census Volume 1, Chapter 2: State Level Data. 2022. Accessed May 10, 2024 [[Web page](#)]



Agricultural Antimicrobial Regulations

Figure 1: What do US veterinarians need to know?

THE VFD

 **Original Act passed in 1996**  **VFD revised in 2015 and 2019**

The Veterinary Feed Directive (VFD) drugs section of the Animal Drug Availability Act of 1996, also known as the VFD rule, requires that medically important antimicrobials delivered via feed or water are only available for use in food-animal species (even if the animals are not intended for food production) with a written VFD order from a veterinarian.

4 veterinarians felt very knowledgeable about the VFD



2 felt somewhat knowledgeable

2 did not feel knowledgeable

AMDUCA

 **Passed in 1994**

The Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA) permits veterinarians to prescribe **extra-label uses** of certain approved antimicrobials under certain conditions. Extra-label uses are those not in accordance with the approved label directions.

Under AMDUCA, any extra-label use of an antimicrobial must be by or on the lawful order of a veterinarian within the context of a **veterinarian-client-patient relationship (VCPR)**.

3 veterinarians felt very knowledgeable about AMDUCA





2 felt somewhat knowledgeable

3 did not feel knowledgeable



4 of eight veterinarians felt that they had adequate information to make decisions about extra-label antimicrobial use

GUIDANCE FOR INDUSTRY #263

 **Finalized in 2021**  **Implemented in 2023**

The US Food and Drug Administration (FDA) Guidance for Industry #263 requires that all medically important antimicrobials for use in animals are available only via a written prescription from a veterinarian, even if formerly available over the counter.

5 veterinarians felt very knowledgeable about GFI #263



3 felt somewhat knowledgeable



Five out of seven veterinarians felt very confident in communicating with clients about GFI #263

DRAFT GUIDANCE FOR INDUSTRY #273

 **Published for comment in 2023**

Draft Guidance for Industry #273 proposes that all medically important antimicrobials for use in the feed or water of food-animals be voluntarily labeled with a recommended duration of use.

3 veterinarians felt very knowledgeable about GFI #273

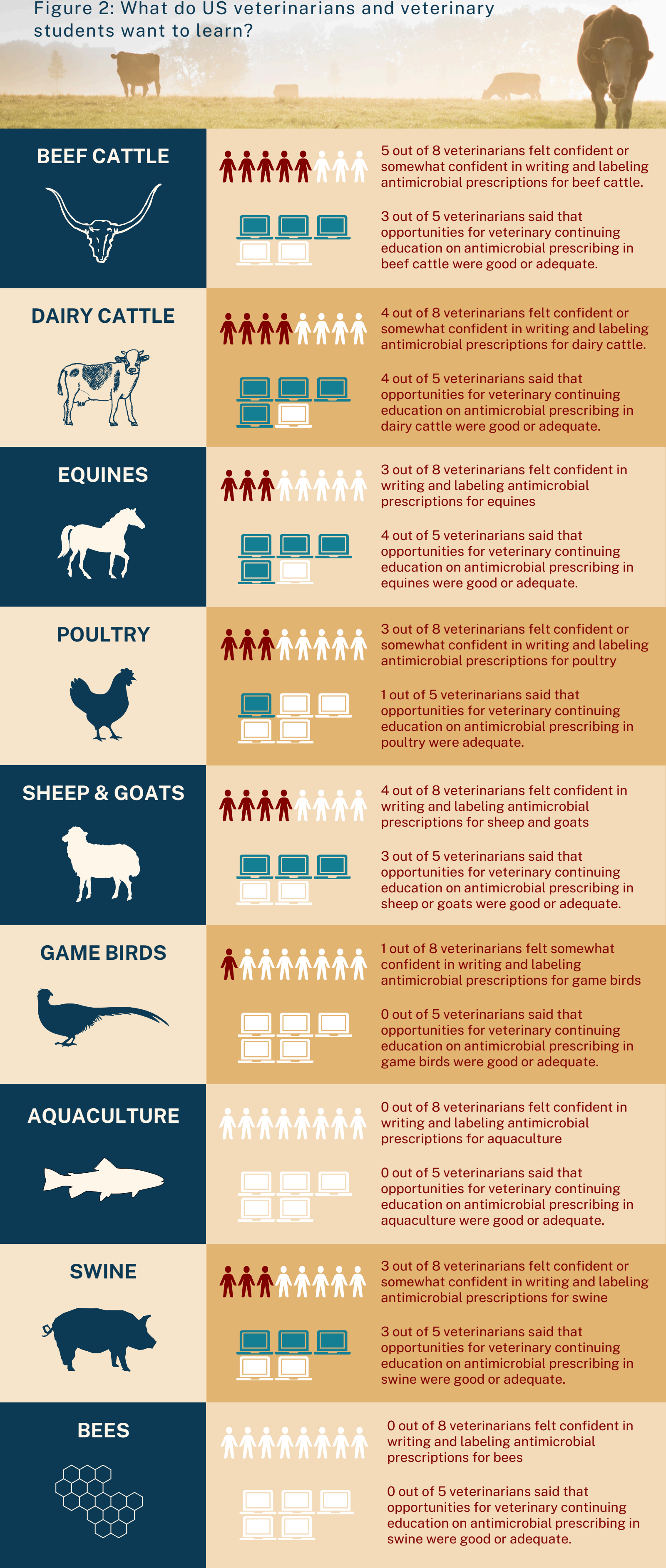


3 felt somewhat knowledgeable

2 did not feel knowledgeable

Agricultural Antimicrobial Prescribing

Figure 2: What do US veterinarians and veterinary students want to learn?



Agricultural Antimicrobial Prescribing

Figure 3: The Veterinarian-Client-
Patient Relationship



7 of 9 veterinarians are very confident in:



Determining when to provide antimicrobial treatment



7 of 10 veterinarians are very confident in:



Working with clients to develop written protocols for
disease prevention and treatment



5 of 10 veterinarians are very confident in:



Judiciously prescribing antimicrobials as surgical
prophylaxis



Selecting the appropriate dose and duration of
antimicrobial treatment



6 of 7
veterinarians felt very or
somewhat confident in having
conversations about antimicrobial
stewardship and prudent
antimicrobial use with clients.



2 of 5
veterinarians occasionally
discussed the risk of soil or water
contamination and the spread of
antimicrobial resistance associated
with veterinary antimicrobial use.



4 of 7 veterinarians felt that clients were somewhat
knowledgeable about antimicrobial resistance.



3 of 7 veterinarians felt that clients were very or
somewhat knowledgeable about prudent
antimicrobial use.



4 of 7 veterinarians felt that clients were somewhat
knowledgeable about veterinary antimicrobial
prescribing regulations.