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Report II

Health and Management Practices on U.S. Feedlots, 2021



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Items of Note

From March 2021 through January 2022, the USDA's National Animal Health Monitoring System (NAHMS), in collaboration with the National Agricultural Statistics Service (NASS), conducted a national study focusing on cattle health and management on U.S. feedlots with at least 50 head. The NAHMS Feedlot 2021 study was designed to provide a snapshot of current feedlot cattle health management practices and to allow for the analysis of trends from previous NAHMS feedlot studies conducted in 2017, 2011, 1999, and 1994 (<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms>).

When interpreting estimates in the report, note that, as shown in Appendix II and the 2017 NASS Census of Agriculture, feedlots with 1,000 or more head capacity contained 77.2 percent of the cattle on feed but made up only 5.2 percent of the feedlots in the United States. It is helpful to keep this industry structure in mind when interpreting estimates at the feedlot level and at the cattle level.

Unless otherwise specified, the time period for estimates in the report is January 1 through December 31, 2020 (i.e., calendar year 2020). Two feedlot capacity categories were used in the report based on number of head: small (50-999) and large (1,000 or more). Highlights of the report appear below.

Initial Processing and Management

Cattle are often "processed" after arrival on the feedlot where a pen or group of cattle is run through a chute to have one or more procedures, such as vaccinations, performed on the cattle while they are immobilized in the chute. For the purposes of this report, processing cattle or treating cattle as a group meant that the entire pen or the majority of cattle in the pen were run through a chute and processed. About two-thirds of feedlots (67.9 percent) processed all cattle as a group at or within four weeks of placement. About one-quarter of feedlots (24.1 percent) did not process any cattle as a group at placement.

Traditionally, feedlot cattle were processed on the day of arrival or shortly after arrival to the feedlot. Recent evidence has shown that postponing processing can be of benefit. Cattle may be able to respond to the effects of vaccination better after recovering from the stress of transport. For feedlots that processed any cattle as a group within four weeks of placement, the highest percentage of feedlots (36.7 percent) processed all cattle less than 1 day after arrival (i.e., on the day of arrival), with 12.1 percent and 11.7 percent processing all cattle 4 to 13 days and 14 to 28 days after arrival, respectively.

For feedlots that processed any cattle as a group within four weeks of placement, a higher percentage of small feedlots (52.4 percent) processed any cattle on the day of arrival compared with large feedlots (24.7 percent). A higher percentage of large feedlots than small feedlots processed any cattle 1 to 3 days after arrival (69.0 and 24.7 percent, respectively) and 4 to 13 days after arrival (59.5 and 20.5 percent, respectively).

The arrival processing procedures performed by each feedlot often vary based on the feedlot veterinarian's recommendations. For feedlots that processed any cattle as a group within four weeks of placement, most feedlots vaccinated all cattle against BVD (80.8 percent) or clostridial diseases (70.1 percent), and 83.7 percent administered a parasiticide to all cattle.

For feedlots that processed any cattle as a group within four weeks of placement, a low percentage of feedlots tested any cattle for BVD infection (7.3 percent), administered an immunostimulant such as Zelnote® (4.8 percent), or listened to cattle lungs with a stethoscope (5.5 percent). A higher percentage of large feedlots vaccinated against BVD (98.0 percent) and administered an injectable antibiotic (72.7 percent) as an initial processing procedure compared with small feedlots (83.3 and 37.2 percent, respectively). A higher percentage of feedlots in the West administered a parasiticide (98.7 percent) compared with feedlots in the East (85.8 percent).

Heifers may get pregnant if they are kept in the same pen as bulls or bull calves that have reached puberty. For feedlots that processed any heifers as a group within four weeks of placement, a higher percentage of large feedlots performed a pregnancy check (51.5 percent) or administered an abortifacient (57.9 percent) on heifers at arrival compared with small feedlots (7.8 and 17.3 percent, respectively).

Weather-related Stress Mitigation

Extreme heat in the summer or cold in the winter can affect cattle performance. Wind breaks, which can be fences, trees, or shrubs that block winter winds, can reduce cold stress. Providing shade or shelter or sprinklers, misters, or water trucks that spray water into pens helps alleviate heat stress in the summer. Building mounds refers to the practice of constructing small sloping hills in feedlot pens to provide a comfortable, dry resting place for cattle in muddy conditions. Evidence shows that some feed additives such as yeast may reduce heat stress in cattle.

There were no differences by feedlot capacity or region in the percentage of feedlots that used wind breaks or feed additives to mitigate weather-related stress, with three-quarters (75.6 percent) of feedlots using wind breaks and 22.6 percent using feed additives. A higher percentage of large feedlots used mounds (70.4 percent) or sprinklers, misters, or water trucks (46.3 percent) to mitigate weather-related stress compared with small feedlots (40.8 and 8.1 percent, respectively). A higher percentage of small feedlots (84.1 percent) provided shade/shelter to cattle compared with large feedlots (58.4 percent).

Disease Conditions

For the occurrence of disease conditions included in this report, there were no requirements that the disease be confirmed via necropsy, testing, or other means. Thus, while testing, necropsy, or veterinary diagnosis could have been used in the respondents' assessments as to whether a disease occurred, these determinations could have been based on respondents' perceptions based on experience.

Respiratory disease (bovine respiratory disease [BRD], shipping fever) is the most common cause of morbidity and mortality on cattle feedlots. Often, respiratory disease is caused by co-infections with viruses such as infectious bovine rhinotracheitis (IBR) virus or bovine respiratory syncytial virus (BRSV), and bacteria such as *Mannheimia haemolytica* or *Pasteurella multocida*. Cattle experiencing respiratory disease usually reduce feed intake, and a percentage of these animals die, making respiratory disease costly for the feedlot industry.

About three-fourths of feedlots (77.5 percent) experienced at least one case of respiratory disease in 2020, with a higher percentage of large feedlots (98.8 percent) experiencing at least one case of respiratory disease in 2020 compared with small feedlots (74.7 percent).

A higher percentage of cattle under 400 lb at arrival (25.9 percent) developed respiratory disease in 2020 compared with cattle 700 lb or more at arrival (9.6 percent). On small feedlots, there were no differences by arrival weight in the percentage of cattle affected by respiratory disease, but on large feedlots, a higher percentage of cattle under 400 lb at arrival (31.0 percent) were affected by respiratory disease in 2020 compared with cattle 700 lb or more at arrival (10.4 percent). Overall, 12.2 percent of cattle were affected with respiratory disease in 2020.

A higher percentage of large feedlots experienced at least one case of acute interstitial pneumonia, foot rot, central nervous system disease, pinkeye, or cardiovascular disease compared with small feedlots. Large feedlots have more animals, so it is understandable that they are more likely to experience at least one case of a disease compared with small feedlots. This is the first NAHMS feedlot study to ask about occurrence of papillomatous digital dermatitis (hairy heel wart) and cardiovascular disease. The latter has emerged as a disease of concern in feedlots due to cattle being raised to steadily increasing weights. Overall, 8.3 percent and 15.2 percent of all feedlots experienced at least one case of hairy heel wart or cardiovascular disease, respectively.

Postmortem examinations (necropsies) can be a useful aid in diagnosing disease, monitoring disease occurrence, and assessing treatment efficacy, but they often do not provide a definitive cause of death. Almost two-thirds of feedlots (63.6 percent) did not have any necropsies performed on any cattle that died in 2020. Only 7.9 percent of feedlots had necropsies performed on all cattle that died in 2020. A higher percentage of large feedlots (78.7 percent) than small feedlots (30.8 percent) performed a necropsy on any cattle that died in 2020.

Some feedlots have separate pens to house sick cattle (hospital pens) where individual sick cattle can be moved from their pen of origin to the hospital pen to receive treatment and recover. Two-thirds (67.0 percent) of feedlots had separate pens to house sick cattle. A higher percentage of large (93.0 percent)

than small feedlots (63.6 percent) had separate pens to house sick cattle, and a higher percentage of feedlots in the West region (86.1 percent) than in the East region (56.5 percent) had separate pens to house sick cattle.

Any Antibiotic Use

Just as with humans, cattle sometimes become sick and need to be given antibiotics. Medically important antibiotics (antibiotics important for human use) are used in feedlot cattle for disease treatment, control, or prevention. Non-medically important antibiotics, such as ionophores, can be used for growth promotion and improving feed efficiency as well as for disease control or prevention. Antibiotics can be given in feed or water, by injection, by bolus (pill given by mouth), by drench (liquid given by mouth), or topically (paste/liquid applied on skin or eyes).

Most feedlots (90.2 percent) used antibiotics for at least one animal in 2020. A higher percentage of large feedlots (36.5 percent) compared with small feedlots (4.1 percent) used injectable or bolus-dosed antibiotics for group administration to prevent, control, or treat bovine respiratory disease. There were no differences by feedlot capacity or by region in the percentage of feedlots that used any antibiotics in feed.

Injectable or Bolus-dosed Antibiotic Use

For feedlots that used any injectable or bolus-dosed antibiotics in 2020, the majority said that veterinarian recommendations (82.4 percent), personal experience (83.7 percent), and duration of action (62.4 percent) were either extremely important or very important in the selection of these antibiotics. The majority of feedlots also said that other producers' recommendations (61.9 percent), laboratory test results (62.1 percent), drug company advertisements (91.9 percent), and over-the-counter availability (68.6 percent) were either not important or slightly important factors in the selection of these antibiotics. For feedlots that used any injectable or bolus-dosed antibiotics in 2020, a higher percentage of large feedlots (77.9 percent) than small feedlots (41.2 percent) said the approved route by which antibiotics are given was either very important or extremely important in the selection of injectable or bolus-dosed antibiotics.

For feedlots on which any cattle were affected with bovine respiratory disease (BRD) in 2020, over 40 percent used tulathromycin (46.6 percent) or florfenicol (44.4 percent) as the initial treatment for individual cases of BRD. For feedlots on which cattle were affected with BRD, all large and 94.0 percent of small feedlots used injectable or bolus-dosed antibiotics for initial treatment of at least one individual case of BRD on the feedlot.

Antibiotic Use in Feed

On January 1, 2017, the U.S. Food and Drug Administration (FDA) implemented policy changes regarding the use of medically important antibiotics (antibiotics important for human use) in food-producing animals. These changes included: 1) eliminating the use of medically important antibiotics for growth promotion purposes in food-producing animals, and 2) requiring veterinary oversight for use of medically important antibiotics in animal feed or water. As a result of these policy changes, a Veterinary Feed Directive (VFD) became necessary for use of any medically important antibiotic in feed of food-producing animals.

Non-medically important antibiotics used in cattle feed, such as ionophores, do not require a VFD and can still be used for growth promotion/feed efficiency purposes. Ionophores lack utility in human medicine and their use in animals does not pose cross-resistance issues; thus, they do not have the same human health concerns as medically important antibiotics.

A little over half of feedlots (56.6 percent) used ionophores in feed. There were no differences by feedlot capacity or region in the percentage of feedlots that used ionophores in feed. Over three-fourths of cattle (77.6 percent) received ionophores in feed in 2020.

Monensin, lasalocid, and laidlomycin are the three ionophores approved for use in feedlot cattle. All three are approved for improving feed efficiency. Monensin and lasalocid are also approved for prevention and control of coccidiosis. For feedlots that administered any ionophore in feed to any cattle in 2020, most

(91.6 percent) used the ionophore for growth promotion/improved feed efficiency, and a little over half (55.6 percent) used ionophores for prevention or control of coccidiosis.

Medically important antibiotics require a VFD when used in feed, and they can be used for disease treatment, control, or prevention purposes but not for growth promotion/feed efficiency. Two medically important antibiotics commonly used in cattle feed are chlortetracycline, which is often used for respiratory disease, and tylosin, which is used for reduction in the incidence of liver abscesses.

A little over half of all feedlots (52.2 percent) used medically important antibiotics in feed in 2020. The highest percentage of feedlots (43.1 percent) used medically important antibiotics in feed for respiratory disease. The medically important antibiotic used in feed by the highest percentage of feedlots was chlortetracycline (33.0 percent).

A higher percentage of cattle on large (57.9 percent) than on small feedlots (8.3 percent) received tylosin in feed in 2020. About half (49.2 percent) of the cattle placed in 2020 received tylosin in feed. A higher percentage of cattle on small (34.0 percent) than on large feedlots (6.6 percent) received chlortetracycline in feed in 2020. Overall, 11.3 percent of cattle received chlortetracycline in feed.

Nutrition

Coccidiosis in cattle can cause diarrhea, loss of appetite, and decreased rate-of-gain, with severe cases leading to death. It primarily affects young cattle 1-2 months of age but can affect cattle up to 1 year in age. Coccidiostats are used for treatment, control, and prevention of coccidiosis. Monensin and lasalocid are ionophore coccidiostats approved for use in cattle. Common non-ionophore coccidiostats used in cattle include decoquinate (Deccox®) and amprolium (Corid®).

About a quarter of feedlots (27.5 percent) used non-ionophore coccidiostats at some point during the feeding period in 2020. There were no differences by feedlot capacity or region in the percentage of feedlots that used non-ionophore coccidiostats. At the animal level, 13.4 percent of cattle received a non-ionophore coccidiostat in 2020.

Beta-agonists are approved for use in feedlot cattle during the last 28-42 days on feed for increased rate of gain, improved feed efficiency, and increased carcass leanness. Beta-agonists approved for cattle in the U.S. include ractopamine (Optaflexx®, Actogain®, Optigrid®) and zilpaterol (Zilmax®), the latter of which is no longer marketed.

A higher percentage of large feedlots (22.0 percent) than small feedlots (1.9 percent) used a beta-agonist in 2020. At the animal level, a higher percentage of cattle on large (53.2 percent) than on small feedlots (4.2 percent) received a beta-agonist in 2020. In addition, a higher percentage of cattle on feedlots in the West (51.7 percent) than in the East region (5.7 percent) received a beta-agonist in 2020. Overall, almost half of cattle (45.1 percent) received a beta-agonist in 2020.

Meeting the nutritional needs of cattle is key to preserving animal health and growth. Furthermore, the cost of gain for cattle in feedlots is highly dependent on the cost of ingredients in the diet. A nutritionist can help determine the optimum, least-cost rations needed to support growth and finishing objectives for a particular group of cattle. Overall, 61.2 percent of feedlots used a nutritionist in 2020. A higher percentage of large feedlots (94.6 percent) used a nutritionist compared with small feedlots (56.8 percent).

Biosecurity

Feedlots that have a biosecurity plan in place will be more prepared to maintain continuity of business operations in the event of an introduction of a foreign animal disease, such as foot-and-mouth disease. A biosecurity plan for a specific operation should include a map of the operation along with a line of separation, which is an outer control boundary around, or within, the premises to limit the movement of pathogens into areas where cattle can be exposed. A biosecurity plan should also include a map of access points to the operation, the cleaning and disinfection station(s), designated parking areas, vehicle movement pathways, and carcass disposal/pickup locations.

A higher percentage of large feedlots (30.3 percent) than small feedlots (5.6 percent) had a written or electronic biosecurity plan in 2020.

If foot-and-mouth disease (FMD) is ever found in United States livestock, Regulatory Officials will limit the movement of cattle to control the spread of this very contagious animal disease. The Secure Beef Supply Plan for Continuity of Business provides opportunities to voluntarily prepare before an outbreak occurs. Guidance includes developing contingency plans for limited animal movement, enhancing biosecurity practices to limit exposure, identifying signs of FMD, and working with Regulatory Officials for movement permits and outbreak response. This will better position feedlots that have no evidence of infection to move cattle to processing or another premises under a movement control permit issued by Regulatory Officials, which maintains business continuity.

About two-thirds of feedlots (66.9 percent) were not familiar with the Secure Beef Supply Plan. A higher percentage of large feedlots (12.5 percent) than small feedlots (1.6 percent) were very familiar with the Secure Beef Supply Plan. It should be noted that after completion of this study, the beef cattle industry received USDA National Animal Disease Preparedness and Response (NADPRP) funding in 2023 to advance cattle producers' participation in the Secure Beef Supply Plan, so the percentages of feedlots familiar with the Secure Beef Supply Plan may now be higher.

Sharing a fence line with another operation where nose-to-nose contact is possible between ruminant species can result in disease spread between operations. The vast majority (91.8 percent) of feedlots did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants in 2020.

For feedlots that did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants, the average distance to the nearest operation with cattle, bison, or other domestic ruminants was 1.7 miles.

As expected, large feedlots had a higher average number of employees (8.3) directly involved with cattle care than small feedlots (1.8). For feedlots with employees directly involved in cattle care, nearly a third (31.5 percent) had employees that had contact with cattle, bison, or other ruminants on other operations, and slightly over a fourth (26.2 percent) had employees that owned cattle, bison, or other ruminants at a location other than the feedlot.

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Introduction

The National Animal Health Monitoring System (NAHMS) is a nonregulatory program of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS). NAHMS is designed to help meet the Nation's animal health information needs and has collected data on animal health and management practices on U.S. feedlots via four previous studies.

The NAHMS 1994 Cattle on Feed Evaluation (COFE) provided the first national information on the health and management practices of feedlots in the United States. Data were collected from 3,214 feedlots from 13 major cattle-on-feed States, which accounted for 85.8 percent of the U.S. cattle-on-feed inventory on January 1, 1994.

The NAHMS Feedlot '99 study was designed to provide participants and those affiliated with the cattle-feeding industry with information on the Nation's feedlot-cattle population to be used for education and research. For Feedlot '99, a statistically valid sample was selected so that inferences could be made to 100 percent of the cattle on feed in feedlots with a capacity of 1,000 head or more on January 1, 1999, in 12 participating States. These feedlots represented 82.1 percent of all cattle on feed on January 1, 2000, in the 50 States.

The NAHMS Feedlot 2011 study took an in-depth look at large U.S. feedlots (1,000 head or more capacity) in 12 States and small feedlots (fewer than 1,000 head capacity) in 13 States. Large feedlots accounted for 82.1 percent of the January 1, 2011, inventory in all U.S. feedlots but only 2.8 percent of all feedlots. The 12 participating States accounted for over 95 percent of the inventory in large feedlots (NASS, "Cattle on Feed" February 18, 2011).

The NAHMS Antimicrobial Use and Stewardship on U.S. Feedlots, 2017 study represented the first time that NAHMS conducted a targeted study on antimicrobial use and stewardship, and it was also the first time that NAHMS collected detailed information on antimicrobial use in feed and water on feedlots with a capacity of 50 to 999 head. The Antimicrobial Use and Stewardship on U.S. Feedlots, 2017 study was conducted in 22 top cattle-producing States. The 13 States from which small feedlots were selected represented 93.2 percent of U.S. cattle inventory on feedlots with 50 to 999 head and 91.3 percent of feedlots with a capacity of 50 to 999 head. The 16 States from which large feedlots were selected represented 92.8 percent of U.S. cattle inventory on feedlots with 1,000 or more head capacity and 92.3 percent of feedlots with 1,000 or more head capacity.

The NAHMS Health Management on U.S. Feedlots, 2021 study continued collecting detailed information on antimicrobial use and stewardship that began with the Antimicrobial Use and Stewardship on U.S. Feedlots, 2017 study. However, it also included questions on general management practices used on feedlots, similar to the NAHMS Feedlot studies conducted in 1994, 1999, and 2011. Many of the management practices on which data were collected are potentially relevant to antimicrobial use. For example, if calves are preconditioned prior to placement in a feedlot, they are at lower risk of disease and may be less likely to require antibiotics at the feedlot, so some questions about knowledge of preconditioning practices performed on calves prior to arrival at the feedlot were included in the study questionnaire. The study was initially to be conducted in 2020 but was postponed to 2021 due to COVID-19. Twenty-two States participated. Small feedlots were selected from 18 States, and these States represented 95.7 percent of the inventory on feedlots with 50 to 999 head and 94.0 percent of feedlots with 50 to 999 head. Large feedlots were selected from 17 States, and these States represented 95.5 percent of the inventory on feedlots with 1,000 or more head and 94.4 percent of feedlots with 1,000 or more head.

Terms Used in This Report

Antibiotic: An antimicrobial that inhibits and/or kills certain bacteria. Appropriately utilized antibiotics are very effective against illnesses caused by bacteria.

Antimicrobial: Any substance of natural, semisynthetic, or synthetic origin that kills or inhibits the growth of microorganisms. All antibiotics are antimicrobials, but not all antimicrobials are antibiotics. For the purposes of this report, the terms “antimicrobial” and “antibiotic” are considered synonymous.

Antimicrobial stewardship and judicious use: Includes keeping records on antimicrobial use, offering employees training regarding use of antimicrobials, periodically undergoing facility audits or assessments, using a veterinarian for guidance on antimicrobial use, having a valid veterinarian-client-patient-relationship, and taking steps to prevent disease.

Antimicrobial use definitions (excerpted from American Veterinary Medical Association (AVMA) website - <https://www.avma.org/policies/avma-definitions-antimicrobial-use-treatment-control-and-prevention>):

Antimicrobial prevention of disease (prophylaxis): On a population basis, prevention is the administration of an antimicrobial to a group of animals, none of which have evidence of disease or infection, when transmission of existing undiagnosed infections, or the introduction of pathogens, is anticipated based on history, clinical judgement, or epidemiological knowledge.

Antimicrobial control of disease (metaphylaxis): On a population basis, control is the use of antimicrobials to reduce the incidence of infectious disease in a group of animals that already has some individuals with evidence of infectious disease or evidence of infection.

Antimicrobial treatment of disease: On a population basis, treatment is the administration of an antimicrobial to those animals within the group with evidence of infectious disease.

Backgrounder operation: Often used interchangeably with a stocker operation, a backgrounder operation is a farm or ranch that raises weaned calves prior to entering a feedlot. Calves that have spent time on backgrounder/stocker operations have recovered from the stress of weaning and tend to adapt more smoothly to a feedlot environment compared with freshly weaned calves. Sometimes, distinctions are made between backgrounder and stocker operations. For example, stocker operations are more likely to keep calves for longer periods than backgrounder operations, which typically keep calves just long enough for them to get over the stress of weaning or leaving the farm or ranch of origin before they enter a feedlot environment. In addition, backgrounder operations typically haul feed to the calves, while stocker operations expect calves to graze on pasture for most of their nutritional needs. In general, a backgrounder or stocker operation is an intermediate step for calves between the farm or ranch of origin and a feedlot. In terms of U.S. Food and Drug Administration (FDA) definitions of classes of cattle (which determine conditions of use for beef cattle ear implants), backgrounder operations would typically be described as having growing beef steers or heifers in a dry lot (where these cattle are in a dirt floor pen or on grass with insufficient biomass to sustain growth—i.e., feed is delivered to the pen), and stocker operations would be described as having growing beef steers or heifers on pasture (where these cattle get the majority of their diet from grazing).

Beef Quality Assurance (BQA): A national educational program for cattle producers that offers science-based management techniques and showcases a commitment to quality through every segment of the beef industry, thereby raising consumer confidence. Nearly every U.S. State has an active BQA program. BQA’s mission is to guide producers towards continuous improvement using science-based production practices that assure cattle well-being, beef quality, and safety. The program links all beef producers with livestock production specialists, veterinarians, nutritionists, marketers, and food purveyors interested in continuously improving the quality of the beef they produce. BQA programs promote best practices and principles around cattle handling, facility management, cattle transportation, good record keeping, and protecting herd health, which all result in better outcomes for cattle and producers. In addition, BQA programming focuses on educating and training cattle producers, farm advisors, and veterinarians on animal husbandry practices, as well as issues regarding food safety and quality. The BQA program is executed through a State and National partnership to create standardized educational opportunities. Producers can obtain BQA certification by completing several hours of training, in person or online, and are required to recertify every three years. Information on resources and certification can be found at www.bqa.org.

BQA Feedyard Assessment: An onsite educational tool that allows for assessing and benchmarking key indicators of animal care and welfare as well as feedyard conditions. The assessment has areas of focus covering animal health records, animal handling observations, animal health and employee training protocols, and facilities/equipment evaluation. It is developed to be in close alignment with commonly used feedyard audit tools. Assessments might be utilized as a self-assessment, completed by a second-party, or conducted by a third-party assessor. It can be accessed at www.bqa.org.

Cattle on feed: Cattle being fed a high-energy ration consisting of components such as grain, silage, hay, and/or protein supplement before being sent to slaughter. Operations with cattle being “backgrounded only” for later sale as feeders or for placement in another feedlot were excluded from this study. This report is restricted to steers and heifers.

Cattle placed/placement: This report is restricted to steers and heifers placed in a feedlot and fed a ration that will produce a “select or better” carcass at slaughter. Placement refers to the time that cattle entered the feedlot.

Coccidiostat: An antiprotozoal agent added to animal feed or water to inhibit the reproduction and development of coccidia organisms.

Dairy crossbreed: Crossbreeding means breeding one breed to another. It can mean breeding one dairy breed to another (e.g., Holstein to Jersey), but this is not common. For the purposes of this report, dairy crossbreeds primarily refer to dairy breeds (e.g., Holstein) bred to beef breeds (e.g., Angus). Other names may include beef x dairy cross, crossbreeds, or composite calves.

Feeding period: The time span beginning when cattle enter the feedlot and ending when cattle are marketed (i.e., shipped for slaughter).

Feedlot: An operation that feeds cattle for the slaughter market.

Feedlot capacity: The total number of cattle that could be accommodated in the feedlot at one time. In this report, feedlots were categorized as small or large:

Small: Feedlot capacity of 50 to 999 head.

Large: Feedlot capacity of 1,000 or more head.

Note: Although feedlots were selected from the NASS list frame based on having 50 or more cattle on feed, a small number of participating feedlots reported a feedlot capacity of fewer than 50 head on the day of the interview. These feedlots were included in the Small category (50–999).

Grow yard: Another name for backgrounding operation.

Group processing: Group processing refers to running a pen of cattle through a chute to have one or more procedures (e.g., administering vaccines or antibiotics) performed on the cattle while they are immobilized in the chute. Group processing is often performed shortly after cattle arrive at a feedlot.

Group treatment: For the purposes of this report, group treatment refers to running a pen of cattle through a chute for antibiotic treatment while cattle are immobilized in the chute. Group treatment can occur during group processing shortly after arrival at the feedlot, or it can occur later in the feeding period if cattle are affected by respiratory disease or another disease.

Heifer: A bovine female less than 3 years of age that has not borne a calf. Young cows that have had their first calf are sometimes called “first-calf heifers,” but for the purposes of this study, any animal that has had a calf is considered a cow.

Ionophore: A drug administered in feed that promotes the efficient use of feedstuffs by altering the fermentation pattern in the rumen. Monensin, lasalocid, and laidlomycin are ionophores approved for use in feedlot cattle. All three are approved for improving feed efficiency. Monensin and lasalocid are also approved for prevention and control of coccidiosis. Ionophores are antibiotics that are not considered medically important by the FDA.

Medically important antimicrobial: Any antimicrobial the FDA defines as medically important with respect to the use of that class of antimicrobials for therapeutic use in human medicine. As of January 1, 2017, medically important antimicrobials are no longer approved by the FDA for use in food-producing animals for growth promotion purposes, and medically important antimicrobials used in animal feed or water require veterinary oversight. In addition, the FDA's Guidance for Industry #263 requires, as of June 11, 2023, that all medically important antibiotics by all routes of administration will be under veterinarian oversight for distribution and use.

Percent cattle: The total number of cattle on all feedlots with a certain attribute divided by the total number of cattle on all feedlots (or on all feedlots within a certain category, e.g., capacity).

Percent feedlots: The number of feedlots with a certain attribute divided by the total number of feedlots (or by the total number of feedlots within a certain category, e.g., capacity). Percentages will sum to 100 if attributes are mutually exclusive (e.g., percentage of feedlots within a capacity category). Percentages will not sum to 100 if attributes are not mutually exclusive (e.g., the percentage of feedlots using treatment methods where feedlots used more than one method).

Placement weight: The weight of cattle at the time they enter (are placed in) the feedlot. Placement weight can give an idea of disease risk upon entering the feedlot. For example, cattle placed at less than 400 lb tend to have the highest disease risk while cattle placed at 900 lb or more generally have the lowest risk. Some data in this report were collected according to the following placement weights:

- Less than 400 lb at placement
- 400–699 lb at placement
- 700–899 lb at placement
- 900 or more lb at placement

Population estimates: Point estimates in this report (weighted percentages or averages) are provided with a measure of precision called the standard error. A 95-percent confidence interval can be approximated with bounds equal to the estimate, plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. An estimate of 7.5 with a standard error of 1.0 results in a confidence interval of 5.5 to 9.5 (two times the standard error above and below the estimate). In this report, estimates are reported as being “higher” or “lower” based on 95-percent confidence intervals that do not overlap. Not all statistically different estimates are mentioned in the text of this report. All estimates in this report are rounded to the nearest tenth. If the estimate rounded to 0, the standard error was reported (0.0). If there were no reports of the event (0.0 percent) or if all operations reported the event (100.0 percent), no standard error was reported (—).

Preconditioning practices: Practices that help a calf become ready to leave the operation of origin and reduce the calf's stress when adjusting to a new location, such as a feedlot. Typical recommended preconditioning practices include keeping the calf on the operation of origin for at least 45 days after weaning, dehorning (if horned), castrating bulls, administering appropriate vaccines, deworming, and getting the calf used to eating from a feed bunk and drinking from a water tank. Preconditioned calves are at lower risk of disease upon arrival at a feedlot.

Region: Some of the data in this report are broken out by region. For this study, feedlot regions were defined as follows:

- East: IA, IL, IN, MI, MN, MO, OH, PA, WI
- West: CA, CO, ID, KS, MT, ND, NE, OK, SD, TX, UT, WA, WY

Route of administration for antibiotics:

Feed: Medically important antibiotics are added to cattle feed for preventing, controlling, or treating disease. Non-medically important antibiotics can be used in cattle for increasing rate of gain and/or improving feed efficiency as well as preventing or controlling disease.

Water: Antibiotics are added to drinking water for control or treatment of disease in a group of cattle.

Injection or bolus (individual treatment): Individual sick animals treated with antibiotics by injection, bolus (pill given by mouth), or drench (liquid given by mouth) for disease treatment.

Injection or bolus (group treatment): In this report, “treated as a group” means that the majority of cattle in a pen or group were treated with antibiotics by injection or bolus for preventing, controlling, or treating a disease outbreak, such as bovine respiratory disease or shipping fever.

Steer: A castrated male bovine.

Stocker operation: Often used interchangeably with a backgrounder operation, a stocker operation is a farm or ranch that raises weaned calves prior to feedlot entry. Calves that have spent time on backgrounder/stocker operations have recovered from the stress of weaning and tend to adapt more smoothly to a feedlot environment compared with freshly weaned calves. Sometimes, distinctions are made between backgrounder and stocker operations. For example, stocker operations are more likely to keep calves for longer periods than backgrounder operations, which typically keep calves just long enough for them to get over the stress of weaning or leaving the farm or ranch of origin before they enter a feedlot environment. In addition, backgrounder operations typically haul feed to the calves, while stocker operations expect calves to graze on pasture for most of their nutritional needs. In general, a backgrounder or stocker operation is an intermediate step for calves between the farm or ranch of origin and a feedlot. In terms of U.S. Food and Drug Administration (FDA) definitions of classes of cattle (which determine conditions of use for beef cattle ear implants), stocker operations would be described as having growing beef steers or heifers on pasture (where these cattle get the majority of their diet from grazing), and backgrounder operations would typically be described as having growing beef steers or heifers in a dry lot (where these cattle are in a dirt floor pen or on grass with insufficient biomass to sustain growth—i.e., feed is delivered to the pen).

Veterinarian-Client-Patient Relationship (VCPR): a VCPR is the basis for interaction among veterinarians and their clients and patients. A veterinarian must have an established VCPR to issue a Veterinary Feed Directive (VFD). The Federal VCPR definition* includes the following elements:

1. A veterinarian has assumed the responsibility for making medical judgments regarding the health of (an) animal(s) and the need for medical treatment, and the client (the owner of the animal or animals or other caretaker) has agreed to follow the instructions of the veterinarian;
2. There is sufficient knowledge of the animal(s) by the veterinarian to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s); and
3. The practicing veterinarian is readily available for follow-up in case of adverse reactions or failure of the regimen of therapy. Such a relationship can exist only when the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of examination of the animal(s), and/or by medically appropriate and timely visits to the premises where the animal(s) are kept.

* 21 CFR § 530.3(i) (2025). Available at: <https://www.ecfr.gov/current/title-21/chapter-I/subchapter-E/part-530/subpart-A/section-530.3>

Veterinary Feed Directive (VFD): An authorization by a veterinarian to allow for use of a VFD drug (animal drugs intended for use in or on animal feed that require the supervision of a licensed veterinarian). A VFD is required to use medically important antibiotics (antibiotics important for human use) in animal feed. VFDs are also required for some newer non-medically important antibiotics in animal feed such as avilamycin, which is approved for swine and poultry but not cattle. A prescription is used for medically important antibiotics given by injection or in drinking water, and a VFD is similar to a prescription except the VFD pertains to animal feed. Businesses selling prescription medicine typically require the presence of a licensed pharmacist due to State pharmacy laws. The VFD was created by the U.S. Food and Drug Administration (FDA) in the 1990s so feed mills would not need a licensed pharmacist or other medical professional to be present during dispensing of antibiotics in animal feed.

VFD antibiotic: An antibiotic intended for use in or on animal feed that requires a veterinary feed directive issued by a licensed veterinarian.

Section I: Survey Results

Where applicable, column or row totals are shown as 100.0 to aid in interpretation; however, estimates may not always sum to 100.0 due to rounding. Columns or rows not summing to 100.0 indicate the options were not mutually exclusive.

Note: Unless otherwise specified, the time period for all tables is calendar year 2020, January 1 through December 31, 2020.

A. Cattle Breeds and Arrival Weights

Feedlots in the United States often do not raise cattle from birth and instead obtain cattle after weaning to be placed in the feedlot. In some cases, they purchase cattle (“feeder cattle”) to be placed in the feedlot, but they can also “custom feed” cattle owned by someone else, often the cow-calf operation of origin.

Most cattle placed in feedlots are beef breeds. In the past, Holstein steers were the primary dairy animals placed in feedlots. However, sexed semen has become popular on dairy operations where the best cows or heifers are bred with sexed semen to produce females to be added to the milking string. Then cows or heifers with less genetic potential are bred to beef bulls to produce crossbred calves to be used for beef, which makes those calves more valuable than Holstein steers.

Beef breeds less than 400 lb upon arrival to the feedlot are recently weaned and are considered to be at higher risk of contracting diseases. In contrast, cattle with arrival weights of 900 lb or more are considered to be at lower risk for disease upon placement on the feedlot.

For beef breeds, the highest percentage of operations (60.0 percent) placed cattle 400–699 lb at arrival. One quarter of feedlots (25.8 percent) placed any dairy breeds or dairy crossbreeds. A lower percentage (81.0 percent) of feedlots in the East region placed beef breeds compared with feedlots in the West region (95.1). A higher percentage of feedlots in the East region (35.4 percent) placed dairy breeds or dairy crossbreeds compared with feedlots in the West region (8.3 percent). A higher percentage of small feedlots (27.6 percent) placed dairy breeds or dairy crossbreeds compared with large feedlots (12.1 percent).

A.1. Percentage of feedlots that placed any cattle on feed of the following breed types and arrival weights in 2020, by feedlot capacity and by region:

Percent Feedlots										
Breed type and arrival weight (lb)	Feedlot capacity (number head)				Region				All feedlots	
	Small (50-999)		Large (1,000 or more)		West		East			
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Breed type										
Any beef breeds	84.5	(1.4)	97.4	(0.7)	95.1	(1.5)	81.0	(1.7)	86.0	(1.2)
Any dairy breeds or dairy crossbreeds	27.6	(1.6)	12.1	(2.9)	8.3	(1.9)	35.4	(1.9)	25.8	(1.4)
Arrival weight (lb)										
Less than 400	39.0	(1.9)	30.9	(4.5)	25.2	(2.9)	45.1	(2.2)	38.0	(1.7)
400 to 699	67.3	(1.9)	74.6	(3.9)	77.8	(2.8)	62.9	(2.2)	68.2	(1.7)
700 to 899	27.6	(1.8)	59.4	(4.4)	35.3	(3.0)	29.1	(2.0)	31.3	(1.7)
900 or more	12.1	(1.4)	36.3	(3.8)	19.7	(2.4)	12.3	(1.5)	14.9	(1.3)
Less than 700	86.8	(1.4)	83.3	(3.0)	86.1	(2.2)	86.6	(1.5)	86.4	(1.3)
700 or more	31.1	(1.9)	64.2	(4.4)	41.7	(3.2)	31.3	(2.1)	35.0	(1.8)
Beef breed arrival weight (lb)										
Less than 400	27.1	(1.8)	26.7	(4.5)	22.8	(2.8)	29.5	(2.1)	27.1	(1.7)
400 to 699	58.7	(1.9)	69.9	(4.3)	74.8	(3.0)	51.8	(2.2)	60.0	(1.8)
700 to 899	24.3	(1.7)	58.5	(4.4)	35.0	(3.0)	24.6	(1.9)	28.3	(1.6)
900 or more	9.3	(1.2)	34.4	(3.6)	19.2	(2.4)	8.4	(1.2)	12.2	(1.1)
Dairy breed or dairy crossbreed arrival weight (lb)										
Less than 400	18.1	(1.4)	7.1	(1.9)	2.9	(1.0)	24.5	(1.8)	16.8	(1.2)
400 to 699	12.4	(1.3)	8.0	(2.8)	4.7	(1.5)	15.9	(1.7)	11.9	(1.2)
700 to 899	4.6	(0.9)	5.3	(1.8)	1.0	(0.3)	6.7	(1.2)	4.7	(0.8)
900 or more	3.3	(0.7)	3.5	(1.8)	1.3	(0.7)	4.5	(1.0)	3.4	(0.7)

The vast majority of cattle placed in 2020 were beef breeds (93.0 percent) compared with dairy breeds (7.0 percent). A lower percentage of beef breeds less than 400 lb at arrival (4.0 percent) were placed compared with the other weight classes of beef breeds at arrival.

A.2. Percentage of cattle placed on feed by breed type and arrival weight of cattle in 2020, and by feedlot capacity and region:

Percent Cattle*										
Feedlot capacity (number head)					Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Breed type and arrival weight (lb)	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Breed type										
Any beef breeds	83.1	(1.8)	95.0	(1.7)	95.3	(1.6)	79.7	(2.1)	93.0	(1.4)
Any dairy breeds or dairy crossbreeds	16.9	(1.8)	5.0	(1.7)	4.7	(1.6)	20.3	(2.1)	7.0	(1.4)
Total	100.0		100.0		100.0		100.0		100.0	
Arrival weight (lb)										
Less than 400	15.8	(1.6)	6.8	(1.8)	6.4	(1.8)	19.5	(1.9)	8.3	(1.6)
400 to 699	51.4	(2.9)	29.7	(2.6)	32.6	(2.6)	38.2	(2.7)	33.5	(2.3)
700 to 899	24.2	(2.3)	47.8	(2.2)	45.7	(2.2)	32.5	(2.6)	43.7	(2.0)
900 or more	8.6	(1.6)	15.7	(1.6)	15.3	(1.6)	9.8	(1.6)	14.5	(1.4)
Total	100.0		100.0		100.0		100.0		100.0	
Less than 700	67.2	(3.1)	36.5	(3.0)	39.0	(3.0)	57.6	(3.2)	41.8	(2.7)
700 or more	32.8	(3.1)	63.5	(3.0)	61.0	(3.0)	42.4	(3.2)	58.2	(2.7)
Total	100.0		100.0		100.0		100.0		100.0	
Beef breed arrival weight (lb)										
Less than 400	7.6	(1.0)	3.3	(0.9)	3.1	(0.8)	9.0	(1.5)	4.0	(0.8)
400 to 699	45.4	(2.8)	29.0	(2.6)	31.8	(2.6)	32.1	(2.5)	31.9	(2.3)
700 to 899	23.2	(2.3)	47.3	(2.3)	45.3	(2.2)	30.8	(2.6)	43.1	(2.0)
900 or more	6.8	(1.5)	15.4	(1.6)	15.0	(1.6)	7.9	(1.4)	14.0	(1.4)
Total	83.1	(1.8)	95.0	(1.7)	95.3	(1.6)	79.7	(2.1)	93.0	(1.4)
Dairy breed or dairy crossbreed weight (lb)										
Less than 400	8.2	(1.1)	3.5	(1.6)	3.2	(1.5)	10.5	(1.3)	4.3	(1.3)
400 to 699	6.0	(1.2)	0.7	(0.2)	0.8	(0.2)	6.1	(1.2)	1.6	(0.3)
700 to 899	1.0	(0.3)	0.5	(0.2)	0.4	(0.1)	1.7	(0.4)	0.6	(0.1)
900 or more	1.8	(0.7)	0.3	(0.1)	0.3	(0.1)	1.9	(0.8)	0.5	(0.2)
Total	16.9	(1.8)	5.0	(1.7)	4.7	(1.6)	20.3	(2.1)	7.0	(1.4)

*As a percentage of total cattle placed during 2020.

B. Preconditioning and Backgrounding

Preconditioning can help a calf become ready to leave the operation of origin and reduce the calf's stress when adjusting to a new location, such as a feedlot. Typical recommended preconditioning practices include keeping the calf on the operation of origin for at least 45 days after weaning, dehorning (if horned), castrating bulls, administering appropriate vaccines, deworming, and getting the calf used to eating from a feed bunk and drinking from a water tank. Preconditioned calves are generally considered to be at lower risk of disease upon arrival at a feedlot and may be less likely to need antibiotics at arrival.

A backgrounder operation is a farm or ranch that raises weaned calves prior to entering a feedlot. Calves on backgrounder operations learn to eat from a feed bunk and drink from a water tank, and they may undergo castration, dehorning, administration of vaccines, or other preconditioning practices. Backgrounded or preconditioned calves have recovered from the stress of weaning and tend to adapt more smoothly to a feedlot environment compared with freshly weaned calves.

1. Reliability of information

Compared with calves that have gone through a sale barn after leaving the operation of origin, calves that arrive at the feedlot directly from a cow-calf operation or backgrounding/stocker operation are more likely to have reliable information about preconditioning practices performed on the calves.

Less than half of feedlots had reliable information about preconditioning and backgrounding for all of the cattle placed for all breed and weight classes, with the exception of dairy breeds or dairy crossbreeds less than 400 lb at placement. These under 400 lb dairy breeds or crossbreeds often arrive at the feedlot directly from large operations that specialize in raising weaned dairy calves, so backgrounding information is often known for these cattle.

B.1.a. For feedlots that placed the following types of cattle on feed in 2020 (Table A.1.), percentage of feedlots by proportion of placed cattle for which reliable information about preconditioning and backgrounding was available:

Percent Feedlots									
Proportion of Cattle with Reliable Information about Preconditioning/Backgrounding									
Breed type and arrival weight (lb)	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Beef breed arrival weight (lb)									
Less than 400	25.7	(8.1)	16.5	(8.0)	11.5	(5.1)	46.2	(9.7)	100.0
400 to 699	16.9	(4.6)	12.0	(3.6)	26.6	(5.3)	44.5	(6.3)	100.0
700 or more	17.3	(5.4)	26.1	(6.5)	27.5	(6.8)	29.2	(6.7)	100.0
Dairy breed or dairy crossbreed arrival weight (lb)									
Less than 400	7.9	(3.3)	12.2	(6.3)	22.9	(8.6)	57.1	(9.9)	100.0
400 to 699	22.7	(9.3)	21.0	(8.8)	12.0	(5.5)	44.3	(11.3)	100.0
700 or more	20.3	(10.7)	17.9	(12.0)	23.4	(12.1)	38.3	(13.7)	100.0

There were no differences by feedlot capacity or region in the percentage of feedlots for which reliable information about preconditioning and backgrounding was available for any cattle of any placement weight or breed type.

B.1.b. For feedlots that placed the following types of cattle on feed in 2020 (Table A.1.), percentage of feedlots for which reliable information about preconditioning and backgrounding was available for any cattle* placed, by feedlot capacity and by region:

Breed type and arrival weight (lb)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any cattle	91.7	(2.8)	88.6	(6.8)	96.1	(2.5)	88.7	(3.8)	91.3	(2.6)
Less than 400	75.6	(9.1)	68.3	(18.4)	79.1	(11.0)	70.8	(11.4)	74.3	(8.1)
400 to 699	84.0	(5.0)	76.6	(8.8)	94.3	(3.2)	75.3	(7.2)	83.1	(4.6)
700 or more	81.5	(6.4)	88.9	(4.2)	93.6	(2.9)	74.8	(8.8)	82.7	(5.4)
Dairy breed or dairy crossbreed arrival weight (lb)										
Less than 400	96.7	(3.3)	78.4	(9.6)	78.3	(10.2)	95.0	(3.3)	92.1	(3.3)
400 to 699	77.0	(11.0)	78.8	(8.7)	88.0	(6.8)	73.0	(12.3)	77.3	(9.3)
700 or more	83.1	(12.0)	58.7	(15.5)	84.8	(9.4)	76.6	(15.6)	79.7	(10.7)

*Information being available for "Any cattle" means that information was available for some, most, or all cattle placed in the given breed type and arrival weight (Table B.1.a).

In some cases, cattle are born and raised at or by the feedlot operation, which can occur when feedlots also operate a cow-calf operation or a dairy. On one third of feedlots (33.3 percent), all cattle placed in 2020 were born and raised at or by the feedlot operation. On two-thirds of feedlots (66.7 percent), none or some of the cattle placed in 2020 were born and raised on the feedlot.

B.1.c. Percentage of feedlots by whether all cattle placed on the feedlot in 2020 were born and raised on the operation, and by feedlot capacity and region:

All cattle placed in 2020 born and raised on the operation	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Yes	35.7	(4.8)	15.0	(9.9)	41.5	(7.0)	28.8	(5.4)	33.3	(4.3)
No	64.3	(4.8)	85.0	(9.9)	58.5	(7.0)	71.2	(5.4)	66.7	(4.3)
Total	100.0		100.0		100.0		100.0		100.0	

For feedlots on which all cattle placed in 2020 were not born and raised on the operation (i.e., all or some of the cattle placed were from outside sources), preconditioning and backgrounding information of outside-source cattle was viewed as not important on a higher percentage of small feedlots (16.8 percent) compared with large feedlots (1.8 percent) and on a higher percentage of feedlots in the East (21.2 percent) than in the West (0.0 percent). A higher percentage of large feedlots (98.2 percent) than small feedlots (83.2 percent) and a higher percentage of feedlots in the West (100.0 percent) than in the East (78.8 percent) viewed preconditioning and backgrounding information as at least slightly important.

B.1.d. For the 66.7 percent of feedlots for which all or some cattle placed on the feedlot in 2020 were not born and raised on the operation (Table B.1.c.), percentage of feedlots by importance of having reliable information on the preconditioning and backgrounding of those outside-source cattle prior to arrival, and by feedlot capacity and region:

Importance	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Not important	16.8	(4.8)	1.8	(1.3)	0.0	(—)	21.2	(5.8)	14.6	(4.1)
Slightly important	7.4	(3.4)	16.7	(7.3)	7.7	(4.0)	9.3	(4.2)	8.8	(3.1)
Moderately important	24.6	(5.9)	15.9	(6.8)	24.0	(10.5)	23.0	(5.9)	23.3	(5.2)
Very important	27.8	(5.6)	42.3	(9.9)	39.6	(9.7)	25.6	(5.5)	30.0	(5.0)
Extremely important	23.4	(5.4)	23.4	(8.1)	28.7	(9.6)	20.9	(5.5)	23.4	(4.8)
Total	100.0		100.0		100.0		100.0		100.0	
At least slightly important*	83.2	(4.8)	98.2	(1.3)	100.0	(—)	78.8	(5.8)	85.4	(4.1)

*Includes feedlots indicating that having reliable information on preconditioning and backgrounding was slightly, moderately, very, or extremely important.

Preconditioning and backgrounding information is often not available, or only limited information is available, for cattle obtained at a sale barn. For feedlots that reported it was slightly, moderately, very, or extremely important to have reliable preconditioning and backgrounding information on outside-source cattle in 2020, slightly over half (58.3 percent) said they were able to access all of the desired preconditioning and backgrounding information on these cattle. A higher percentage of small (64.3 percent) than large (29.3 percent) feedlots were able to access all of the desired preconditioning and backgrounding information on outside-source cattle.

B.1.e. For the 57.0 percent* of feedlots that reported it was important to have reliable preconditioning and backgrounding information in 2020 (Table B.1.d.), percentage of feedlots that were able to access all of the desired preconditioning and backgrounding information, by feedlot capacity and by region:

Percent Feedlots									
Able to access information	Feedlot capacity (number head)				Region				
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct. Std. error
Yes	64.3	(6.9)	29.3	(8.1)	46.1	(11.3)	65.4	(6.9)	58.3 (6.0)
No	35.7	(6.9)	70.7	(8.1)	53.9	(11.3)	34.6	(6.9)	41.7 (6.0)
Total	100.0		100.0		100.0		100.0		100.0

*This estimate ($66.7 \times 0.854 = 57.0$) comes from the 66.7 percent of feedlots that had all or some cattle placed in 2020 not born and raised on the operation (Table B.1.c), of which 85.4 percent of feedlots reported it was slightly, moderately, very, or extremely important to have reliable preconditioning and backgrounding information (Table B.1.d).

For feedlots that were not able to access all of the desired preconditioning and backgrounding information on outside-source cattle, the highest percentage of feedlots (87.1 percent) said that information was not accessible because cattle were purchased at a sale barn where this information was not available.

B.1.f. For the 23.8 percent¹ of feedlots that were not able to access all of the desired preconditioning and backgrounding information in 2020 (Table B.1.e.), percentage of feedlots by reason that information was not accessible, and by feedlot capacity and region:

Reason	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Finding cattle to purchase for which this information is known is inconvenient	56.2	(12.3)	45.6	(12.4)	61.1	(12.0)	45.0	(13.8)	53.0	(9.2)
Cattle are purchased at a sale barn where this information is not available ²	88.4	(7.9)	84.1	(7.2)	91.3	(4.4)	83.0	(10.6)	87.1	(5.9)
Cattle for which this information is known are too expensive	20.0	(9.8)	24.9	(10.8)	25.3	(12.5)	17.7	(9.0)	21.5	(7.8)
There is no practical mechanism for transfer of this information	50.8	(12.7)	53.1	(12.6)	65.6	(12.8)	37.5	(12.4)	51.5	(9.7)
Other	14.8	(10.0)	11.4	(5.6)	19.0	(11.7)	8.6	(8.4)	13.8	(7.2)

¹This estimate ($66.7 \times 0.854 \times 0.417 = 23.8$) comes from the 66.7 percent of feedlots that had all or some cattle placed in 2020 not born and raised on the operation (Table B.1.c), of which 85.4 percent of feedlots reported it was slightly, moderately, very, or extremely important to have reliable preconditioning and backgrounding information (Table B.1.d), of which 41.7 percent of feedlots were not able to access all of the desired preconditioning and backgrounding information (Table B.1.e).

²For this question, there was no option for "Cattle are purchased at a sale barn where preconditioning or backgrounding information was available, but I chose not to use or trust this information." It is possible that some preconditioning or backgrounding information was available for respondents who chose this option, but they chose not to trust this information because the cattle originated from an operation with which they were not familiar, and they had no way to verify the information.

2. Procedures performed prior to arrival at feedlot

Tables B.2.a–B.2.c concern information known about cattle prior to arrival at the feedlot, so these tables are only applicable to feedlots that knew the history of cattle purchased or that raise their own calves on the operation.

Polled cattle naturally do not grow horns, and horned cattle naturally grow horns. Some cattle breeds are horned (e.g., Holstein), some breeds have both horned and polled varieties (e.g., Hereford, Simmental), and some breeds are naturally polled (e.g., Angus).

Of the feedlots that knew the history of cattle placed, 29.8 percent placed only naturally polled cattle. A higher percentage of small feedlots (32.8 percent) placed only naturally polled cattle compared with large feedlots (7.1 percent).

B.2.a. When feedlots were aware of the history of cattle placed, percentage of feedlots for which all cattle placed in 2020 were naturally polled (do not grow horns, such as Angus breeds), by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
32.8	(5.0)	7.1	(3.0)	31.3	(7.9)	28.9	(5.3)	29.8	(4.4)

Vaccination is a common preconditioning procedure. There are two main types of vaccines: modified-live (attenuated) and killed (inactivated). There are often both modified-live and killed vaccines available for viruses. Most vaccines against bacteria are bacterin or bacterin-toxoid products, which are killed vaccines. Modified-live vaccines contain a living organism that has been modified such that it does not cause disease in an animal. In killed vaccines, the target organism has been inactivated and is no longer living. Modified-live vaccines generally offer better and longer-lasting immunity compared with killed vaccines.

When feedlots were aware of the history of the cattle placed, there was no predominant procedure performed for all cattle prior to arrival at the feedlot. The “Don’t know” column in the table below indicates the feedlot did not know if that particular procedure had been performed prior to arrival, even though the history of the cattle was known.

B.2.b. When feedlots were aware of the history of the cattle placed, percentage of feedlots by proportion of those cattle that underwent the following preconditioning and backgrounding procedures prior to arrival at the feedlot in 2020:

Percent Feedlots											
Percentage of Cattle that Underwent the Procedure											
	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Don't know		Total
Procedure	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Introduction to a feed bunk	16.1	(3.7)	21.7	(3.9)	9.9	(2.8)	42.1	(4.9)	10.3	(2.9)	100.0
Given respiratory vaccines less than 2 weeks prior to or at weaning	30.2	(4.7)	11.3	(3.0)	8.5	(2.7)	31.1	(4.3)	19.0	(3.7)	100.0
Given respiratory vaccines more than 2 weeks prior to weaning	20.9	(3.9)	5.9	(1.9)	12.2	(3.0)	40.8	(4.9)	20.2	(3.8)	100.0
Given modified live, not killed, respiratory vaccines	9.7	(3.0)	6.6	(2.0)	12.3	(2.4)	43.3	(4.5)	28.1	(3.9)	100.0
Weaned 4–6 weeks before arrival at feedlot	37.8	(4.5)	16.6	(3.4)	7.1	(2.6)	23.0	(3.9)	15.6	(3.5)	100.0
Weaned more than 6 weeks before arrival at feedlot	36.6	(4.2)	10.8	(2.8)	4.9	(1.9)	32.3	(4.4)	15.3	(3.4)	100.0
Bull calves and/or bulls castrated at least 3 weeks prior to arrival at feedlot	14.5	(3.4)	6.4	(2.4)	15.5	(3.3)	57.6	(4.6)	6.0	(2.0)	100.0
Non-polled cattle dehorned at least 3 weeks prior to arrival at feedlot*	26.2	(5.4)	10.3	(3.5)	14.4	(3.7)	41.2	(5.3)	7.9	(2.7)	100.0
Treated for external or internal parasites	20.5	(3.7)	10.5	(2.7)	11.4	(3.2)	40.2	(4.8)	17.5	(3.5)	100.0
Given antibiotics within 4 weeks prior to arrival at feedlot	53.8	(4.7)	17.2	(3.7)	2.2	(1.3)	2.7	(1.5)	24.1	(4.0)	100.0

*Omitting the 29.8 percent of feedlots for which all placed cattle were naturally polled (do not grow horns, Table B.2.a).

When feedlots were aware of the history of the cattle placed, respiratory vaccines were given more than 2 weeks prior to weaning to most or all of the cattle on a higher percentage of small (56.6 percent) than large feedlots (25.4 percent).

B.2.c. When feedlots were aware of the history of the cattle placed, percentage of feedlots for which most (51 to 99 percent) or all (100 percent) cattle underwent the following preconditioning and backgrounding procedures prior to arrival at the feedlot in 2020, by feedlot capacity and by region:

Procedure	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Introduction to a feed bunk	54.3	(5.3)	34.3	(8.2)	39.1	(9.1)	59.1	(5.6)	52.0	(4.8)
Given respiratory vaccines less than 2 weeks prior to or at weaning	40.3	(4.9)	34.4	(10.1)	54.0	(9.1)	31.6	(5.0)	39.6	(4.6)
Given respiratory vaccines more than 2 weeks prior to weaning	56.6	(5.3)	25.4	(6.7)	47.2	(7.9)	56.1	(6.0)	52.9	(4.8)
Given modified live, not killed, respiratory vaccines	57.6	(5.1)	40.3	(9.9)	67.6	(6.7)	49.0	(5.9)	55.6	(4.5)
Weaned 4–6 weeks before arrival at feedlot	29.7	(4.8)	32.7	(9.9)	23.0	(7.8)	33.9	(5.6)	30.0	(4.5)
Weaned more than 6 weeks before arrival at feedlot	37.5	(5.1)	35.1	(8.4)	21.9	(7.3)	45.6	(6.0)	37.2	(4.6)
Bull calves and/or bulls castrated at least 3 weeks prior to arrival at feedlot	75.9	(4.3)	51.4	(10.0)	72.9	(6.2)	73.2	(4.8)	73.1	(3.8)
Non-polled cattle dehorned at least 3 weeks prior to arrival at feedlot*	57.2	(6.4)	46.8	(10.6)	48.6	(9.8)	59.4	(6.6)	55.6	(5.5)
Treated for external or internal parasites	53.2	(5.4)	38.8	(9.8)	64.1	(9.0)	44.6	(5.9)	51.5	(5.0)
Given antibiotics within 4 weeks prior to arrival at feedlot	5.0	(2.1)	4.1	(2.5)	1.4	(0.8)	6.8	(2.9)	4.9	(1.9)

*Omitting the 29.8 percent of feedlots for which all placed cattle were naturally polled (do not grow horns, Table B.2.a).

C. Initial Processing and Management

Cattle are often “processed” shortly after arrival to the feedlot where they are run through a chute and various procedures are performed, such as administering vaccines, deworming, applying identification, testing for diseases such as bovine viral diarrhea (BVD), applying growth promoting implants, castrating, dehorning, or treating high-risk cattle with antibiotics. Procedures performed at arrival processing can vary by feedlot. For example, some vaccines may only be needed in some parts of the U.S., and some feedlots may only obtain cattle that are already castrated and dehorned.

1. Bovine respiratory disease risk assessment

Bovine respiratory disease (BRD), also known as shipping fever or bronchopneumonia, is the leading cause of illness and death on U.S. feedlots. Transportation over long distances and commingling with cattle from other operations are stressors thought to contribute to development of BRD in newly arrived cattle on feedlots.

Feedlots were asked if cattle were assessed for risk of bovine respiratory disease when they arrived at the feedlot, leading to modification of arrival processing protocols based on this assessment. Overall, 43.2 percent of feedlots assessed cattle for BRD upon arrival and modified processing protocols based on assessment findings. While it appeared that a higher percentage of large feedlots assessed cattle for BRD upon arrival compared with small feedlots, these estimates are not different when taking standard errors into account.

C.1.a. Percentage of feedlots for which any cattle placed in 2020 were assessed for their risk for bovine respiratory disease when they arrived at the feedlot and had initial processing protocols modified based on this assessment, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
39.8	(4.8)	69.5	(10.6)	46.0	(6.4)	41.7	(5.8)	43.2	(4.4)

For feedlots that based initial processing protocols on a risk assessment for bovine respiratory disease, all feedlots viewed “appearance of cattle at arrival” and “presence of respiratory disease in some cattle in the group” as at least slightly important when making this risk assessment.

C.1.b. For the 43.2 percent of feedlots that based initial processing protocols on a risk assessment for bovine respiratory disease in 2020 (Table C.1.a.), percentage of feedlots by level of importance of the following factors when making the risk assessment:

Percent Feedlots											
Level of Importance											
	Not Important		Slightly Important		Moderately Important		Very Important		Extremely Important		Total
Factor	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Long shipping distance	22.4	(5.6)	12.8	(5.1)	20.1	(5.2)	29.4	(5.8)	15.3	(5.2)	100.0
Arrival weight class	15.1	(4.9)	11.6	(4.1)	25.1	(6.3)	34.3	(6.3)	14.0	(5.2)	100.0
Appearance of cattle at arrival	0.0	(—)	3.3	(3.1)	10.6	(4.1)	51.3	(7.3)	34.9	(6.8)	100.0
Respiratory disease in cattle previously received from same source	10.2	(4.4)	7.4	(3.9)	13.2	(4.9)	34.5	(6.5)	34.7	(7.2)	100.0
Presence of respiratory disease in some cattle in group	0.0	(—)	8.5	(4.4)	10.1	(3.8)	25.4	(6.2)	55.9	(7.3)	100.0
Whether cattle were commingled with other cattle prior to arrival	6.8	(3.2)	10.1	(4.2)	14.8	(5.4)	40.4	(6.8)	27.9	(6.2)	100.0
Geographic origin of the cattle	17.8	(5.4)	4.7	(2.5)	22.4	(6.3)	34.3	(6.9)	20.8	(6.1)	100.0
Lack of previous respiratory vaccination	8.3	(4.1)	10.8	(4.4)	14.2	(4.8)	29.3	(6.4)	37.4	(7.1)	100.0
Lack of preconditioning/backgrounding	13.2	(4.9)	8.0	(3.9)	14.3	(4.4)	42.8	(7.1)	21.7	(5.8)	100.0
Season of the year	18.8	(5.0)	7.6	(3.6)	21.5	(6.1)	37.7	(6.5)	14.5	(4.6)	100.0
Weather at time of arrival at the feedlot	9.4	(3.6)	16.9	(5.2)	18.8	(5.7)	41.5	(7.2)	13.3	(4.9)	100.0
Experience of receiving crew	14.7	(4.7)	13.7	(4.7)	12.9	(4.2)	33.3	(6.4)	25.6	(4.9)	100.0
Breed of cattle	23.3	(6.2)	18.9	(5.7)	38.1	(6.8)	14.8	(4.3)	4.8	(3.1)	100.0
History of prior antibiotic treatment	22.1	(5.8)	12.6	(3.8)	18.3	(5.5)	35.2	(6.7)	11.8	(4.7)	100.0
Other	90.0	(4.7)	0.0	(—)	0.3	(0.3)	3.4	(3.2)	6.3	(3.4)	100.0

For feedlots that based initial processing protocols on a risk assessment for bovine respiratory disease, a higher percentage of large feedlots (71.9 percent) than small feedlots (38.6 percent) considered long shipping distance as very or extremely important in making this risk assessment. Likewise, a higher percentage of feedlots in the West region (77.3 percent) than in the East region (25.2 percent) considered long shipping distance as very or extremely important in making this risk assessment.

C.1.c. For the 43.2 percent of feedlots that based initial processing protocols on a risk assessment for bovine respiratory disease in 2020 (Table C.1.a.), percentage of feedlots that considered the following factors as very or extremely important,* by feedlot capacity and by region:

Factor	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Long shipping distance	38.6	(7.8)	71.9	(8.0)	77.3	(9.5)	25.2	(7.7)	44.7	(6.6)
Arrival weight class	46.2	(8.5)	57.1	(10.4)	50.9	(12.5)	46.6	(8.8)	48.2	(7.3)
Appearance of cattle at arrival	85.0	(6.0)	91.0	(4.6)	84.7	(8.2)	87.0	(6.3)	86.1	(5.0)
Respiratory disease in cattle previously received from same source	68.3	(8.1)	73.0	(11.7)	70.0	(12.3)	68.7	(8.3)	69.2	(6.9)
Presence of respiratory disease in some cattle in group	81.8	(6.5)	79.5	(7.1)	82.1	(8.3)	80.9	(7.2)	81.4	(5.5)
Whether cattle were commingled with other cattle prior to arrival	67.8	(8.0)	70.5	(9.8)	57.3	(12.1)	74.9	(7.5)	68.3	(6.7)
Geographic origin of the cattle	51.3	(8.5)	71.8	(8.2)	62.4	(12.4)	50.7	(8.8)	55.1	(7.2)
Lack of previous respiratory vaccination	69.0	(7.3)	56.1	(11.3)	68.2	(9.5)	65.7	(8.5)	66.6	(6.4)
Lack of preconditioning/backgrounding	68.4	(7.1)	46.9	(10.2)	65.7	(9.4)	63.7	(8.2)	64.5	(6.2)
Season of the year	50.1	(8.5)	61.4	(9.2)	64.7	(11.8)	44.7	(8.9)	52.2	(7.2)
Weather at time of arrival at the feedlot	53.0	(8.4)	63.5	(9.2)	62.4	(11.9)	50.4	(8.8)	54.9	(7.1)
Experience of receiving crew	57.8	(7.7)	63.5	(10.2)	75.7	(8.5)	48.7	(9.0)	58.8	(6.5)
Breed of cattle	18.5	(6.1)	24.8	(7.4)	12.8	(4.1)	23.8	(7.7)	19.7	(5.1)
History of prior antibiotic treatment	50.6	(8.3)	31.3	(8.2)	32.1	(11.6)	56.0	(8.5)	47.0	(7.0)
Other	8.4	(4.9)	15.3	(12.3)	16.0	(10.4)	5.9	(3.7)	9.7	(4.6)

*Producers were asked to rate each factor as not, slightly, moderately, very, or extremely important (Table C.1.b).

2. Group processing

Group processing refers to running a pen or group of cattle through a chute to have one or more procedures performed on the cattle while they are immobilized in the chute. Group processing is often performed shortly after cattle arrive at a feedlot.

About two-thirds of feedlots (67.9 percent) processed all cattle as a group at or within four weeks of placement. About one-quarter of feedlots (24.1 percent) did not process any cattle as a group at placement.

C.2.a Percentage of feedlots by the proportion of cattle processed* as a group at, or within four weeks of, placement in 2020, excluding cattle processed individually for treating illness:

Percent Feedlots								
Proportion of Cattle Processed as a Group								Total
None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
24.1	(4.2)	3.4	(1.6)	4.7	(1.9)	67.9	(4.5)	100.0

*Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

There were no differences by feedlot capacity or by region in the percentage of feedlots that processed any cattle as a group within four weeks of placement.

C.2.b Percentage of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020, excluding cattle processed individually for treating illness, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
74.6	(4.7)	86.3	(9.9)	76.0	(7.3)	75.9	(5.1)	75.9	(4.2)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

Traditionally, feedlot cattle were processed on the day of arrival or shortly after arrival to the feedlot. Recent evidence has shown that postponing processing can be of benefit. Cattle may be able to respond to vaccination more effectively after recovering from the stress of transport.

For feedlots that processed any cattle as a group within four weeks of placement, the highest percentage (36.7 percent) processed all cattle less than 1 day after arrival (i.e., on the day of arrival). Only 11.7 percent of feedlots processed all cattle 14 to 28 days after arrival.

C.2.c. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by time period during which cattle were initially processed and by proportion of cattle processed as a group during that time period:

Percent Feedlots									
Proportion of Cattle Processed as a Group									
Time period	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Less than 1 day after arrival	51.3	(5.6)	7.6	(2.8)	4.4	(1.8)	36.7	(5.5)	100.0
1 to 3 day(s) after arrival	69.4	(4.8)	7.0	(2.2)	10.3	(3.0)	13.3	(3.7)	100.0
4 to 13 days after arrival	74.3	(4.5)	6.9	(1.6)	6.7	(2.4)	12.1	(3.8)	100.0
14 to 28 days after arrival	79.0	(4.5)	5.0	(2.3)	4.3	(2.1)	11.7	(3.7)	100.0

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

For feedlots that processed any cattle as a group within four weeks of placement, a higher percentage of small feedlots (52.4 percent) processed any cattle on the day of arrival compared with large feedlots (24.7 percent). A higher percentage of large feedlots than small feedlots processed any cattle 1 to 3 days after arrival (69.0 and 24.7 percent, respectively) and 4 to 13 days after arrival (59.5 and 20.5 percent, respectively).

C.2.d. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by time period during which any cattle³ were initially processed, and by feedlot capacity and region:

Percent Feedlots									
Time period	Feedlot capacity (number head)				Region				
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Std. error
Less than 1 day after arrival	52.4	(6.2)	24.7	(6.4)	55.6	(10.4)	45.0	(6.4)	48.7 (5.6)
1 to 3 day(s) after arrival	24.7	(5.3)	69.0	(10.1)	38.4	(8.2)	26.3	(5.9)	30.6 (4.8)
4 to 13 days after arrival	20.5	(4.8)	59.5	(9.8)	27.1	(7.5)	24.9	(5.7)	25.7 (4.5)
14 to 28 days after arrival	20.7	(5.2)	22.5	(6.9)	15.8	(7.5)	23.8	(5.7)	21.0 (4.5)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

³"Any cattle" means some, most, or all cattle were initially processed as a group in the given time period (Table C.2.c).

The arrival processing procedures performed by each feedlot often vary based on the feedlot veterinarian's recommendations. For feedlots that processed any cattle as a group within four weeks of placement, most feedlots vaccinated all cattle against BVD (80.8 percent), clostridial diseases (70.1 percent), or any respiratory diseases (87.6 percent), and 83.7 percent of feedlots administered a parasiticide to all cattle.

C.2.e. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by initial processing procedure and by proportion of cattle that underwent that procedure at initial processing:

Percent Feedlots									
Proportion of Cattle that Underwent Procedure									
Procedure	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Vaccinations									
Vaccination against bovine viral diarrhea (BVD)	14.8	(3.7)	2.6	(1.7)	1.9	(0.9)	80.8	(4.1)	100.0
Vaccination against clostridial diseases (e.g., blackleg)	19.2	(4.1)	4.5	(2.3)	6.3	(2.5)	70.1	(4.8)	100.0
Vaccination against tetanus	52.5	(5.6)	20.3	(4.4)	0.1	(0.1)	27.1	(5.3)	100.0
Vaccination against Moraxella (pinkeye)	71.2	(4.8)	9.9	(2.9)	4.0	(2.0)	14.9	(4.5)	100.0
Vaccination against any respiratory diseases	7.0	(2.8)	2.3	(1.6)	3.1	(1.4)	87.6	(3.5)	100.0
Other Procedures									
Testing for bovine viral diarrhea (BVD) infection	92.7	(2.8)	4.1	(2.2)	2.3	(1.4)	1.0	(1.0)	100.0
Implantation	27.4	(4.4)	11.2	(3.1)	11.6	(3.5)	49.9	(5.3)	100.0
Administration of a parasiticide	9.6	(3.0)	2.3	(1.4)	4.4	(1.9)	83.7	(3.5)	100.0
Administration of an immunostimulant (e.g., Zelnote®)	95.2	(2.2)	1.9	(0.7)	0.0	(—)	3.0	(2.1)	100.0
Individual weighing of the animal	61.4	(5.2)	7.6	(2.7)	0.5	(0.3)	30.6	(4.9)	100.0
Taking the temperature of the animal	76.3	(4.6)	19.8	(4.2)	1.5	(1.5)	2.4	(1.4)	100.0
Listening to lungs with stethoscope	94.5	(2.2)	5.3	(2.2)	0.0	(—)	0.2	(0.2)	100.0
Administration of injectable antibiotic	58.1	(5.1)	32.5	(4.6)	2.3	(1.2)	7.1	(2.6)	100.0
Administration of vitamin and/or mineral injection	80.5	(4.3)	10.5	(3.4)	1.5	(1.1)	7.5	(2.6)	100.0
Other procedure	83.6	(4.3)	7.1	(3.1)	1.6	(1.6)	7.7	(2.9)	100.0

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

For feedlots that processed any cattle as a group within four weeks of placement, a low percentage of feedlots tested any cattle for BVD infection (7.3 percent), administered an immunostimulant such as Zelnote® (4.8 percent), or listened to cattle lungs with a stethoscope (5.5 percent). A higher percentage of large feedlots vaccinated against BVD (98.0 percent) or administered an injectable antibiotic (72.7 percent) as an initial processing procedure compared with small feedlots (83.3 and 37.2 percent, respectively). A higher percentage of feedlots in the West administered a parasiticide (98.7 percent) compared with feedlots in the East (85.8 percent).

C.2.f. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by initial processing procedure performed on any cattle,³ and by feedlot capacity and region:

Procedure	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Vaccinations										
Vaccination against bovine viral diarrhea (BVD)	83.3	(4.3)	98.0	(1.5)	92.6	(5.8)	81.1	(4.9)	85.2	(3.7)
Vaccination against clostridial diseases (e.g., blackleg)	79.1	(4.7)	92.1	(3.6)	90.3	(5.8)	75.6	(5.5)	80.8	(4.1)
Vaccination against tetanus	45.5	(6.4)	60.2	(9.2)	46.8	(9.2)	47.9	(7.1)	47.5	(5.6)
Vaccination against Moraxella (pinkeye)	29.4	(5.8)	25.0	(9.8)	39.1	(9.0)	23.0	(5.5)	28.8	(4.8)
Vaccination against any respiratory diseases	92.3	(3.3)	98.0	(1.5)	93.9	(5.6)	92.5	(3.1)	93.0	(2.8)
Other Procedures										
Testing for bovine viral diarrhea (BVD) infection	7.0	(3.0)	9.8	(6.9)	5.9	(3.5)	8.1	(3.8)	7.3	(2.8)
Implantation	71.6	(5.3)	79.6	(9.7)	73.5	(5.9)	72.2	(6.0)	72.6	(4.4)
Administration of a parasiticide	91.2	(3.2)	85.4	(8.5)	98.7	(1.3)	85.8	(4.5)	90.4	(3.0)
Administration of an immunostimulant (e.g., Zelnote®)	4.2	(2.5)	9.1	(3.8)	9.2	(5.1)	2.3	(2.0)	4.8	(2.2)
Individual weighing of the animal	38.9	(6.0)	36.8	(8.7)	43.3	(8.3)	36.0	(6.6)	38.6	(5.2)
Taking the temperature of the animal	21.2	(4.8)	39.7	(10.2)	22.7	(8.2)	24.2	(5.6)	23.7	(4.6)
Listening to lungs with stethoscope	5.6	(2.6)	4.5	(2.4)	2.4	(1.6)	7.2	(3.4)	5.5	(2.2)
Administration of injectable antibiotic	37.2	(5.8)	72.7	(8.1)	40.3	(7.6)	42.8	(6.6)	41.9	(5.1)
Administration of vitamin and/or mineral injection	17.6	(4.7)	32.3	(8.6)	27.6	(9.0)	15.1	(4.5)	19.5	(4.3)
Other procedure	16.8	(4.9)	14.1	(7.1)	22.4	(8.4)	13.1	(4.8)	16.4	(4.3)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

³"Any cattle" means some, most, or all cattle underwent the procedure at initial processing (Table C.2.e).

Vaccines are given to cattle primarily for prevention and control of infectious diseases caused by viruses and bacteria. Viral respiratory vaccines used in cattle often contain antigens for infectious bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD), parainfluenza 3 (PI3), and bovine respiratory syncytial virus (BRSV). Two bacterial respiratory pathogens that feedlot cattle may be vaccinated against are *Mannheimia haemolytica* and *Pasteurella multocida*. Vaccines can be administered by injection or intranasally.

For feedlots that processed any cattle as a group within four weeks of placement, slightly over three-fourths (77.6 percent) administered an injectable vaccine against viral respiratory pathogens to all cattle while about a third (32.5 percent) gave an intranasal vaccine against viral respiratory pathogens to all cattle.

C.2.g. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by type of respiratory vaccine given and by proportion of cattle that were administered those vaccines at initial processing:

Percent Feedlots									
Proportion of Cattle Given the Respiratory Vaccine									
	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Total
Type of respiratory vaccine	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Injectable vaccination against viral respiratory disease	14.3	(4.0)	3.7	(2.0)	4.4	(1.9)	77.6	(4.8)	100.0
Intranasal vaccination against viral respiratory disease	48.0	(5.7)	14.9	(3.6)	4.6	(2.2)	32.5	(5.6)	100.0
Vaccination against bacterial respiratory disease due to <i>Mannheimia</i> and/or <i>Pasteurella</i>	36.2	(5.1)	9.7	(3.1)	3.2	(1.3)	50.9	(5.6)	100.0

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

For feedlots that processed any cattle as a group within four weeks of placement, there were no differences by feedlot capacity or region in the percentage of feedlots that used each type of respiratory vaccine for any cattle. A higher percentage of feedlots gave injectable vaccines against viral respiratory pathogens (85.7 percent) compared with the percentage that gave intranasal vaccines against viral respiratory pathogens (52.0 percent) or that gave vaccines against bacterial respiratory disease due to *Mannheimia* and/or *Pasteurella* (63.8 percent).

C.2.h. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by type of respiratory vaccine given to any cattle,³ and by feedlot capacity and region:

Type of respiratory vaccine	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Injectable vaccination against viral respiratory disease	85.9	(4.2)	84.6	(10.0)	87.5	(7.3)	84.7	(4.7)	85.7	(4.0)
Intranasal vaccination against viral respiratory disease	49.4	(6.3)	68.4	(8.0)	42.9	(10.5)	57.3	(6.6)	52.0	(5.7)
Vaccination against bacterial respiratory disease due to <i>Mannheimia</i> and/or <i>Pasteurella</i>	63.7	(5.9)	64.9	(10.5)	64.0	(9.1)	63.7	(6.1)	63.8	(5.1)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

³"Any cattle" means some, most, or all cattle were administered the given type of respiratory vaccine within 4 weeks of placement (Table C.2.g).

Heifers may get pregnant if they are kept in the same pen as bulls or bull calves that have reached puberty. For feedlots that processed any cattle as a group within four weeks of placement, the majority of feedlots did not perform a pregnancy check on heifers (67.1 percent) or administer an abortifacient (a drug that causes abortion, such as prostaglandin) to heifers (60.1 percent) at arrival.

C.2.i. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by initial processing procedure for heifers and by proportion of heifers that underwent that procedure at initial processing:

Percent Feedlots											
Proportion of Heifers on Which Procedure Was Performed											
Procedure	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		No heifers placed or no heifers processed as part of a group		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Pregnancy check at arrival	67.1	(4.8)	4.9	(0.8)	4.7	(2.5)	1.4	(1.1)	21.9	(4.2)	100.0
Administered an abortifacient such as prostaglandin at arrival	60.1	(5.1)	14.5	(3.4)	2.2	(1.4)	1.3	(1.0)	21.9	(4.2)	100.0

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

For feedlots that processed any heifers as a group within four weeks of placement, a higher percentage of large feedlots performed a pregnancy check (51.5 percent) or administered an abortifacient (57.9 percent) on any heifers at arrival compared with small feedlots (7.8 and 17.3 percent, respectively).

C.2.j. For the 59.3 percent¹ of feedlots that processed² any heifers³ as part of a group at, or within four weeks of, placement in 2020 (Table C.2.i.), percentage of feedlots by initial processing procedure for any heifers,⁴ and by feedlot capacity and region:

Percent Feedlots												
Procedure	Feedlot capacity (number head)					Region						
	Small		Large			West		East		All feedlots		
	(50-999)		(1,000 or more)									
	Pct.	Std. error	Pct.	Std. error			Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Pregnancy check at arrival	7.8	(3.8)	51.5	(10.6)			18.7	(4.5)	10.9	(5.4)	14.1	(3.6)
Administered an abortifacient such as prostaglandin at arrival	17.3	(5.1)	57.9	(11.1)			25.1	(6.4)	21.7	(6.6)	23.1	(4.7)

¹This estimate $(75.9 \times ((100 - 21.9) / 100) = 59.3)$ comes from the 75.9 percent of feedlots that processed any cattle as a group at, or within four weeks of, placement (Table C.2.b.), of which 78.1 percent of feedlots processed any heifers as part of a group at, or within four weeks of, placement (Table C.2.i.).

²Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

³"Any heifers" means some, most, or all heifers were processed as a group within 4 weeks of placement (Table C.2.i.).

⁴"Any heifers" means some, most, or all heifers underwent the given procedure within 4 weeks of placement (Table C.2.i.).

Castration is one of the preconditioning practices recommended before bull calves leave the cow-calf operation of origin. Castration involves removing the testicles surgically or through placing a rubber band above the testicles, which causes them to fall off. In general, bull calves should be castrated as early as possible. Castration makes male calves less aggressive and safer for producers to work around, and it also improves meat quality. For feedlots that processed any cattle as a group within four weeks of placement, over half of these feedlots (58.4 percent) did not need to castrate male calves at arrival processing because calves were castrated prior to arrival.

C.2.k. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by proportion of male³ calves that arrived at the feedlot uncastrated:

Percent Feedlots									
Proportion of Male Calves That Arrived at the Feedlot Uncastrated									
None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		No male calves placed or no male calves processed as part of a group	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
58.4	(5.4)	25.1	(4.6)	6.2	(2.5)	9.1	(3.3)	1.3	(1.1)
								Total	Pct.
									100.0

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

³The questionnaire asked for the proportion of "bulls and bull calves" that arrived at the feedlot uncastrated. This was an error, and it should have asked about "male" calves instead.

For feedlots that processed any male calves as a group within four weeks of placement, a higher percentage of large feedlots (72.5 percent) had at least some male calves arrive at the feedlot uncastrated compared with small feedlots (36.1 percent).

C.2.l. For the 74.9 percent¹ of feedlots that processed² any male calves³ as part of a group at, or within four weeks of, placement in 2020 (Table C.2.k.), percentage of feedlots with any male calves that arrived at the feedlot uncastrated, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)					Region				
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
36.1	(5.9)	72.5	(7.6)	53.5	(10.6)	33.8	(6.1)	40.9	(5.5)

¹This estimate ($75.9 \times 0.987 = 74.9$) comes from the 75.9 percent of feedlots that processed any cattle as a group at, or within four weeks of, placement (Table C.2.b.), of which 98.7 percent of feedlots processed any male calves as part of a group at, or within four weeks of, placement (Table C.2.k.).

²Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

³"Any male calves" means some, most, or all male calves were processed as a group within 4 weeks of placement (Table C.2.k.).

Cattle born with horns are often dehorned as calves. Removing horns reduces the risk of injury to other cattle and to people who handle the cattle and reduces bruising on carcasses. Some beef breeds, such as Angus, are naturally polled, meaning they do not grow horns. Dehorning refers to removing horns at the base of the head while tipping refers to cutting off the pointed end or tip of the horn.

Note that table B.2.a. shows that 29.8 percent of feedlots placed only naturally polled cattle, and table C.2.a. shows that 24.1 percent of feedlots did not process any cattle as a group. This study did not capture the percentage of cattle that arrived at the feedlot with horns. Note that feedlots could have performed both tipping and dehorning on the operation, but no single animal would have both of these procedures performed on it.

For feedlots that processed any cattle as a group within four weeks of placement, there were no differences in the percentage of feedlots that dehorned none, some, most, or all cattle arriving at the feedlot with horns compared with the percentage of feedlots that tipped none, some, most, or all cattle, respectively.

C.2.m. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots by dehorning method for horned cattle and proportion of horned cattle that underwent that procedure at initial processing:

Percent Feedlots										
Proportion of Horned Cattle Dehorned or Tipped										
Procedure	None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		No horned cattle placed or no horned cattle processed as part of a group	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
	Total		Total		Total		Total		Total	
Dehorned	16.6	(3.7)	14.2	(4.3)	2.1	(1.6)	14.7	(3.8)	52.3	(4.9)
Tipped	29.0	(4.8)	6.0	(2.5)	5.8	(2.6)	6.9	(2.9)	52.3	(4.9)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²"Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

For feedlots that processed any cattle as a group within four weeks of placement, there were no differences by feedlot capacity or by region in the percentage of feedlots performing dehorning or tipping of any horned cattle.

C.2.n. For the 36.2 percent¹ of feedlots that processed² any horned cattle³ as part of a group at, or within four weeks of, placement in 2020 (Table C.2.m.), percentage of feedlots by dehorning procedure used for horned cattle,⁴ and by feedlot capacity and region:

Percent Feedlots										
Procedure	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Dehorned	70.9	(8.4)	44.9	(11.3)	56.1	(12.2)	75.2	(8.7)	65.1	(7.6)
Tipped	36.0	(9.4)	49.9	(11.2)	49.8	(10.4)	27.1	(9.8)	39.1	(7.1)
Dehorned or tipped	89.1	(5.7)	80.6	(7.1)	85.7	(7.1)	88.9	(5.9)	87.2	(4.7)

¹ This estimate ($47.7 \times 0.759 = 36.2$) comes from the 75.9 percent of feedlots that processed any cattle as a group at, or within four weeks of, placement (Table C.2.b.), of which 47.7 percent of feedlots processed any horned cattle as part of a group at, or within four weeks of, placement (Table C.2.m.).

²Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

³ "Any horned cattle" means some, most, or all horned cattle were processed as a group within 4 weeks of placement (Table C.2.m.).

⁴ "Horned cattle" means some, most, or all horned cattle underwent the given procedure within 4 weeks of placement (Table C.2.m.).

3. Changes in group processing procedures due to COVID-19

It is possible that feedlots could have processed a different proportion of cattle as a group at arrival in 2020 during COVID-19 compared with 2019 due to various reasons such as labor availability. A very small percentage of feedlots (2.8 percent) reported processing a different proportion of cattle in 2020 compared to 2019 due to COVID-19 or its effects.

C.3.a. Percentage of feedlots that reported processing a different proportion of cattle as a group in 2020 compared to the proportion of cattle processed as a group in 2019 due to COVID-19 or its effects, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
2.1	(1.2)	7.8	(3.2)	3.5	(1.2)	2.3	(1.7)	2.8	(1.1)

For feedlots that processed a different proportion of cattle as a group in 2020 compared to 2019 due to COVID-19 or its effects, most of these feedlots (81.0 percent) processed a lower proportion of cattle in 2020 compared with 2019.

C.3.b. For the 2.8 percent of feedlots that processed a different proportion of cattle as a group in 2020 compared to 2019 due to COVID-19 or its effects (Table C.3.a.), percentage of feedlots by change in the proportion of cattle processed as a group in 2020 compared to 2019:

Percent Feedlots		
Change	Pct.	Std. error
More than 2019	19.0	(9.4)
Less than 2019	81.0	(9.4)
Total	100.0	

COVID-19 did not appear to affect processing procedures performed for newly arrived cattle. For feedlots that processed any cattle as a group within four weeks of placement, only 0.2 percent reported changing arrival processing procedures in 2020 compared with 2019 due to COVID-19 or its effects.

C.3.c. For the 75.9 percent of feedlots that processed¹ any cattle² as a group at, or within four weeks of, placement in 2020 (Table C.2.b.), percentage of feedlots that changed arrival processing procedures in 2020 compared to 2019 due to COVID-19 or its effects:

Percent Feedlots	
Pct.	Std. error
0.2	(0.2)

¹Processing includes procedures such as deworming, castration, dehorning, implanting, ear tagging, and administering vaccines, antibiotics, vitamins, or minerals.

²Any cattle" means some, most, or all cattle were processed as a group within 4 weeks of placement (Table C.2.a).

4. Pen-riding or walking frequency

Most sickness in feedlot cattle occurs early in the feeding period. Animals arriving at the feedlot must transition from their home environment to that of the feedlot. This transition frequently involves transport, sometimes over long distances; mixing with or exposure to animals from other sources (commingling); diet changes; and handling during processing. The transition can be stressful and result in exposure to pathogens to which the cattle are not immune. Large feedlots often have employees who monitor pens of cattle on horseback (pen riders) searching for signs of illness or other issues. On smaller feedlots, this may be accomplished by walking rather than riding on horseback. Since the highest risk period for illness or nonadaptation to the feedlot environment occurs soon after arrival, some feedlots use protocols for observing animals early in the feeding period that differ from those used later in the feeding period.

A higher percentage of feedlots performed pen-riding or walking procedures more than twice a day for cattle at the feedlot less than 15 days (17.4 percent) compared with cattle at the feedlot 30 days or more (4.1 percent).

C.4.a. Percentage of feedlots by frequency of pen-riding or walking procedures in 2020, and by time period of cattle at feedlot:

Percent Feedlots										
Frequency of Pen-Riding or Walking Procedures										
Time period	Less than once a day		Once a day		Twice a day		More than twice a day		No standard procedure	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
New arrivals (at feedlot less than 15 days)	0.0	(—)	32.0	(4.4)	45.4	(5.0)	17.4	(3.9)	5.3	(2.5)
Animals at feedlot 15 to 29 days	0.3	(0.2)	49.5	(4.7)	36.9	(4.2)	8.1	(2.6)	5.3	(2.5)
Animals at feedlot 30 days or more	12.1	(3.2)	52.2	(5.0)	26.4	(4.2)	4.1	(1.9)	5.3	(2.5)

No feedlots conducted pen-riding or walking procedures less than once a day for new arrivals. There were no differences by feedlot capacity or by region in the percentage of feedlots performing pen-riding or walking once a day, twice a day, or more than twice a day.

C.4.b. [A15] Percentage of feedlots by frequency of pen-riding or walking procedures for **new arrivals** (cattle at feedlot less than 15 days) in 2020, by feedlot capacity and by region:

Percent Feedlots										
Frequency	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than once a day	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Once a day	30.5	(4.9)	42.6	(9.1)	41.7	(7.8)	26.6	(5.4)	32.0	(4.4)
Twice a day	44.8	(5.4)	49.3	(10.0)	39.6	(9.2)	48.6	(5.9)	45.4	(5.0)
More than twice a day	18.7	(4.4)	8.1	(6.5)	10.5	(5.8)	21.3	(5.2)	17.4	(3.9)
No standard procedure	6.0	(2.8)	0.0	(—)	8.3	(5.8)	3.6	(2.2)	5.3	(2.5)
Total	100.0		100.0		100.0		100.0		100.0	

For cattle at the feedlot for 15 to 29 days, a higher percentage of large than small feedlots (76.0 and 46.0 percent, respectively) conducted pen-riding or walking procedures once a day, and a higher percentage of small than large feedlots (39.8 and 14.7 percent, respectively) conducted pen-riding or walking procedures twice a day.

C.4.c. Percentage of feedlots by frequency of pen-riding or walking procedures for **cattle at the feedlot for 15 to 29 days** in 2020, by feedlot capacity and by region:

Percent Feedlots										
Frequency	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than once a day	0.0	(—)	2.4	(1.6)	0.6	(0.5)	0.1	(0.1)	0.3	(0.2)
Once a day	46.0	(5.2)	76.0	(8.2)	75.9	(8.2)	34.8	(5.7)	49.5	(4.7)
Twice a day	39.8	(4.8)	14.7	(5.7)	10.2	(4.8)	51.7	(5.9)	36.9	(4.2)
More than twice a day	8.2	(2.8)	6.9	(6.5)	5.0	(3.7)	9.8	(3.4)	8.1	(2.6)
No standard procedure	6.0	(2.8)	0.0	(—)	8.3	(5.8)	3.6	(2.2)	5.3	(2.5)
Total	100.0		100.0		100.0		100.0		100.0	

A majority of feedlots (52.2 percent) conducted pen-riding or walking procedures once a day for cattle at the feedlot 30 days or more. A higher percentage of feedlots in the West region (28.0 percent) than in the East region (3.2 percent) conducted pen-riding or walking procedures less than once a day for cattle at the feedlot for 30 days or more. A higher percentage of feedlots in the East region (35.7 percent) than in the West region (9.7 percent) conducted pen-riding or walking procedures more than twice a day for cattle at the feedlot for 30 days or more.

C.4.d. Percentage of feedlots by frequency of pen-riding or walking procedures for **cattle at the feedlot for 30 days or more** in 2020, by feedlot capacity and by region:

Percent Feedlots										
Frequency	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than once a day	9.1	(3.3)	34.8	(11.3)	28.0	(8.3)	3.2	(2.0)	12.1	(3.2)
Once a day	52.4	(5.6)	50.7	(10.0)	50.1	(8.6)	53.3	(6.1)	52.2	(5.0)
Twice a day	28.9	(4.7)	7.7	(4.8)	9.7	(4.9)	35.7	(5.9)	26.4	(4.2)
More than twice a day	3.7	(1.9)	6.9	(6.5)	3.9	(3.5)	4.2	(2.1)	4.1	(1.9)
No standard procedure	6.0	(2.8)	0.0	(—)	8.3	(5.8)	3.6	(2.2)	5.3	(2.5)
Total	100.0		100.0		100.0		100.0		100.0	

D. Weather-Related Stress Mitigation

Extreme heat in the summer or cold in the winter can affect cattle performance. Wind breaks, which can be fences, trees, or shrubs that block winter winds, can reduce cold stress. The other methods in the table below are primarily used to alleviate heat stress in the summer. Building mounds refers to the practice of constructing small sloping hills in feedlot pens to provide a comfortable, dry resting place for cattle in muddy conditions. Evidence shows some feed additives such as yeast may reduce heat stress in cattle.

There were no differences by feedlot capacity or region in the percentage of feedlots that used wind breaks or feed additives to mitigate weather-related stress, with three-quarters (75.6 percent) of feedlots using wind breaks and 22.6 percent using feed additives. A higher percentage of large feedlots used mounds (70.4 percent) or sprinklers, misters, or water trucks (46.3 percent) to mitigate weather-related stress compared with small feedlots (40.8 and 8.1 percent, respectively). A higher percentage of small feedlots (84.1 percent) provided shade/shelter to cattle compared with large feedlots (58.4 percent).

D.1. Percentage of feedlots by type of weather-related stress mitigation methods used in 2020, and by feedlot capacity and region:

Percent Feedlots										
Method	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Shade/shelter	84.1	(2.9)	58.4	(9.9)	54.1	(6.8)	96.0	(2.2)	81.1	(2.8)
Sprinklers, misters, and/or water trucks	8.1	(3.3)	46.3	(9.8)	28.1	(7.9)	4.0	(2.4)	12.6	(3.2)
Wind breaks	76.8	(4.2)	66.5	(8.7)	83.6	(5.3)	71.1	(5.1)	75.6	(3.8)
Building mounds	40.8	(4.2)	70.4	(9.6)	84.9	(6.2)	21.8	(4.8)	44.3	(3.8)
Feed additives, such as yeast, essential oils, or pepper extract	21.3	(4.4)	32.9	(10.0)	36.8	(8.7)	14.8	(4.1)	22.6	(4.0)
Other	31.5	(5.3)	21.4	(8.8)	33.5	(9.4)	28.6	(5.6)	30.3	(4.9)

E. Disease Conditions

For the occurrence of disease conditions included in this report, there were no requirements that the disease be confirmed via necropsy, testing, or other means. Thus, while testing, necropsy, or veterinary diagnosis could have been used in the respondents' assessments as to whether a disease occurred, these determinations could have been based on respondents' perceptions based on past experience.

1. Bovine respiratory disease

Respiratory disease (bovine respiratory disease, shipping fever) is the most common cause of morbidity and mortality on cattle feedlots. Often, respiratory disease is caused by co-infections with viruses such as bovine respiratory syncytial virus (BRSV) or infectious bovine rhinotracheitis (IBR) virus, and bacteria such as *Mannheimia haemolytica* or *Pasteurella multocida*. Cattle experiencing respiratory disease usually reduce feed intake, and a percentage of these animals die, making respiratory disease costly for the feedlot industry.

About three-fourths of feedlots (77.5 percent) experienced at least one case of respiratory disease in 2020, with a higher percentage of large feedlots (98.8 percent) experiencing at least one case of respiratory disease in 2020 compared with small feedlots (74.7 percent).

E.1.a. For feedlots that placed any cattle on feed in each of the following arrival weight classes in 2020 (Table A.1.), percentage of feedlots on which any cattle were affected with bovine respiratory disease, by arrival weight, and by feedlot capacity and region:

	Percent Feedlots									
	Feedlot capacity (number head)					Region				
	Small (50-999)		Large (1,000 or more)				West		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Arrival weight (lb)										
Less than 400	53.8	(10.6)	93.6	(4.2)	66.6	(16.4)	60.7	(10.7)	62.6	(9.0)
400 to 699	64.1	(7.0)	96.6	(2.1)	81.7	(9.7)	57.2	(8.4)	67.6	(6.3)
700 or more	40.7	(9.3)	96.9	(2.4)	50.7	(13.1)	48.1	(11.0)	49.3	(8.4)
Any arrival weight	74.7	(4.7)	98.8	(0.8)	86.4	(7.2)	72.6	(5.2)	77.5	(4.2)

A higher percentage of cattle under 400 lb at arrival (25.9 percent) developed respiratory disease in 2020 compared with cattle 700 lb or more at arrival (9.6 percent). On small feedlots, there were no differences by arrival weight in the percentage of cattle affected by respiratory disease, but on large feedlots, a higher percentage of cattle under 400 lb at arrival (31.0 percent) were affected by respiratory disease in 2020 compared with cattle 700 lb or more at arrival (10.4 percent). Overall, 12.2 percent of cattle were affected with respiratory disease in 2020.

E.1.b. For feedlots that placed any cattle on feed in each of the following arrival weight classes in 2020 (Table A.1.), percentage of cattle that were affected with bovine respiratory disease, by arrival weight, and by feedlot capacity and region:

Percent Cattle*										
Arrival weight (lb)	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 400	6.7	(2.9)	31.0	(6.2)	27.4	(9.6)	24.4	(5.4)	25.9	(5.5)
400 to 699	6.8	(1.7)	17.8	(1.0)	16.5	(1.2)	5.8	(1.6)	14.8	(1.4)
700 or more	3.3	(0.8)	10.4	(1.7)	10.2	(1.7)	3.9	(0.9)	9.6	(1.7)
Any arrival weight	6.4	(1.1)	13.5	(1.3)	12.7	(1.4)	9.8	(2.5)	12.2	(1.3)

*As a percentage of cattle placed in that arrival weight class during 2020.

Almost all large feedlots (98.8 percent) and slightly more than half (56.6 percent) of small feedlots had at least one animal die due to bovine respiratory disease in 2020. A higher percentage of large feedlots had at least one animal die due to bovine respiratory disease than small feedlots for all arrival weight classes.

E.1.c. For feedlots that placed any cattle on feed in each of the following arrival weight classes in 2020 (Table A.1.), percentage of feedlots on which any cattle died due to bovine respiratory disease, by arrival weight, and by feedlot capacity and region:

Percent Feedlots										
Arrival weight (lb)	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 400	39.5	(10.2)	93.6	(4.2)	62.6	(16.4)	46.1	(10.8)	51.4	(9.0)
400 to 699	46.6	(7.3)	96.6	(2.1)	55.7	(11.1)	49.2	(8.7)	52.0	(6.8)
700 or more	27.3	(8.1)	95.5	(2.8)	41.4	(11.5)	34.8	(10.3)	37.8	(7.6)
Any arrival weight	56.6	(5.6)	98.8	(0.9)	63.5	(9.9)	60.6	(6.0)	61.6	(5.2)

Overall, 1.4 percent of cattle placed in 2020 died of bovine respiratory disease. There were no differences by feedlot capacity or region in the percentage of cattle that died within each arrival weight class.

E.1.d. For feedlots that placed any cattle on feed in each of the following arrival weight classes in 2020 (Table A.1.), percentage of cattle that died due to bovine respiratory disease, by arrival weight, and by feedlot capacity and region:

Percent Cattle ¹										
Arrival weight (lb)	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 400	1.0	(0.4)	7.3	(3.3)	(D) ²	(D)	(D)	(D)	6.0	(2.9)
400 to 699	0.7	(0.1)	2.0	(0.2)	1.8	(0.2)	1.0	(0.3)	1.6	(0.2)
700 or more	0.4	(0.1)	0.9	(0.2)	0.8	(0.2)	0.5	(0.1)	0.8	(0.2)
Any arrival weight	0.8	(0.1)	1.6	(0.3)	1.2	(0.2)	2.7	(1.3)	1.4	(0.3)

¹As a percentage of cattle placed in that arrival weight class during 2020.

²Values of (D) denote too few to report.

2. Change in bovine respiratory disease occurrence due to COVID-19

In the early days of the pandemic caused by COVID-19, many slaughter plants were closed or operating at reduced capacity, which may have caused some cattle to be held at the feedlot longer than usual. Any extra time that cattle spent at the feedlot due to COVID-19 did not seem to affect the occurrence of respiratory disease since only 3.8 percent of feedlots reported that the percentage of cattle affected with bovine respiratory disease was different in 2020 compared to 2019.

E.2.a. Percentage of feedlots for which the overall percentage of cattle affected with bovine respiratory disease in 2020 was different than the overall percentage of cattle affected with bovine respiratory disease in 2019 due to COVID-19 or its effects, by feedlot capacity and by region:

Percent Feedlots										
Feedlot capacity (number head)				Region						
Small (50-999)		Large (1,000 or more)		West		East		All feedlots		
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Std. error
2.9	(1.6)	10.3	(8.8)	3.4	(3.2)	3.9	(2.2)	3.8	(1.8)	

During development of this question, NAHMS hypothesized that if cattle spent a longer period on feedlots due to the effects of COVID-19 on slaughter capacity, these cattle would have an increased opportunity to develop respiratory disease. However, for the 3.8 percent of feedlots for which the percentage of cattle affected with bovine respiratory disease was different in 2020 compared with 2019 due to COVID-19 or its effects, most of those feedlots (97.8 percent) reported that the percentage of cattle affected with respiratory disease was lower in 2020 compared with 2019.

E.2.b. For the 3.8 percent of feedlots for which the overall percentage of cattle affected with bovine respiratory disease was different in 2020 compared with 2019 due to COVID-19 or its effects (Table E.2.a), percentage of feedlots by change in the percentage of cattle with bovine respiratory disease in 2020 compared to 2019:

Percent Feedlots		
Change	Pct.	Std. error
More than 2019	2.2	(2.3)
Less than 2019	97.8	(2.3)
Total	100.0	

3. Other disease conditions

A higher percentage of large feedlots experienced at least one case of acute interstitial pneumonia, foot rot, central nervous system disease, pinkeye, or cardiovascular disease compared with small feedlots. Large feedlots have more animals, so it is understandable that they are more likely to experience at least one case of a disease compared with small feedlots. This is the first NAHMS study to ask about occurrence of papillomatous digital dermatitis (hairy heel wart) and cardiovascular disease. The latter has emerged as a disease of concern in feedlots due to cattle being raised to steadily increasing weights.

E.3.a. Percentage of feedlots on which any cattle developed the following conditions in 2020, by condition, and by feedlot capacity and region:

Percent Feedlots										
Condition	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	30.4	(4.9)	73.9	(9.1)	47.4	(8.5)	28.9	(5.5)	35.6	(4.7)
Bloat	39.8	(5.4)	70.2	(10.3)	53.5	(8.7)	37.7	(5.9)	43.4	(4.9)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	29.0	(5.0)	53.6	(10.2)	33.8	(8.3)	30.9	(5.6)	31.9	(4.7)
Foot rot (infectious pododermatitis)	30.9	(4.6)	67.9	(10.1)	45.5	(7.9)	29.5	(4.9)	35.2	(4.2)
Hairy heel wart (papillomatous digital dermatitis)	7.9	(2.6)	11.0	(4.0)	6.1	(2.9)	9.5	(3.2)	8.3	(2.3)
Central nervous system (CNS) disease (e.g., polio, listeriosis, “brainers”)	5.4	(2.2)	64.4	(9.1)	22.8	(6.7)	6.3	(2.4)	12.2	(2.8)
Pinkeye	38.1	(5.2)	68.4	(8.6)	58.6	(9.5)	32.2	(5.5)	41.7	(4.9)
Cardiovascular disease (e.g., heart failure, brisket disease)	10.3	(3.4)	52.8	(10.1)	26.6	(6.8)	8.9	(3.6)	15.2	(3.4)
Fatigued cattle syndrome	3.0	(1.6)	13.8	(9.0)	5.3	(3.5)	3.7	(2.1)	4.2	(1.8)
Other	13.2	(3.9)	14.7	(6.7)	12.9	(6.1)	13.6	(4.4)	13.3	(3.5)
Any of the above	80.1	(4.1)	93.1	(6.5)	91.2	(6.2)	76.2	(4.8)	81.6	(3.8)

There were no differences by feedlot capacity or by region in the percentage of cattle that developed any of the diseases in the table below.

E.3.b. Percentage of cattle that developed the following conditions in 2020, by condition, and by feedlot capacity and region:

Condition	Percent Cattle*									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	0.7	(0.3)	1.8	(0.8)	1.7	(0.7)	1.2	(0.4)	1.6	(0.6)
Bloat	0.8	(0.3)	0.5	(0.1)	0.5	(0.1)	0.9	(0.4)	0.6	(0.1)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	8.9	(6.4)	0.4	(0.2)	2.0	(1.5)	1.4	(0.5)	1.9	(1.3)
Foot rot (infectious pododermatitis)	2.8	(1.0)	0.7	(0.3)	1.0	(0.4)	2.0	(0.8)	1.1	(0.4)
Hairy heel wart (papillomatous digital dermatitis)	0.8	(0.4)	0.1	(0.1)	0.1	(0.1)	1.1	(0.5)	0.3	(0.1)
Central nervous system (CNS) disease (e.g., polio, listeriosis, "brainers")	0.3	(0.2)	0.1	(0.0)	0.1	(0.0)	0.4	(0.2)	0.1	(0.1)
Pinkeye	4.2	(1.5)	1.4	(1.1)	1.7	(1.1)	3.1	(1.3)	1.9	(1.0)
Cardiovascular disease (e.g., heart failure, brisket disease)	0.5	(0.4)	0.3	(0.1)	0.4	(0.1)	0.1	(0.0)	0.3	(0.1)
Fatigued cattle syndrome	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
Other	0.1	(0.0)	0.0	(0.0)	0.0	(0.0)	0.1	(0.1)	0.0	(0.0)

*As a percentage of total cattle placed during 2020.

4. Change in other disease conditions due to COVID-19

Low percentages of feedlots reported that the percentage of cattle affected with the conditions in the table below in 2020 was different than the percentage of cattle affected with the conditions in 2019 due to COVID-19 or its effects.

E.4.a. Percentage of feedlots for which the overall percentage of cattle affected with the given condition in 2020 was different than the overall percentage of cattle affected with the condition in 2019 due to COVID-19 or its effects, by condition, and by feedlot capacity and region:

Condition	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	0.8	(0.7)	16.9	(9.0)	5.5	(3.3)	1.1	(1.0)	2.7	(1.4)
Bloat	0.0	(—)	13.0	(9.1)	4.2	(3.3)	0.0	(—)	1.5	(1.2)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	0.0	(—)	10.6	(9.1)	3.4	(3.2)	0.0	(—)	1.2	(1.2)
Foot rot (infectious pododermatitis)	2.8	(2.0)	1.1	(1.1)	4.4	(4.4)	1.6	(1.4)	2.6	(1.8)
Hairy heel wart (papillomatous digital dermatitis)	0.7	(0.7)	1.1	(1.1)	0.0	(—)	1.2	(1.0)	0.8	(0.6)
Central nervous system (CNS) disease (e.g., polio, listeriosis, “brainers”)	0.0	(—)	9.8	(8.9)	3.2	(3.2)	0.0	(—)	1.1	(1.2)
Pinkeye	5.6	(2.7)	10.9	(8.9)	13.1	(4.7)	2.3	(1.5)	6.2	(2.0)
Cardiovascular disease (e.g., heart failure, brisket disease)	1.1	(1.1)	0.0	(—)	0.0	(—)	1.5	(1.5)	0.9	(0.9)
Fatigued cattle syndrome	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Other	0.0	(—)	0.7	(0.7)	0.2	(0.2)	0.0	(—)	0.1	(0.1)

The standard errors in the table below are quite large due to the low number of feedlots that reported that the percentage of cattle affected with each given condition in 2020 was different than the percentage of cattle affected with the condition in 2019 due to COVID-19 or its effects. For feedlots for which the overall percentage of cattle affected with each of the conditions below in 2020 was different than the overall percentage of cattle affected with the condition in 2019 due to COVID-19 or its effects, most feedlots (90.7 percent) experienced more pinkeye in 2020 compared with 2019, and all of these feedlots (100.0 percent) experienced more foot rot, cardiovascular disease, and digestive disorders excluding bloat in 2020 compared with 2019.

E.4.b. For feedlots for which the overall percentage of cattle affected with each of the conditions below in 2020 was different than the overall percentage of cattle affected with the condition in 2019 due to COVID-19 or its effects (Table E.4.a.), percentage of feedlots by change in the percentage of cattle on the feedlot affected by each condition:

Condition	Percent Feedlots					
	Change					
	More than 2019		Less than 2019		Total	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	33.1	(21.4)	66.9	(21.4)	100.0	(—)
Bloat	23.8	(22.2)	76.2	(22.2)	100.0	(—)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	100.0	(—)	0.0	(—)	100.0	(—)
Foot rot (infectious pododermatitis)	100.0	(—)	0.0	(—)	100.0	(—)
Hairy heel wart (papillomatous digital dermatitis)	17.7	(20.6)	82.3	(20.6)	100.0	(—)
Central nervous system (CNS) disease (e.g., polio, listeriosis, “brainers”)	0.0	(—)	100.0	(—)	100.0	(—)
Pinkeye	90.7	(8.9)	9.3	(8.9)	100.0	(—)
Cardiovascular disease (e.g., heart failure, brisket disease)	100.0	(—)	0.0	(—)	100.0	(—)
Fatigued cattle syndrome	NA*		NA		NA	
Other	100.0	(—)	0.0	(—)	100.0	(—)

*Values of NA denote that no feedlots reported the percentage of cattle affected with this condition in 2020 was different than in 2019 due to COVID-19 or its effects.

5. Post-mortem examinations (Necropsies)

Postmortem examinations (necropsies) can be a useful aid in diagnosing disease, monitoring disease occurrence, and assessing treatment efficacy, but they often do not provide a definitive cause of death. Almost two-thirds of feedlots (63.6 percent) did not have any necropsies performed on any cattle that died in 2020. Only 7.9 percent of feedlots had necropsies performed on all cattle that died in 2020.

E.5.a. Percentage of feedlots by proportion of cattle that underwent a post-mortem examination (i.e., necropsy) when cattle died on the feedlot in 2020:

Percent Feedlots								
Proportion of Cattle That Had a Post-mortem Examination								
None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Total
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
63.6	(4.6)	21.8	(4.0)	6.6	(2.5)	7.9	(2.7)	100.0

A higher percentage of large feedlots (78.7 percent) than small feedlots (30.8 percent) performed at least one necropsy on any cattle that died in 2020.

E.5.b. Percentage of feedlots for which any cattle* that died on the feedlot underwent a post-mortem examination (i.e., necropsy) in 2020, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)					Region				
Small (50-999)		Large (1,000 or more)			West		East		All feedlots
Pct.	Std. error	Pct.	Std. error		Pct.	Std. error	Pct.	Std. error	Pct. Std. error
30.8	(4.8)	78.7	(7.3)		53.7	(9.5)	26.8	(4.8)	36.4 (4.6)

*"Any cattle" means some, most, or all cattle underwent a post-mortem examination (Table E.5.a).

6. Initial treatment for respiratory disease, digestive disorders, foot rot, and pinkeye

The tables in Section E.6. provide information about products used in the initial course of treatment for respiratory disease, digestive disorders, foot rot, and pinkeye, which could have been interpreted by respondents as general practices and not actual use. For this reason, the percentages of feedlots using antibiotics in the initial course of treatment for these conditions may not match the percentages of feedlots reporting use of any antibiotics for these conditions in Tables G.2.a. and G.4.b.

Bovine respiratory disease (BRD) is the most common cause of morbidity and mortality in cattle feedlots. Antibiotics are typically recommended for treatment of BRD, so it was not surprising that on feedlots with any cattle affected with BRD in 2020, almost all (97.0 percent) used an injectable antibiotic as part of the initial course of treatment for BRD. A higher percentage of feedlots used an injectable antibiotic (97.0 percent) or a nonsteroidal anti-inflammatory drug (62.7 percent) for the initial course of treatment for BRD compared with the other treatments listed in the table below. There were no differences by feedlot capacity or by region in the percentages of feedlots that used each of the treatments in the table below as an initial course of treatment for BRD.

With regard to nonsteroidal anti-inflammatory treatments, in October 2024 the Food and Drug Administration (FDA) reminded veterinarians and producers that there are no aspirin products approved by the FDA for use in cattle, so they should stop using aspirin products for pyrexia and pain in cattle. Flunixin meglumine (e.g., Banamine®) is FDA-approved for pyrexia and pain in cattle.

E.6.a. For the 77.5 percent of feedlots on which any cattle were affected with bovine respiratory disease in 2020 (Table E.1.a.), percentage of feedlots by initial course of treatment for bovine respiratory disease, and by feedlot capacity and region:

Treatment	Percent Feedlots									
	Feedlot capacity (number head)					Region				
	Small (50-999)		Large (1,000 or more)		West	East		All feedlots		
	Pct.	Std. error	Pct.	Std. error		Pct.	Std. error	Pct.	Std. error	
Injectable antibiotic	96.6	(2.4)	99.3	(0.7)	100.0	(—)	95.2	(3.3)	97.0	(2.1)
Bolus-dosed oral antibiotic	14.8	(4.8)	40.5	(10.2)	26.6	(8.5)	14.1	(5.2)	18.8	(4.5)
In-feed antibiotic	37.4	(6.2)	52.3	(10.3)	28.6	(7.6)	46.5	(7.3)	39.7	(5.4)
Respiratory vaccine	35.1	(5.3)	50.1	(10.3)	21.9	(6.0)	46.9	(6.7)	37.4	(4.8)
Corticosteroid (e.g., Dexium®)	25.7	(5.8)	51.3	(10.3)	36.3	(9.5)	25.5	(6.5)	29.7	(5.4)
Nonsteroidal anti-inflammatory (e.g., Banamine®, aspirin)	59.9	(6.2)	77.6	(6.1)	59.1	(9.4)	64.9	(6.6)	62.7	(5.4)
Antihistamine	5.0	(2.7)	13.8	(7.0)	4.0	(1.8)	7.9	(3.9)	6.4	(2.5)
Vitamin B injection	23.1	(5.4)	12.1	(4.3)	10.5	(5.6)	28.3	(6.5)	21.4	(4.6)
Vitamin C injection	0.0	(—)	5.7	(3.0)	2.0	(1.1)	0.2	(0.2)	0.9	(0.5)
Immunostimulant (e.g., Zelnote®)	0.2	(0.1)	0.6	(0.6)	0.3	(0.3)	0.2	(0.2)	0.2	(0.2)
Injectable mineral supplement (e.g., MultiMin®)	13.1	(4.5)	9.5	(3.5)	9.5	(5.1)	14.4	(5.3)	12.5	(3.8)
Probiotic Paste	14.7	(4.4)	21.4	(9.0)	11.4	(4.2)	18.4	(5.8)	15.8	(3.9)
Other	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)

Digestive disorders other than bloat can cause symptoms such as diarrhea, which can result from causes such as coccidiosis or feed changes. For feedlots on which any cattle developed any digestive disorders other than bloat (e.g., coccidiosis, diarrhea) in 2020, a higher percentage of small feedlots (43.3 percent) than large feedlots (8.3 percent) used a nonsteroidal anti-inflammatory product as part of the initial course of treatment for these disorders.

It should be noted that some treatment options for coccidiosis via feed or water were inadvertently omitted as options in the question used for the table below. Coccidiosis in cattle can be treated with amprolium (e.g., Corid®) given by drench or drinking water, and in-water products were not included as an option in the table below. Also, while the ionophores monensin and lasalocid are antibiotics that can be used in feed for control of coccidiosis, other products that are not antibiotics can be used in feed for coccidiosis, such as decoquinate and amprolium, and these non-antibiotic, in-feed products were not included as an option in the table below.

E.6.b. For the 31.9 percent of feedlots on which any cattle developed any digestive disorders other than bloat (e.g., coccidiosis, diarrhea) in 2020 (Table E.3.a.), percentage of feedlots by initial course of treatment for those digestive disorders, and by feedlot capacity and region:

Percent Feedlots										
Treatment	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Injectable antibiotic	56.7	(11.0)	29.9	(9.8)	55.5	(14.7)	48.6	(11.9)	51.5	(9.3)
Bolus-dosed oral antibiotic	47.9	(10.3)	44.7	(14.4)	40.7	(13.2)	52.0	(11.7)	47.3	(8.8)
In-feed antibiotic	19.9	(8.1)	24.4	(8.8)	16.0	(8.3)	24.3	(9.8)	20.8	(6.7)
Corticosteroid (e.g., Dexium®)	4.5	(3.3)	2.0	(2.0)	3.5	(3.5)	4.5	(3.9)	4.1	(2.7)
Nonsteroidal anti-inflammatory (e.g., Banamine®, aspirin)	43.3	(10.5)	8.3	(4.2)	17.8	(11.6)	50.2	(11.8)	36.6	(8.7)
Antihistamine	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Vitamin B injection	13.4	(8.1)	5.9	(3.1)	0.7	(0.7)	20.1	(11.0)	12.0	(6.5)
Vitamin C injection	0.0	(—)	2.0	(2.0)	0.0	(—)	0.7	(0.7)	0.4	(0.4)
Immunostimulant (e.g., Zelnate®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Injectable mineral supplement (e.g., MultiMin®)	12.9	(8.0)	4.7	(2.9)	4.3	(3.7)	10.6	(11.3)	11.3	(6.5)
Probiotic Paste	28.8	(8.9)	40.9	(14.9)	22.2	(10.2)	37.6	(11.2)	31.1	(8.0)
Other	17.0	(9.1)	4.1	(4.1)	16.3	(13.2)	13.4	(8.9)	14.6	(7.6)

Foot rot (infectious pododermatitis, interdigital necrobacillosis) is a contagious disease that affects the interdigital space (between the toes) of ruminants and causes lameness. For feedlots on which any cattle developed foot rot in 2020, most (96.9 percent) used an injectable antibiotic as an initial course of treatment for foot rot. A higher percentage of feedlots in the West region (48.5 percent) than in the East region (0.4 percent) used a bolus-dosed oral antibiotic as an initial course of treatment for foot rot.

Note that there are no antibiotics approved for use in feed for foot rot in cattle, and since extra-label use of antibiotics in feed is prohibited in food-producing animals, antibiotics cannot be used in feed for foot rot treatment, control, or prevention in cattle. Antibiotics could be used in drinking water for foot rot control or treatment under a valid veterinarian-client-patient relationship (VCPR), but antibiotic use in drinking water is not very common in feedlot cattle.

E.6.c. For the 35.2 percent of feedlots on which any cattle developed foot rot in 2020 (Table E.3.a.), percentage of feedlots by initial course of treatment for foot rot, and by feedlot capacity and region:

Treatment	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Injectable antibiotic	96.0	(4.0)	100.0	(—)	100.0	(—)	94.3	(5.6)	96.9	(3.0)
Bolus-dosed oral antibiotic	17.0	(5.9)	41.1	(13.7)	48.5	(9.8)	0.4	(0.3)	22.7	(6.2)
Topical antibiotic	22.6	(9.5)	19.0	(9.9)	21.6	(10.8)	21.9	(10.8)	21.8	(7.7)
Corticosteroid (e.g., Dexium®)	8.7	(6.5)	14.3	(6.0)	9.1	(3.5)	10.9	(9.3)	10.1	(5.1)
Nonsteroidal anti-inflammatory (e.g., Banamine®, aspirin)	28.4	(9.2)	43.8	(12.8)	23.7	(8.7)	39.2	(12.4)	32.0	(7.8)
Antihistamine	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Vitamin B injection	9.6	(6.8)	4.5	(2.7)	1.6	(1.1)	14.3	(9.5)	8.4	(5.2)
Vitamin C injection	0.0	(—)	2.0	(2.0)	1.0	(1.0)	0.0	(—)	0.5	(0.5)
Immunostimulant (e.g., Zelnate®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Injectable mineral supplement (e.g., MultiMin®)	12.6	(8.3)	3.5	(2.5)	10.9	(9.6)	10.0	(8.6)	10.4	(6.4)
Probiotic Paste	6.2	(6.0)	0.0	(—)	0.0	(—)	8.8	(8.5)	4.7	(4.6)
Other	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)

Pinkeye (infectious bovine keratoconjunctivitis) is a contagious bacterial infection of the eyes of cattle, often spread by face flies. For feedlots on which any cattle developed pinkeye in 2020, the majority (82.4 percent) used an injectable antibiotic as part of the initial course of treatment for pinkeye.

Note that there are no antibiotics approved for use in feed for pinkeye in cattle, and since extra-label use of antibiotics in feed is prohibited in food-producing animals, antibiotics cannot be used in feed for pinkeye treatment, control, or prevention in cattle. Antibiotics could be used in drinking water for pinkeye control or treatment under a valid veterinarian-client-patient relationship (VCPR), but antibiotic use in drinking water is not very common in feedlot cattle.

E.6.d. For the 41.7 percent of feedlots on which any cattle developed pinkeye in 2020 (Table E.3.a.), percentage of feedlots by initial course of treatment for pinkeye, and by feedlot capacity and region:

Treatment	Percent Feedlots									
	Feedlot capacity (number head)					Region				
	Small (50-999)		Large (1,000 or more)			West		East		All feedlots
	Pct.	Std. error	Pct.	Std. error		Pct.	Std. error	Pct.	Std. error	
Injectable antibiotic	81.9	(7.3)	84.8	(7.1)		88.4	(6.7)	76.3	(10.2)	82.4 (6.1)
Bolus-dosed oral antibiotic	0.0	(—)	19.8	(14.8)		7.3	(6.4)	0.0	(—)	3.6 (3.2)
Topical antibiotic	51.1	(9.3)	32.9	(11.8)		47.5	(10.4)	48.1	(11.5)	47.8 (7.7)
Corticosteroid (e.g., Dexium®)	7.4	(4.9)	19.1	(13.5)		8.2	(5.6)	11.1	(8.0)	9.6 (4.8)
Nonsteroidal anti-inflammatory (e.g., Banamine®, aspirin)	7.4	(4.9)	23.4	(14.6)		8.3	(6.4)	12.8	(7.9)	10.6 (5.1)
Antihistamine	0.0	(—)	0.0	(—)		0.0	(—)	0.0	(—)	0.0 (—)
Vitamin B injection	4.3	(4.2)	2.0	(1.4)		0.7	(0.5)	7.1	(6.9)	3.9 (3.5)
Vitamin C injection	0.0	(—)	1.0	(1.0)		0.4	(0.4)	0.0	(—)	0.2 (0.2)
Immunostimulant (e.g., Zelnote®)	0.0	(—)	0.0	(—)		0.0	(—)	0.0	(—)	0.0 (—)
Injectable mineral supplement (e.g., MultiMin®)	10.8	(5.6)	1.4	(1.4)		6.3	(4.8)	12.1	(7.8)	9.1 (4.6)
Probiotic Paste	4.3	(4.2)	16.5	(13.4)		5.9	(5.3)	6.9	(6.5)	6.5 (4.3)
Other	4.1	(4.1)	5.4	(3.9)		8.7	(6.7)	0.0	(—)	4.3 (3.4)

7. Hospital pen use

Some feedlots have separate pens to house sick cattle (hospital pens) where individual sick cattle can be moved from their pen of origin to the hospital pen to receive treatment and recover. Two-thirds (67.0 percent) of feedlots had separate pens to house sick cattle. A higher percentage of large (93.0 percent) than small feedlots (63.6 percent) had separate pens to house sick cattle, and a higher percentage of feedlots in the West region (86.1 percent) than in the East region (56.5 percent) had separate pens to house sick cattle.

E.7.a. Percentage of feedlots that had separate pens to house sick cattle (e.g., hospital pens) in 2020, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
63.6	(4.7)	93.0	(4.8)	86.1	(5.8)	56.5	(5.5)	67.0	(4.1)

For feedlots that had separate pens to house sick cattle, over 80 percent always provided increased waterer/bunk space per animal compared to the home pen, increased observation/surveillance compared to the home pen, wind breaks, or shade for cattle in the hospital pen.

E.7.b. For the 67.0 percent of feedlots that had separate pens to house sick cattle in 2020 (Table E.7.a.), percentage of feedlots by resource provided to cattle in the hospital pen, and by percentage of time that the resource was available:

Percent Feedlots							
Percentage of Time Available							
Resource	None of the time		Some of the time*		All of the time		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Wind breaks	6.4	(2.1)	5.7	(2.7)	87.8	(3.4)	100.0
Shade	6.5	(2.8)	13.0	(4.2)	80.4	(4.9)	100.0
Sprinklers/misters to keep cattle cool	86.0	(4.0)	5.4	(2.6)	8.5	(3.2)	100.0
Additional bedding (e.g., straw) compared to home pen	19.0	(5.0)	31.7	(5.6)	49.3	(5.0)	100.0
Additional hay to eat compared to home pen	14.4	(3.5)	20.2	(4.9)	65.4	(5.6)	100.0
Increased waterer/bunk space per animal compared to home pen	7.3	(3.0)	5.4	(2.7)	87.3	(4.0)	100.0
Increased observation/surveillance compared to home pen	5.6	(2.6)	9.6	(3.7)	84.8	(4.4)	100.0
Dust control	63.0	(5.6)	15.9	(4.4)	21.0	(4.8)	100.0
Other	90.6	(3.6)	2.2	(2.0)	7.2	(2.9)	100.0

*Or as needed.

For feedlots that had separate pens to house sick cattle, there were no differences by feedlot capacity in the use of any of the resources listed in the table below for cattle in the hospital pen. A higher percentage of feedlots in the East region (99.8 percent) offered shade for cattle in the hospital pen compared with feedlots in the West region (85.9 percent).

E.7.c. For the 67.0 percent of feedlots that had separate pens to house sick cattle in 2020 (Table E.7.a.), percentage of feedlots that provided the following resources to cattle in the hospital pen for any period of time,* by feedlot capacity and by region:

Resource	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Wind breaks	94.6	(2.4)	88.2	(4.9)	93.3	(1.7)	93.8	(3.6)	93.6	(2.1)
Shade	96.5	(2.4)	77.8	(10.5)	85.9	(6.1)	99.8	(0.2)	93.5	(2.8)
Sprinklers/misters to keep cattle cool	11.7	(4.6)	26.0	(6.8)	19.9	(7.2)	9.0	(4.2)	14.0	(4.0)
Additional bedding (e.g., straw) compared to home pen	80.6	(5.5)	82.8	(9.4)	71.2	(9.5)	89.2	(4.6)	81.0	(5.0)
Additional hay to eat compared to home pen	83.5	(4.2)	96.1	(2.4)	92.3	(4.4)	79.9	(5.3)	85.6	(3.5)
Increased waterer/bunk space per animal compared to home pen	92.6	(3.5)	93.2	(3.1)	92.2	(4.6)	93.1	(3.9)	92.7	(3.0)
Increased observation/surveillance compared to home pen	93.9	(3.0)	96.9	(2.3)	92.3	(4.5)	96.1	(2.8)	94.4	(2.6)
Dust control	34.1	(6.3)	52.1	(10.6)	42.2	(8.4)	32.5	(7.4)	37.0	(5.6)
Other	9.1	(3.7)	11.1	(9.4)	8.1	(5.9)	10.5	(4.3)	9.4	(3.6)

*Including some of the time (or as needed) or all of the time (Table E.7.b).

8. Liver condemnations

Liver abscesses in feedlot cattle can decrease performance (e.g., average daily gain) but do not typically cause noticeable clinical signs. Liver abscesses can be easily detected by visual examination of the liver at slaughter and may cause condemnation of the liver depending on the severity of liver abscessation. Livers that are condemned result in economic loss since the liver can no longer be sold for human consumption. In some cases, the abscessed liver can adhere to other organs or the body wall, requiring additional time for evisceration and carcass trimming at slaughter.

A higher percentage of large feedlots (28.4 percent) compared with small feedlots (6.3 percent) received information from slaughter facilities about the percentage of their cattle affected with liver abscesses resulting in condemnation of the liver. There were no differences by region in the percentage of feedlots that received information from slaughter facilities about the percentage of their cattle with liver abscesses.

E.8. Percentage of feedlots that received information from slaughter facilities about the percentage of cattle affected with liver abscesses resulting in condemnation of livers in 2020, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
6.3	(2.3)	28.4	(7.6)	13.5	(4.0)	6.0	(2.5)	8.7	(2.2)

9. Change in late-fed death loss due to COVID-19

COVID-19 or its effects caused some cattle to be held to weights heavier than planned due to slaughter plant closures and reduced capacity, which could have increased death loss in late-fed cattle (defined as cattle fed 100 days or more).

Overall, 3.2 percent of feedlots reported the rate of death loss in late-fed cattle in 2020 was different than the rate of death loss in late-fed cattle in 2019 due to COVID-19 or its effects.

E.9.a. Percentage of feedlots for which the rate of death loss in late-fed cattle (cattle fed 100 days or more) in 2020 was different than the rate of death loss in late-fed cattle in 2019 due to COVID-19 or its effects, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1.3	(1.0)	17.9	(9.3)	6.2	(3.6)	1.7	(1.3)	3.2	(1.5)

For feedlots whose rate of death loss in late-fed cattle (cattle fed 100 days or more) in 2020 was different than that in 2019 due to COVID-19 or its effects, 70.5 percent claimed to have a higher rate of death loss and 29.5 percent claimed to have a lower rate of death loss in late-fed cattle in 2020 compared with 2019. When taking standard errors into account, these percentages are not different.

E.9.b. For the 3.2 percent of feedlots for which the rate of death loss in late-fed cattle (cattle fed 100 days or more) in 2020 was different than that in 2019 due to COVID-19 or its effects (Table E.9.a.), percentage of feedlots by change in the rate of death loss in late-fed cattle in 2020 compared to 2019:

Percent Feedlots		
Change	Pct.	Std. error
More than 2019	70.5	(21.1)
Less than 2019	29.5	(21.1)
Total	100.0	

Cattle have been fed to heavier finished weights for many years, which has led to the appearance of diseases in late-fed cattle, such as heart failure, that are not commonly seen in cattle fed to lower weights.

A higher percentage of large feedlots (39.3 percent) compared with small feedlots (2.2 percent) observed an increase in the rate of death loss in late-fed cattle (cattle fed 100 days or more) in the past 5 years.

E.9.c. Percentage of feedlots for which there has been an increase in the rate of death loss in late-fed cattle (cattle fed 100 days or more) in the past 5 years, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
2.2	(1.5)	39.3	(9.3)	12.0	(3.6)	3.5	(2.1)	6.6	(1.8)

For feedlots for which the rate of death loss in late-fed cattle increased in the past 5 years, none attributed the increase to fatigued cattle syndrome. Similar percentages of feedlots said the increase was due to acute interstitial pneumonia (AIP), respiratory disease other than AIP, injury, heart failure, or bloat.

E.9.d. For the 6.6 percent of feedlots for which the rate of death loss in late-fed cattle increased in the past 5 years (Table E.9.c.), percentage of feedlots by disease associated with the increased rate:

Percent Feedlots		
Disease	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	46.8	(13.2)
Bovine respiratory disease, excluding acute interstitial pneumonia	35.8	(14.6)
Injury (e.g., downers, fractures)	44.6	(16.3)
Fatigued cattle syndrome	0.0	(—)
Heart failure	35.5	(11.8)
Bloat	47.2	(16.0)
Other	4.4	(3.5)

F. Any Antibiotic Use

Just as with humans, cattle sometimes become sick and need to be given antibiotics. Medically important antibiotics are defined by the Food and Drug Administration (FDA) as important for use in humans. Medically important antibiotics are used in feedlot cattle for disease treatment, control, or prevention. Non-medically important antibiotics, such as ionophores, can be used in feedlot cattle for growth promotion and improving feed efficiency as well as for disease control or prevention. Antibiotics can be given in feed or water, by injection, by bolus (pill given by mouth), by drench (liquid given by mouth), or topically (paste/liquid applied on skin or eyes).

Beginning on January 1, 2017, the U.S. Food and Drug Administration (FDA) implemented policy changes regarding the use of medically important antibiotics in food-producing animals. These changes included: 1) eliminating the use of medically important antibiotics for growth promotion purposes in food-producing animals, and 2) requiring veterinary oversight for use of medically important antibiotics in animal feed or water. “Veterinary oversight” means that a prescription or Veterinary Feed Directive (VFD) became needed to use medically important antibiotics in water or feed, respectively, of food-producing animals.

On June 11, 2023, the FDA implemented additional policy changes that require veterinary oversight for use of all medically important antibiotics in animals, including both food-producing and companion animals. These new changes mean that medically important injectable antibiotics that were previously available without a prescription (e.g., penicillin, oxytetracycline, tylosin) now require a prescription for purchase. These products were previously available over-the-counter in establishments such as feed and farm stores. On January 1, 2018, the State of California began requiring a prescription for purchase of all medically important injectable antibiotics, so California implemented these changes a few years ahead of the rest of the United States. While the June 11, 2023 FDA rule changes affect antibiotic use in cattle currently, these changes were not in place at the time the Feedlot 2021 study was conducted.

Most feedlots (90.2 percent) used antibiotics in 2020. A higher percentage of large feedlots (36.5 percent) compared with small feedlots (4.1 percent) used injectable or bolus-dosed antibiotics for group administration to prevent, control, or treat bovine respiratory disease. There were no differences by feedlot capacity or by region in the percentage of feedlots that used any antibiotics in feed.

F.1. Percentage of feedlots that used any antibiotics in 2020 by route of administration, and by feedlot capacity and region:

Route of administration	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any injectable or bolus-dosed antibiotics to any cattle	81.5	(4.1)	100.0	(—)	92.0	(5.7)	79.1	(4.7)	83.7	(3.6)
Injectable or bolus-dosed antibiotics for the individual treatment ¹ of bovine respiratory disease	69.6	(5.1)	98.8	(0.8)	82.9	(8.0)	67.5	(5.7)	73.1	(4.6)
Injectable or bolus-dosed antibiotics for group administration ² to prevent, control, or treat bovine respiratory disease	4.1	(1.8)	36.5	(8.5)	15.0	(3.9)	3.9	(2.0)	7.9	(1.9)
Injectable or bolus-dosed antibiotics for the individual treatment of conditions other than bovine respiratory disease	53.4	(5.2)	77.1	(8.3)	67.6	(9.3)	49.7	(5.4)	56.2	(4.8)
Any antibiotic in feed to any cattle	68.6	(5.2)	80.0	(9.0)	65.9	(8.2)	72.2	(5.4)	69.9	(4.5)
Antibiotics that do not require a veterinary feed directive ³	55.1	(5.6)	67.1	(9.9)	61.3	(8.7)	53.8	(6.0)	56.6	(4.9)
Antibiotics that do require a veterinary feed directive ³	49.9	(5.5)	68.9	(9.4)	46.4	(8.4)	55.3	(6.1)	52.2	(5.0)
Any antibiotics in water to any cattle	5.4	(2.3)	9.6	(3.6)	2.5	(0.9)	7.7	(3.2)	5.9	(2.1)
Any antibiotics to any cattle	88.9	(3.4)	100.0	(—)	92.0	(5.7)	89.3	(3.5)	90.2	(3.0)

¹Individual treatment is defined as the administration of antibiotics only to those cattle identified to be sick.

²Group administration of antibiotics means that the majority of the pen was given an antibiotic at one time.

³Examples of antibiotics that do not require a VFD include ionophores (e.g., Rumensin®, Monovet®, Bovatec®, and Cattlyst®), bambermycin, and bacitracin. Examples of antibiotics that do require a VFD include chlortetracycline (e.g., Aureomycin®) and tylosin (e.g., Tylan®).

G. Injectable or Bolus-dosed Antibiotic Use

All injectable or bolus-dosed antibiotics used in feedlot cattle are medically important. Injectable or bolus-dosed medically important antibiotics ceased to be available over the counter for use in animals beginning on June 11, 2023, meaning a prescription from a veterinarian is now required to purchase these antibiotics. The Feedlot 2021 study was conducted before these changes went into place.

1. Factors involved in selection of injectable or bolus-dosed antibiotics

For feedlots that used any injectable or bolus-dosed antibiotics in 2020, the majority said that veterinarian recommendations (82.4 percent), personal experience (83.7 percent), and duration of action (62.4 percent) were either extremely important or very important in the selection of these antibiotics. The majority of feedlots also said that other producers' recommendations (61.9 percent), laboratory test results (62.1 percent), drug company advertisements (91.9 percent), and over-the-counter availability (68.6 percent) were either not important or slightly important factors in the selection of these antibiotics.

G.1.a. For the 83.7 percent of feedlots that used any injectable or bolus-dosed antibiotics in 2020 (Table F.1.), percentage of feedlots by level of importance of the following factors in the selection of injectable and bolus-dosed antibiotics:

Percent Feedlots											
Level of Importance											
	Not Important		Slightly Important		Moderately Important		Very Important		Extremely Important		Total
Factor	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
Veterinarian recommendations	3.5	(1.9)	3.0	(1.8)	11.1	(3.3)	45.4	(5.1)	37.0	(5.2)	100.0
Other producers' recommendations	41.8	(4.9)	20.1	(4.2)	21.5	(4.5)	15.5	(3.8)	1.1	(0.9)	100.0
Laboratory test results	49.9	(4.5)	12.2	(3.6)	13.7	(3.6)	14.6	(3.9)	9.7	(3.3)	100.0
Drug company advertisement	73.8	(4.8)	18.1	(4.0)	6.2	(2.7)	1.0	(1.0)	0.9	(0.9)	100.0
Personal experience (past response rates)	2.3	(1.6)	1.2	(1.2)	12.8	(3.5)	44.1	(5.7)	39.6	(5.6)	100.0
Cost of antibiotic	24.2	(4.7)	13.2	(3.6)	45.6	(5.6)	14.4	(3.9)	2.6	(1.5)	100.0
Approved route by which antibiotic is given	19.0	(4.5)	9.6	(3.0)	25.1	(4.4)	35.6	(5.1)	10.7	(3.1)	100.0
Duration of action (e.g., only needs to be given once)	8.8	(3.2)	4.8	(2.2)	24.0	(4.9)	47.6	(5.1)	14.8	(3.6)	100.0
Drug withdrawal time	17.9	(4.3)	14.2	(3.9)	26.4	(4.2)	21.8	(4.6)	19.7	(4.4)	100.0
Over the counter availability (i.e., no prescription required)	53.9	(5.2)	14.7	(4.1)	14.0	(3.7)	12.0	(3.5)	5.4	(2.6)	100.0
Other	93.8	(2.5)	1.0	(0.8)	1.6	(1.6)	2.7	(1.7)	0.8	(0.8)	100.0

For feedlots that used any injectable or bolus-dosed antibiotics in 2020, a higher percentage of large feedlots (77.9 percent) than small feedlots (41.2 percent) said the approved route by which antibiotics are given was either very important or extremely important in the selection of injectable or bolus-dosed antibiotics.

G.1.b. For the 83.7 percent of feedlots that used any injectable or bolus-dosed antibiotics in 2020 (Table F.1.), percentage of feedlots that ranked the following factors as very or extremely important* in the selection of injectable or bolus-dosed antibiotics, by feedlot capacity and by region:

Factor	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Veterinarian recommendations	82.8	(4.6)	80.1	(7.9)	87.5	(4.8)	79.1	(5.9)	82.4	(4.0)
Other producers' recommendations	16.8	(4.4)	15.6	(7.1)	13.3	(6.3)	18.8	(5.1)	16.6	(3.9)
Laboratory test results	21.9	(5.2)	38.3	(10.4)	33.9	(9.1)	18.0	(5.3)	24.2	(4.8)
Drug company advertisement	2.2	(1.6)	0.0	(—)	0.0	(—)	3.2	(2.2)	1.9	(1.4)
Personal experience (past response rates)	83.7	(4.6)	83.8	(4.2)	85.7	(5.7)	82.5	(5.4)	83.7	(4.0)
Cost of antibiotic	16.7	(4.7)	18.1	(7.2)	12.0	(5.0)	20.1	(5.8)	16.9	(4.0)
Approved route by which antibiotic is given	41.2	(5.6)	77.9	(6.7)	42.7	(8.4)	48.6	(6.8)	46.3	(5.3)
Duration of action (e.g., only needs to be given once)	61.1	(6.0)	70.3	(10.2)	57.8	(8.2)	65.4	(6.6)	62.4	(5.1)
Drug withdrawal time	41.4	(6.1)	41.8	(9.9)	40.6	(9.5)	42.1	(6.7)	41.5	(5.5)
Over the counter availability (i.e., no prescription required)	17.1	(4.7)	18.9	(9.8)	20.2	(7.8)	15.5	(4.8)	17.3	(4.2)
Other	2.9	(1.9)	7.4	(6.0)	2.7	(2.3)	4.1	(2.7)	3.5	(1.9)

*Producers were asked to rate each factor as not, slightly, moderately, very, or extremely important (Table G.1.a).

2. Individual treatment for bovine respiratory disease

For feedlots on which any cattle were affected with bovine respiratory disease in 2020, over 40 percent used tulathromycin (46.6 percent) or florfenicol (44.4 percent) as the initial treatment for individual cases of bovine respiratory disease (BRD). All large and 94.0 percent of small feedlots used injectable or bolus-dosed antibiotics for initial treatment of at least one individual case of BRD on the feedlot.

G.2.a. For the 77.5 percent of feedlots on which any cattle were affected with bovine respiratory disease in 2020 (Table E.1.a.), percentage of feedlots by injectable or bolus-dosed antibiotic administered to any cattle for initial, individual treatment¹ of bovine respiratory disease and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Tilmicosin (Micotil®)	13.5	(4.7)	15.2	(7.3)	13.1	(6.3)	14.3	(5.3)	13.7	(4.1)
Gamithromycin (Zactran®)	10.5	(3.5)	14.6	(9.5)	9.4	(4.7)	12.3	(4.7)	11.1	(3.3)
Tulathromycin (Draxxin®)	42.0	(6.3)	72.3	(10.7)	45.6	(8.3)	47.4	(7.5)	46.6	(5.6)
Tylosin (Tylan® 200)	6.6	(2.9)	7.1	(3.6)	5.0	(3.1)	7.9	(3.8)	6.7	(2.5)
Tildipirosin (Zuprevo®)	17.1	(4.7)	38.4	(10.8)	18.7	(6.8)	21.5	(5.7)	20.3	(4.4)
Florfenicol (Nuflor®)	43.4	(6.2)	49.9	(10.5)	39.6	(8.3)	47.9	(7.5)	44.4	(5.5)
Florfenicol w/ flunixin meglumine (Resflor Gold®)	16.1	(4.5)	36.9	(10.6)	23.0	(6.6)	16.4	(5.3)	19.2	(4.1)
Enrofloxacin (Baytril®)	32.3	(6.0)	50.4	(10.3)	36.5	(8.8)	33.9	(7.2)	35.0	(5.6)
Danofloxacin (Advocin®)	3.3	(2.6)	13.1	(4.5)	10.6	(5.4)	0.5	(0.3)	4.8	(2.3)
Ceftiofur (Naxcel®, Excenel®, Excede®)	20.7	(4.8)	45.4	(10.3)	29.1	(6.3)	21.0	(5.6)	24.4	(4.2)
Oxytetracycline (LA-200®, BioMycin®)	35.4	(6.1)	42.1	(10.4)	47.9	(8.6)	27.9	(6.6)	36.4	(5.4)
Penicillin (Aquacillin™, Penicillin G Procaine)	9.6	(3.7)	12.4	(4.2)	15.3	(6.1)	6.1	(3.3)	10.0	(3.2)
Ampicillin (Polyflex®)	2.1	(1.5)	0.7	(0.7)	0.2	(0.2)	3.1	(2.2)	1.9	(1.3)
Sulfadimethoxine (Albon® Injection)	1.1	(1.1)	2.0	(1.5)	0.7	(0.5)	1.6	(1.6)	1.2	(0.9)
Sulfadimethoxine (Albon® Bolus)	6.2	(2.8)	21.5	(11.3)	10.4	(5.2)	7.1	(4.0)	8.5	(3.2)
Sulfamethazine (Sustain III® Bolus, Supra Sulfa® III)	7.5	(3.6)	35.2	(11.6)	21.0	(7.9)	4.7	(3.1)	11.7	(3.9)
Any of the above antibiotics ²	94.0	(3.1)	100.0	(—)	95.9	(4.1)	94.3	(3.5)	95.0	(2.6)

¹Individual treatment here means the administration of antibiotics only to those cattle identified to be sick.

²Some operations skipped this question, which may explain why percentages in this row are not the same as the percentages for injectable or bolus-dosed antibiotics in Table E.6.a.

For cattle that were affected with bovine respiratory disease in 2020, there was no predominant injectable or bolus-dosed antibiotic used for initial individual animal treatment for BRD.

G.2.b. For the 12.2 percent of cattle that were affected with bovine respiratory disease in 2020 (Table E.1.b.), percentage of sick cattle by injectable or bolus-dosed antibiotic administered for initial, individual treatment¹ of bovine respiratory disease, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Sick Cattle									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Tilmicosin (Micotil®)	7.3	(3.7)	4.5	(3.9)	(D) ²	(D)	(D)	(D)	4.7	(3.6)
Gamithromycin (Zactran®)	2.6	(2.3)	5.9	(5.3)	5.8	(5.3)	3.6	(2.7)	5.6	(4.8)
Tulathromycin (Draxxin®)	18.0	(6.0)	9.1	(4.3)	8.5	(4.1)	22.4	(9.4)	9.9	(4.1)
Tylosin (Tylan® 200)	4.0	(3.5)	0.1	(0.1)	0.1	(0.1)	3.6	(3.2)	0.4	(0.3)
Tildipirosin (Zuprevo®)	16.2	(7.7)	34.0	(6.2)	34.4	(6.1)	14.6	(7.8)	32.4	(6.1)
Florfenicol (Nuflor®)	24.6	(6.5)	16.7	(2.0)	18.7	(2.1)	6.3	(2.9)	17.4	(1.9)
Florfenicol w/ flunixin meeglumine (Resflor Gold®)	2.3	(1.1)	1.8	(1.0)	1.9	(1.0)	1.7	(1.0)	1.8	(0.9)
Enrofloxacin (Baytril®)	9.0	(3.3)	4.8	(2.8)	5.0	(2.9)	6.0	(3.3)	5.1	(2.6)
Danofloxacin (Advocin®)	0.3	(0.2)	3.6	(0.9)	3.7	(0.9)	0.2	(0.2)	3.3	(0.8)
Ceftiofur (Naxcel®, Excenel®, Excede®)	7.6	(3.2)	6.3	(1.5)	6.9	(1.6)	2.8	(1.5)	6.4	(1.4)
Oxytetracycline (LA-200®, BioMycin®)	9.0	(3.8)	18.9	(4.5)	19.5	(4.5)	4.9	(3.4)	18.0	(4.1)
Penicillin (Aquacillin™, Penicillin G Procaine)	1.1	(0.8)	0.2	(0.1)	0.3	(0.2)	0.6	(0.6)	0.3	(0.2)
Ampicillin (Polyflex®)	0.2	(0.2)	0.0	(0.0)	0.0	(0.0)	0.2	(0.2)	0.0	(0.0)
Sulfadimethoxine (Albon® Injection)	0.0	(0.0)	0.2	(0.1)	0.2	(0.1)	0.0	(0.0)	0.1	(0.1)
Sulfadimethoxine (Albon® Bolus)	0.7	(0.5)	0.2	(0.1)	0.2	(0.1)	0.6	(0.5)	0.2	(0.1)
Sulfamethazine (Sustain III® Bolus, Supra Sulfa® III)	5.0	(3.0)	1.4	(0.8)	1.6	(0.9)	3.0	(2.4)	1.7	(0.9)

¹Individual treatment here means the administration of antibiotics only to those cattle identified to be sick.

²Values of (D) denote too few to report.

On feedlots that individually treated any cattle for bovine respiratory disease in 2020, over three-quarters of cattle (77.3 percent) sick with BRD responded and recovered after initial individual treatment with antibiotics.

G.2.c. For the 73.6 percent¹ of feedlots that individually treated² any cattle for bovine respiratory disease in 2020 (Table G.2.a.), percentage of sick cattle by outcome of the initial, individual treatment of bovine respiratory disease, and by feedlot capacity and region:

Feedlot Average Percent Cattle										
Outcome ³	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Responded and recovered	77.7	(3.6)	74.9	(4.2)	77.5	(6.2)	77.1	(3.1)	77.3	(3.1)
Died or were euthanized	12.4	(3.3)	8.6	(1.4)	15.3	(6.1)	9.4	(2.0)	11.8	(2.8)
Were considered chronics and marketed early	1.5	(0.5)	5.4	(1.0)	2.0	(0.6)	2.2	(0.7)	2.1	(0.5)
Did not respond and were re-treated	14.1	(1.8)	18.6	(2.6)	10.5	(2.0)	17.9	(2.3)	14.8	(1.6)

¹This estimate (77.5*0.95=73.6) comes from the 77.5 percent of feedlots on which any cattle were affected with bovine respiratory disease (Table E.1.a), of which 95.0 percent of feedlots individually treated any cattle for bovine respiratory disease with one or more injectable or bolus-dosed antibiotics (Table G.2.a).

²Individual treatment is defined as the administration of antibiotics only to those cattle identified to be sick.

³The sums of the columns in this table exceed 100 percent. It is possible that respondents did not realize the question referred only to the initial treatment for respiratory disease, and cattle may have been double counted (e.g., counted in "did not respond and were re-treated" as well as "died or were euthanized").

3. Group treatment for bovine respiratory disease

Feedlots sometimes give injectable or bolus-dosed antibiotics to cattle as a group, meaning all or a majority of the cattle in a pen are given antibiotics at the same time. This could occur if the pen is experiencing an outbreak of respiratory disease or other ailment, but it more often occurs during arrival processing procedures for the control of respiratory disease in cattle that are at high risk of developing bovine respiratory disease associated with *Mannheimia haemolytica*, *Pasteurella multocida*, or *Histophilus somni*.

A higher percentage of large feedlots (36.5 percent) than small feedlots (4.1 percent) gave injectable or bolus-dosed antibiotics to cattle as a group to prevent, control, or treat BRD in 2020.

G.3.a. Percentage of feedlots that administered injectable or bolus-dosed antibiotics to any cattle as a group* to prevent, control, or treat bovine respiratory disease in 2020, by antibiotic given, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Tilmicosin (Micotil®)	0.0	(—)	4.8	(2.8)	1.6	(0.9)	0.0	(—)	0.6	(0.3)
Gamithromycin (Zactran®)	1.0	(1.0)	6.2	(3.6)	4.5	(2.7)	0.0	(—)	1.6	(1.0)
Tulathromycin (Draxxin®)	3.4	(1.7)	21.2	(5.2)	10.0	(3.0)	2.9	(1.7)	5.5	(1.5)
Tylosin (Tylan® 200)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tildipirosin (Zuprevo®)	0.0	(—)	5.1	(1.9)	1.7	(0.6)	0.0	(—)	0.6	(0.2)
Florfenicol (Nuflor®)	0.0	(—)	3.1	(3.0)	1.0	(1.0)	0.0	(—)	0.4	(0.4)
Florfenicol w/ flunixin meglumine (Resflor Gold®)	0.0	(—)	3.8	(2.7)	1.2	(0.9)	0.0	(—)	0.4	(0.3)
Enrofloxacin (Baytril®)	0.0	(—)	1.8	(1.8)	0.6	(0.6)	0.0	(—)	0.2	(0.2)
Danofloxacin (Advocin®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Ceftiofur (Naxcel®, Excenel®, Excede®)	0.7	(0.7)	11.8	(6.5)	3.5	(2.3)	1.2	(1.0)	2.0	(1.0)
Oxytetracycline (LA-200®, BioMycin®)	0.0	(—)	4.6	(2.5)	1.2	(0.7)	0.2	(0.2)	0.6	(0.3)
Penicillin (Aquacillin™, Penicillin G Procaine)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Ampicillin (Polyflex®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfadimethoxine (Albon® Injection)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfadimethoxine (Albon® Bolus)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfamethazine (Sustain III® Bolus, Supra Sulfa® III)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Any of the above antibiotics	4.1	(1.8)	36.5	(8.5)	15.0	(3.9)	3.9	(2.0)	7.9	(1.9)

*Group administration of antibiotics means that the majority of the pen was given an antibiotic at one time.

A higher percentage of cattle on large feedlots (9.0 percent) compared with small feedlots (1.4 percent) were given tulathromycin as a group to prevent, control, or treat BRD in 2020.

G.3.b. Percentage of cattle that were administered injectable or bolus-dosed antibiotics as a group¹ to prevent, control, or treat bovine respiratory disease in 2020, by antibiotic given, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Cattle ²									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Tilmicosin (Micotil®)	0.0	(—)	0.4	(0.3)	0.4	(0.3)	0.0	(—)	0.3	(0.3)
Gamithromycin (Zactran®)	0.7	(0.7)	2.6	(2.3)	2.6	(2.3)	0.0	(—)	2.3	(1.9)
Tulathromycin (Draxxin®)	1.4	(0.7)	9.0	(2.3)	8.7	(2.2)	1.8	(0.9)	7.7	(1.8)
Tylosin (Tylan® 200)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tildipirosin (Zuprevo®)	0.0	(—)	2.7	(1.0)	2.7	(1.0)	0.0	(—)	2.3	(0.8)
Florfenicol (Nuflor®)	0.0	(—)	2.4	(2.3)	2.3	(2.3)	0.0	(—)	2.0	(1.9)
Florfenicol w/ flunixin meglumine (Resflor Gold®)	0.0	(—)	0.3	(0.3)	0.3	(0.3)	0.0	(—)	0.3	(0.2)
Enrofloxacin (Baytril®)	0.0	(—)	0.1	(0.1)	0.1	(0.1)	0.0	(—)	0.0	(0.0)
Danofloxacin (Advocin®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Ceftiofur (Naxcel®, Excenel®, Excede®)	0.2	(0.2)	0.4	(0.3)	0.4	(0.3)	0.3	(0.2)	0.4	(0.3)
Oxytetracycline (LA-200®, BioMycin®)	0.0	(—)	0.2	(0.2)	0.1	(0.1)	0.7	(0.7)	0.2	(0.1)
Penicillin (Aquacillin™, Penicillin G Procaine)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Ampicillin (Polyflex®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfadimethoxine (Albon® Injection)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfadimethoxine (Albon® Bolus)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Sulfamethazine (Sustain III® Bolus, Supra Sulfa® III)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)

¹Group administration of antibiotics means that the majority of the pen was given an antibiotic at one time.

²As a percentage of total cattle placed during 2020.

4. Individual treatment for other disease conditions

For feedlots on which any cattle developed any of the conditions in the table below in 2020, most gave injectable or bolus-dosed antibiotics for the individual treatment of foot rot (81.8 percent) or pinkeye (69.6 percent). Antibiotics are not typically indicated for some of the conditions in the table below such as heart failure, fatigued cattle syndrome, or bloat.

G.4.a. For feedlots on which any cattle developed the given condition in 2020 (Table E.3.a.), percentage of feedlots that administered injectable or bolus-dosed antibiotics for the individual treatment* of the condition, by feedlot capacity and by region:

Condition	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	37.3	(9.2)	44.9	(10.7)	38.0	(7.4)	40.2	(12.2)	39.1	(7.3)
Bloat	7.9	(4.5)	0.0	(—)	0.0	(—)	11.4	(6.4)	6.4	(3.7)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	19.1	(8.3)	26.3	(14.1)	12.9	(8.8)	25.1	(10.4)	20.5	(7.3)
Foot rot (infectious pododermatitis)	83.0	(7.1)	77.5	(7.4)	87.1	(4.1)	77.2	(9.8)	81.8	(5.7)
Hairy heel wart (papillomatous digital dermatitis)	0.0	(—)	5.8	(5.7)	3.4	(3.6)	0.0	(—)	0.9	(0.9)
Central nervous system (CNS) disease (e.g., polio, listeriosis, “brainers”)	60.7	(19.9)	2.8	(2.1)	17.0	(13.8)	41.5	(20.5)	25.2	(11.7)
Pinkeye	72.8	(7.8)	56.1	(12.2)	81.1	(6.5)	57.8	(11.1)	69.6	(6.7)
Cardiovascular disease (e.g., heart failure, brisket disease)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Fatigued cattle syndrome	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Other	55.7	(16.5)	59.0	(22.2)	51.8	(28.0)	58.4	(16.7)	56.1	(14.6)

*Individual treatment is defined as the administration of antibiotics only to those cattle identified to be sick.

For feedlots on which any cattle developed any of the conditions from Table E.3.a., the highest percentage of feedlots used oxytetracycline (45.9 percent) to treat those conditions compared with the other antibiotics in the table below. Oxytetracycline is commonly used to treat pinkeye and foot rot in cattle.

G.4.b. For the 81.6 percent of feedlots on which any cattle developed any of the conditions listed in Table E.3.a. in 2020, percentage of feedlots that administered injectable or bolus-dosed antibiotics for the individual treatment¹ of the condition, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Tilmicosin (Micotil®)	0.9	(0.6)	8.2	(4.2)	4.6	(1.9)	0.0	(—)	1.8	(0.8)
Gamithromycin (Zactran®)	9.3	(3.6)	14.4	(9.4)	8.5	(4.4)	11.0	(4.8)	10.0	(3.4)
Tulathromycin (Draxxin®)	21.5	(4.6)	39.4	(10.0)	23.9	(6.3)	23.9	(5.9)	23.9	(4.4)
Tylosin (Tylan® 200)	3.6	(2.6)	2.1	(1.5)	5.2	(4.8)	2.1	(1.9)	3.4	(2.2)
Tildipirosin (Zuprevo®)	5.6	(3.0)	18.7	(10.4)	10.5	(5.9)	5.2	(3.2)	7.3	(3.1)
Florfenicol (Nuflor®)	10.7	(3.9)	14.9	(5.3)	14.7	(6.2)	9.0	(3.9)	11.3	(3.4)
Florfenicol w/ flunixin meglumine (Resflor Gold®)	8.0	(3.5)	7.2	(3.5)	7.3	(4.9)	8.3	(3.9)	7.9	(3.1)
Ceftiofur (Naxcel®, Excenel®, Excede®)	8.7	(3.5)	25.2	(6.7)	14.8	(5.4)	8.3	(3.8)	10.9	(3.1)
Oxytetracycline (LA-200®, BioMycin®)	42.6	(5.9)	67.0	(8.3)	65.8	(9.3)	32.6	(6.1)	45.9	(5.2)
Penicillin (Aquacillin™, Penicillin G Procaine)	14.1	(4.3)	30.9	(10.8)	15.6	(6.3)	16.9	(5.5)	16.4	(4.1)
Ampicillin (Polyflex®)	0.3	(0.3)	0.0	(—)	0.8	(0.8)	0.0	(—)	0.3	(0.3)
Sulfadimethoxine (Albon® Injection)	0.0	(—)	3.4	(2.1)	1.1	(0.7)	0.0	(—)	0.5	(0.3)
Sulfadimethoxine (Albon® Bolus)	1.3	(1.3)	24.5	(11.1)	7.7	(4.7)	2.3	(1.9)	4.4	(2.2)
Sulfamethazine (Sustain III® Bolus, Supra Sulfa® III)	7.6	(3.5)	21.8	(9.6)	12.8	(5.5)	7.3	(4.1)	9.5	(3.3)
Any of the above antibiotics ²	66.5	(5.8)	82.7	(6.5)	74.2	(8.8)	65.0	(6.2)	68.7	(5.1)

¹Individual treatment here means the administration of antibiotics only to those cattle identified to be sick.

²Some operations skipped this question, which may explain why percentages in this row are not the same as the percentages for injectable or bolus-dosed antibiotics in Table E.6.a.

Of the conditions listed in the table below, antibiotics are typically recommended for pinkeye and foot rot. While no effective treatment exists for acute interstitial pneumonia, antibiotics may help. Bloat, cardiovascular disease, and fatigued cattle syndrome are not typically treated with antibiotics, but there may be circumstances in which antibiotics are indicated. Some of the antibiotics in the table below are not labeled for some of the reasons for use in the table below, but these drugs can be used in an extra-label fashion under the guidance of a veterinarian.

For feedlots that administered the antibiotics below in 2020 via injection or bolus-dosing for the individual treatment of the conditions below, there was not a predominant antibiotic used for any of the reasons for use in the table below.

G.4.c. For feedlots that administered the given antibiotic via injection or bolus-dosing for the individual treatment¹ of the given conditions in 2020² (Table G.4.b.), percentage of feedlots by primary reason for using each antibiotic:

Percent Feedlots										
Antibiotic (trade name examples)										
	Oxytetracycline (LA-200®, BioMycin®)		Tulathromycin (Draxxin®)		Penicillin (Aquacillin™, Penicillin G Procaine)		Florfenicol (Nuflor®)		Ceftiofur (Naxcel®, Excenel®, Excede®)	
Reason for use	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Acute interstitial pneumonia (i.e., AIP, dust pneumonia, atypical pneumonia)	2.1	(1.2)	43.7	(10.7)	3.6	(3.1)	24.2	(10.3)	23.7	(10.6)
Bloat	3.3	(3.2)	0.0	(—)	0.0	(—)	6.6	(6.6)	0.0	(—)
Other digestive disorders excluding bloat (e.g., coccidiosis, diarrhea)	1.5	(1.5)	0.0	(—)	6.2	(6.1)	0.0	(—)	13.8	(12.4)
Foot rot (infectious pododermatitis)	35.4	(7.2)	27.4	(10.9)	23.0	(10.7)	55.9	(14.5)	58.1	(14.2)
Hairy heel wart (papillomatous digital dermatitis)	0.0	(—)	0.0	(—)	0.6	(0.6)	0.0	(—)	0.0	(—)
Central nervous system (CNS) disease (e.g., polio, listeriosis, “brainers”)	6.2	(4.2)	0.6	(0.6)	4.6	(4.6)	0.0	(—)	0.0	(—)
Pinkeye	49.2	(7.8)	19.4	(8.8)	45.8	(13.6)	0.0	(—)	3.2	(2.5)
Cardiovascular disease (e.g., heart failure, brisket disease)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Fatigued cattle syndrome	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Other	2.3	(2.1)	8.8	(6.0)	16.2	(10.3)	13.3	(12.1)	1.2	(1.2)
Total	100.0		100.0		100.0		100.0		100.0	

¹Individual treatment here means the administration of antibiotics only to those cattle identified to be sick.

²Refers to the 37.5, 19.5, 13.4, 9.2, and 8.9 percent of feedlots that administered injectable or bolus-dosed Oxytetracycline, Tulathromycin, Penicillin, Florfenicol, and Ceftiofur, respectively, for the individual treatment of conditions other than bovine respiratory disease. These estimates come from the 81.6 percent of feedlots on which any cattle developed any condition other than bovine respiratory disease (Table E.3.a.), of which 45.9, 23.9, 16.4, 11.3, and 10.9 percent of feedlots administered injectable or bolus-dosed Oxytetracycline, Tulathromycin, Penicillin, Florfenicol, and Ceftiofur, respectively, to any of those cattle (Table G.4.b.).

H. Antibiotic Use in Feed

On January 1, 2017, the U.S. Food and Drug Administration (FDA) implemented policy changes regarding the use of medically important antibiotics (antibiotics important for human use) in food-producing animals. These changes included: 1) eliminating the use of medically important antibiotics for growth promotion purposes in food-producing animals, and 2) requiring veterinary oversight for use of medically important antibiotics in animal feed or water. As a result of these policy changes, a Veterinary Feed Directive (VFD) became necessary for use of any medically important antibiotic in feed of food-producing animals. A VFD signed by a veterinarian serves as the official record authorizing use of a VFD drug (animal drugs intended for use in or on animal feed that require the supervision of a licensed veterinarian). The VFD must include the level (dose) of the drug to be used in feed as well as the reason (indication) for use in feed.

In the Feedlot 2021 study, respondents were asked for up to two reasons for using each medically or non-medically important antibiotic in feed. For medically important antibiotics, no instructions were given to take the reason/indication directly from the VFD. The responses received for reasons/indications for using VFD drugs indicated a high likelihood of recall bias or not remembering the reason/indication given by the veterinarian for using the drug. For this reason, indications for using specific VFD antibiotics were not included in this report.

1. Non-VFD antibiotics given to any cattle regardless of placement weight

Non-medically important antibiotics used in cattle feed, such as ionophores, do not require a VFD and can still be used for growth promotion/feed efficiency purposes. Ionophores lack utility in human medicine and their use in animals does not pose cross-resistance issues; thus, they do not have the same human health concerns as medically important antibiotics. Bambermycin is a non-medically important antibiotic approved for increased rate of weight gain and improved feed efficiency in feedlot cattle. Bacitracin is a non-medically important antibiotic approved in feedlot cattle for reduction in liver condemnations due to abscesses.

A little over half of feedlots (56.6 percent) used ionophores in feed. There were no differences by feedlot capacity or region in the percentage of feedlots that used ionophores in feed. No feedlots used bacitracin, and a very low percentage of feedlots (0.1 percent) used bambermycin.

H.1.a. Percentage of feedlots that administered the given in-feed antibiotic, which did not require a veterinary feed directive (VFD), to any cattle in 2020, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)					Region				
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any ionophore (e.g., Rumensin®, Bovatec®)	55.1	(5.6)	67.1	(9.9)	61.3	(8.7)	53.8	(6.0)	56.6	(4.9)
Bambermycin (Gainpro® 10)	(D)*	(D)	(D)	(D)	(D)	(D)	(D)	(D)	0.1	(0.1)
Bacitracin (BMD®, Bacifer®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)

*Values of (D) denote too few to report.

Over three-fourths of cattle (77.6 percent) received ionophores in feed in 2020. There were no differences by feedlot capacity or region in the percentage of cattle that received ionophores in feed. A little over half of feedlots (56.6 percent) gave ionophores in feed but over three-fourths of cattle (77.6 percent) received ionophores in feed, which is an example of the effect that very large operations can have on estimates at the cattle level.

H.1.b. Percentage of cattle that received the given in-feed antibiotic, which did not require a veterinary feed directive (VFD), in 2020, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Cattle ¹									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any ionophore (e.g., Rumensin®, Bovatec®)	66.3	(7.3)	80.0	(7.9)	81.0	(7.5)	58.1	(9.1)	77.6	(6.8)
Bambermycin (Gainpro® 10)	(D) ²	(D)	(D)	(D)	(D)	(D)	(D)	(D)	3.5	(3.4)
Bacitracin (BMD®, Baciferm®)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)

¹As a percentage of total cattle placed during 2020.

²Values of (D) denote too few to report.

Monensin, lasalocid, and laidlomycin are the three ionophores approved for use in feedlot cattle. All three are approved for improving feed efficiency. Monensin and lasalocid are also approved for prevention and control of coccidiosis.

Respondents were asked to provide up to two reasons for using each non-medically important antibiotic in feed. Because of the low percentage of feedlots that used non-medically important antibiotics other than ionophores, the next two tables on reasons for use are limited to ionophores only.

For feedlots that administered any ionophore in feed to any cattle in 2020, most (91.6 percent) used the ionophore for growth promotion/improved feed efficiency. A little over half of feedlots (55.6 percent) used ionophores for prevention or control of coccidiosis.

H.1.c. For the 56.6 percent of feedlots that administered any ionophore (e.g., Rumensin®, Bovatec®) in feed to any cattle in 2020 (Table H.1.a.), percentage of feedlots by reason for use,* and by feedlot capacity and region:

Percent Feedlots										
Reason for use	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Coccidiosis	54.7	(7.9)	61.2	(10.5)	53.4	(11.8)	57.0	(8.6)	55.6	(7.0)
Growth promotion/ improved feed efficiency	93.1	(3.8)	82.9	(7.5)	96.9	(1.1)	88.1	(5.5)	91.6	(3.4)
Other	3.0	(2.2)	9.2	(8.6)	3.3	(3.4)	4.3	(3.1)	3.9	(2.3)

*Feedlots were able to indicate up to two reasons that ionophores were administered in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use listed on the questionnaire.

For cattle that received any ionophore in feed in 2020, a higher percentage of cattle on small feedlots (97.6 percent) than on large feedlots (63.1 percent) received ionophores in feed for growth promotion/improved feed efficiency. Of the cattle that received ionophores in feed, 80.3 percent received them for prevention or control of coccidiosis, and 68.2 percent received them for growth promotion/improved feed efficiency.

H.1.d. For the 77.6 percent of cattle that received any ionophore (e.g., Rumensin®, Bovatec®) in feed in 2020 (Table H.1.b.), percentage of cattle by reason for use,¹ and by feedlot capacity and region:

Percent Cattle ²										
Reason for use	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Coccidiosis	59.8	(12.9)	83.9	(7.2)	81.8	(7.5)	68.6	(9.9)	80.3	(7.0)
Growth promotion/ improved feed efficiency	97.6	(1.3)	63.1	(15.0)	65.2	(14.1)	91.8	(5.1)	68.2	(12.2)
Other	0.6	(0.5)	1.1	(1.2)	1.1	(1.1)	0.8	(0.6)	1.1	(1.0)

¹Feedlots were able to indicate up to two reasons that ionophores were administered in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use listed on the questionnaire.

²As a percentage of total cattle placed during 2020.

2. VFD antibiotics given to any cattle regardless of placement weight

Medically important antibiotics require a VFD when used in feed, and they can be used for disease treatment, control, or prevention purposes but not for growth promotion/feed efficiency. Two medically important antibiotics commonly used in cattle feed are chlortetracycline, which is often used for respiratory disease, and tylosin, which is used for reduction in the incidence of liver abscesses.

In this study, for antibiotics requiring a VFD, separate questions were asked for cattle less than 700 lb at arrival and for cattle 700 lb or greater at arrival. Cattle less than 700 lb at arrival are younger and may be more likely to receive antibiotics in feed due to increased risk of developing diseases such as BRD. Cattle 700 lb or greater at arrival are more likely to have spent time on a backgrounder or stocker operation prior to arrival at the feedlot, and these cattle may be less likely to receive antibiotics in feed for conditions such as BRD. This section combines the results from the less than 700 lb and the 700 lb or greater categories into a single “any cattle” category.

A little over half of all feedlots (52.2 percent) used medically important antibiotics in feed in 2020. The highest percentage of feedlots (43.1 percent) used medically important antibiotics in feed for respiratory disease.

H.2.a. Percentage of feedlots that administered in-feed antibiotics in 2020 that required a veterinary feed directive (VFD) to any cattle, by reason for use,* and by feedlot capacity and region:

Reason for use	Percent Feedlots									
	Feedlot capacity (number head)					Region				
	Small (50-999)		Large (1,000 or more)			West		East		All feedlots
	Pct.	Std. error	Pct.	Std. error		Pct.	Std. error	Pct.	Std. error	
Reduction in the incidence of liver abscesses	12.0	(3.5)	22.2	(5.6)		14.6	(4.8)	12.4	(4.0)	13.2 (3.1)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	40.5	(5.5)	62.6	(9.6)		36.8	(8.6)	46.6	(6.1)	43.1 (5.0)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	5.5	(2.4)	15.1	(9.7)		11.1	(5.9)	4.1	(2.1)	6.6 (2.5)
Anaplasmosis	1.4	(1.4)	3.8	(2.7)		1.2	(0.9)	1.9	(1.9)	1.7 (1.3)
Other	1.0	(1.0)	2.8	(1.7)		0.6	(0.5)	1.6	(1.4)	1.2 (0.9)
Any reason	49.9	(5.5)	68.9	(9.4)		46.4	(8.4)	55.3	(6.1)	52.2 (5.0)

*Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

About half of all cattle (50.2 percent) received medically important antibiotics in feed in 2020 for reduction in the incidence of liver abscesses. A higher percentage of cattle on large feedlots (57.9 percent) than on small feedlots (13.5 percent) received medically important antibiotics in feed for reduction in the incidence of liver abscesses. A higher percentage of cattle on small feedlots (35.6 percent) than on large feedlots (8.2 percent) received medically important antibiotics in feed for respiratory disease.

H.2.b. Percentage of cattle that received in-feed antibiotics in 2020 that required a veterinary feed directive (VFD), by reason for use,¹ and by feedlot capacity and region:

Reason for use	Percent Cattle ²									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Reduction in the incidence of liver abscesses	13.5	(4.9)	57.9	(10.9)	57.3	(10.7)	9.7	(3.9)	50.2	(10.2)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	35.6	(8.2)	8.2	(3.1)	8.3	(3.1)	39.6	(8.2)	13.0	(3.7)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	6.0	(3.9)	0.6	(0.4)	1.6	(0.9)	1.9	(1.3)	1.6	(0.8)
Anaplasmosis	0.1	(0.1)	0.4	(0.4)	0.4	(0.4)	0.1	(0.1)	0.4	(0.3)
Other	0.1	(0.2)	1.2	(1.4)	1.2	(1.4)	0.2	(0.2)	1.0	(1.1)

¹Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

²As a percentage of total cattle placed during 2020.

The medically important antibiotic used by the highest percentage of feedlots was chlortetracycline (33.0 percent). There were no differences by feedlot capacity or region in the percentage of feedlots that used chlortetracycline.

H.2.c. Percentage of feedlots that administered in-feed antibiotics in 2020 that required a veterinary feed directive (VFD) to any cattle, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	30.9	(5.1)	49.4	(10.1)	40.7	(8.6)	28.8	(5.5)	33.0	(4.7)
Oxytetracycline (Terramycin®, OTC)	4.9	(2.2)	10.1	(6.6)	0.4	(0.3)	8.4	(3.3)	5.5	(2.1)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	8.7	(3.0)	20.7	(10.2)	8.1	(5.1)	11.2	(3.7)	10.1	(3.0)
Neomycin (Neomix)	0.7	(0.7)	0.0	(—)	0.0	(—)	0.9	(0.9)	0.6	(0.6)
Tylosin (Tylan, Tylovet)	8.1	(2.9)	19.8	(5.1)	6.5	(1.3)	11.1	(3.9)	9.4	(2.6)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	0.7	(0.6)	2.0	(2.0)	0.6	(0.6)	0.9	(0.9)	0.8	(0.6)
Any medically important antibiotic	49.9	(5.5)	68.9	(9.4)	46.4	(8.4)	55.3	(6.1)	52.2	(5.0)

A higher percentage of cattle on large (57.9 percent) than on small feedlots (8.3 percent) received tylosin in feed in 2020. About half (49.2 percent) of the cattle placed in 2020 received tylosin in feed. A higher percentage of cattle on small (34.0 percent) than on large feedlots (6.6 percent) received chlortetracycline in feed in 2020.

H.2.d. Percentage of cattle that received in-feed antibiotics in 2020 that required a veterinary feed directive (VFD), by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Cattle ¹									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	34.0	(7.2)	6.6	(2.9)	9.4	(3.7)	22.5	(5.8)	11.3	(3.6)
Oxytetracycline (Terramycin®, OTC)	(D) ²	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.3	(1.5)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	2.7	(1.3)	1.3	(0.8)	1.4	(0.8)	2.2	(0.8)	1.5	(0.7)
Neomycin (Neomix)	0.0	(0.0)	0.0	(—)	0.0	(—)	0.0	(0.0)	0.0	(0.0)
Tylosin (Tylan, Tylovet)	8.3	(3.4)	57.9	(10.9)	56.2	(10.9)	9.7	(3.9)	49.2	(10.3)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	0.7	(0.7)	0.0	(0.0)	0.0	(0.0)	0.9	(0.9)	0.1	(0.1)

¹As a percentage of total cattle placed during 2020.

²Values of (D) denote too few to report.

3. VFD antibiotics given to cattle less than 700 lb at placement

For feedlots that placed any cattle less than 700 lb in 2020, the highest percentage of feedlots (44.9 percent) used medically important antibiotics in feed for respiratory disease for cattle less than 700 lb at placement.

H.3.a. For the 86.4 percent of feedlots that placed any cattle less than 700 lb in 2020 (Table A.1.), percentage of feedlots that administered in-feed antibiotics that required a veterinary feed directive (VFD) to cattle that were less than 700 lb at placement, by reason for use,* and by feedlot capacity and region:

Reason for use	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Reduction in the incidence of liver abscesses	11.0	(3.5)	24.0	(6.2)	16.6	(5.6)	10.4	(3.8)	12.6	(3.1)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	42.0	(6.0)	65.3	(10.2)	38.3	(9.3)	48.7	(6.6)	44.9	(5.4)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	5.0	(2.5)	16.3	(10.4)	9.4	(6.1)	4.8	(2.4)	6.5	(2.7)
Anaplasmosis	1.6	(1.6)	2.1	(2.1)	0.7	(0.7)	2.2	(2.2)	1.7	(1.4)
Other	1.2	(1.2)	3.0	(1.9)	0.7	(0.5)	1.8	(1.7)	1.4	(1.1)
Any reason	51.2	(6.0)	72.0	(9.9)	49.3	(9.1)	56.4	(6.6)	53.8	(5.3)

*Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

For cattle less than 700 lb at placement, a higher percentage of these cattle on large feedlots (52.3 percent) received medically important antibiotics for reduction in the incidence of liver abscesses compared with cattle on small feedlots (11.5 percent). In addition, a higher percentage of cattle on feedlots in the East region (48.0 percent) received medically important antibiotics for respiratory disease compared with cattle on feedlots in the West region (14.0 percent).

H.3.b. For the 41.8 percent of cattle less than 700 lb at placement in 2020 (Table A.2.), percentage of those cattle that received in-feed antibiotics that required a veterinary feed directive (VFD), by reason for use,¹ and by feedlot capacity and region:

Reason for use	Percent Cattle ²									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Reduction in the incidence of liver abscesses	11.5	(4.5)	52.3	(11.8)	51.6	(11.3)	7.7	(3.7)	42.4	(9.7)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	43.6	(10.0)	13.9	(5.0)	14.0	(5.1)	48.0	(9.1)	21.0	(5.5)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	6.7	(5.6)	1.3	(0.8)	2.8	(1.9)	1.9	(1.0)	2.6	(1.5)
Anaplasmosis	0.1	(0.1)	0.8	(0.8)	0.8	(0.8)	0.2	(0.2)	0.7	(0.6)
Other	0.2	(0.2)	0.6	(0.5)	0.5	(0.5)	0.3	(0.3)	0.5	(0.4)

¹Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

²As a percentage of total cattle placed during 2020.

For feedlots that placed any cattle less than 700 lb in 2020, a little over half (53.8 percent) used any medically important antibiotic in feed for cattle less than 700 lb at placement. The medically important antibiotic used in feed by the highest percentage of feedlots for cattle less than 700 lb at placement was chlortetracycline (35.3 percent), which is approved for treatment and control of respiratory disease, treatment of bacterial enteritis, control of anaplasmosis, and reduction of the incidence of liver abscesses.

H.3.c. For the 86.4 percent of feedlots that placed any cattle less than 700 lb in 2020 (Table A.1.), percentage of feedlots that administered in-feed antibiotics that required a veterinary feed directive (VFD) to cattle that were less than 700 lb at placement, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	33.0	(5.7)	51.0	(10.8)	42.7	(9.3)	31.1	(6.0)	35.3	(5.1)
Oxytetracycline (Terramycin®, OTC)	4.6	(2.4)	10.9	(7.1)	0.5	(0.3)	8.2	(3.5)	5.4	(2.2)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	9.0	(3.3)	20.4	(10.9)	9.0	(5.8)	11.2	(4.0)	10.4	(3.3)
Neomycin (Neomix)	0.8	(0.8)	0.0	(—)	0.0	(—)	1.1	(1.1)	0.7	(0.7)
Tylosin (Tylan, Tylovet)	6.5	(2.6)	21.4	(5.7)	7.4	(1.5)	8.9	(3.6)	8.3	(2.3)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	0.8	(0.8)	2.1	(2.1)	0.7	(0.7)	1.0	(1.0)	0.9	(0.7)
Any medically important antibiotic	51.2	(6.0)	72.0	(9.9)	49.3	(9.1)	56.4	(6.6)	53.8	(5.3)

For cattle less than 700 lb at placement, a higher percentage of these cattle received tylosin on large feedlots (52.2 percent) compared with cattle on small feedlots (6.6 percent). In addition, a higher percentage of cattle received chlortetracycline on small feedlots (45.3 percent) compared with cattle on large feedlots (8.7 percent).

H.3.d. For the 41.8 percent of cattle less than 700 lb at placement in 2020 (Table A.2.), percentage of those cattle that received in-feed antibiotics that required a veterinary feed directive (VFD), by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Cattle ¹									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	45.3	(8.2)	8.7	(3.0)	14.2	(4.7)	30.1	(7.6)	17.5	(4.4)
Oxytetracycline (Terramycin®, OTC)	1.5	(1.1)	3.5	(3.3)	(D) ²	(D)	(D)	(D)	3.1	(2.6)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	3.4	(1.9)	2.3	(1.6)	2.6	(1.6)	2.5	(1.1)	2.6	(1.3)
Neomycin (Neomix)	0.0	(0.0)	0.0	(—)	0.0	(—)	0.0	(0.0)	0.0	(0.0)
Tylosin (Tylan, Tylovet)	6.6	(3.1)	52.2	(11.8)	50.0	(11.4)	7.7	(3.7)	41.2	(9.7)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	1.1	(1.1)	0.1	(0.1)	0.1	(0.1)	1.3	(1.3)	0.3	(0.3)

¹As a percentage of total cattle placed during 2020.

²Values of (D) denote too few to report.

4. VFD antibiotics given to cattle 700 lb or greater at placement

For feedlots that placed any cattle 700 lb or greater in 2020, a higher percentage of large feedlots (43.5 percent) used medically important antibiotics in feed for cattle 700 lb or greater at placement for reduction in the incidence of liver abscesses compared with small feedlots (11.1 percent). In addition, a higher percentage of large feedlots (71.9 percent) used any medically important antibiotics in feed for cattle 700 lb or greater at placement compared with small feedlots (30.3 percent).

H.4.a. For the 35.0 percent of feedlots that placed any cattle 700 lb or greater in 2020 (Table A.1.), percentage of feedlots that administered in-feed antibiotics that required a veterinary feed directive (VFD) to cattle that were 700 lb or greater at placement, by reason for use,* and by feedlot capacity and region:

Reason for use	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Reduction in the incidence of liver abscesses	11.1	(6.1)	43.5	(7.7)	19.9	(7.4)	11.7	(7.8)	15.7	(5.4)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	21.8	(7.3)	53.1	(8.8)	26.6	(9.7)	25.9	(8.8)	26.2	(6.5)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	5.9	(3.9)	1.4	(1.4)	5.9	(4.9)	4.7	(4.6)	5.3	(3.4)
Anaplasmosis	0.0	(—)	3.9	(3.8)	1.1	(1.1)	0.0	(—)	0.5	(0.5)
Other	0.0	(—)	2.8	(2.8)	0.8	(0.8)	0.0	(—)	0.4	(0.4)
Any reason	30.3	(8.8)	71.9	(8.1)	39.3	(11.5)	33.1	(10.5)	36.1	(7.7)

*Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

Of the cattle placed at 700 lb or greater, the highest percentage (59.6 percent) received medically important antibiotics for reduction in the incidence of liver abscesses. Only 5.9 percent of cattle 700 lb or more at placement received medically important antibiotics for respiratory disease. For cattle 700 lb or greater at placement, a higher percentage of these cattle in the West region (63.2 percent) received medically important antibiotics for reduction in the incidence of liver abscesses compared with cattle in the East region (17.7 percent).

H.4.b. For the 58.2 percent of cattle 700 lb or greater at placement in 2020 (Table A.2.), percentage of those cattle that received in-feed antibiotics that required a veterinary feed directive (VFD), by reason for use,¹ and by feedlot capacity and region:

Reason for use	Percent Cattle ²									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Reduction in the incidence of liver abscesses	22.5	(10.5)	63.3	(11.6)	63.2	(11.5)	17.7	(10.2)	59.6	(11.2)
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	26.0	(13.3)	3.9	(2.1)	3.8	(2.0)	30.7	(15.2)	5.9	(2.7)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	6.0	(3.8)	0.2	(0.2)	0.6	(0.4)	2.6	(2.7)	0.7	(0.4)
Anaplasmosis	0.0	(—)	0.2	(0.2)	0.2	(0.2)	0.0	(—)	0.1	(0.1)
Other	0.0	(—)	1.7	(2.2)	1.7	(2.2)	0.0	(—)	1.6	(2.0)

¹Feedlots were able to indicate up to two reasons for administering medically important antibiotics in feed. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

²As a percentage of total cattle placed during 2020.

For feedlots that placed any cattle 700 lb or greater in 2020, a higher percentage of large feedlots (43.5 percent) used tylosin in feed for cattle 700 lb or greater at placement compared with small feedlots (7.0 percent).

H.4.c. For the 35.0 percent of feedlots that placed any cattle 700 lb or greater in 2020 (Table A.1.), percentage of feedlots that administered in-feed antibiotics that required a veterinary feed directive (VFD) to cattle that were 700 lb or greater at placement, by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	18.2	(7.1)	49.3	(8.9)	33.5	(11.2)	12.2	(6.1)	22.5	(6.3)
Oxytetracycline (Terramycin®, OTC)	5.2	(3.5)	2.8	(1.8)	0.8	(0.5)	8.7	(5.7)	4.9	(3.0)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	2.6	(2.5)	5.3	(3.0)	0.8	(0.5)	5.0	(4.2)	2.9	(2.2)
Neomycin (Neomix)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tylosin (Tylan, Tylovet)	7.0	(4.8)	43.5	(7.7)	12.6	(3.3)	11.7	(7.8)	12.1	(4.3)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	0.0	(—)	4.4	(4.2)	1.3	(1.3)	0.0	(—)	0.6	(0.6)
Any medically important antibiotic	30.3	(8.8)	71.9	(8.1)	39.3	(11.5)	33.1	(10.5)	36.1	(7.7)

For cattle that were 700 lb or greater at placement, a higher percentage of these cattle on large feedlots (63.3 percent) compared with small feedlots (15.2 percent) received tylosin in feed. Overall, nearly 6 in 10 cattle that were 700 lb or greater at placement received tylosin in feed (58.9 percent) while less than 1 in 10 received chlortetracycline (6.0 percent).

H.4.d. For the 58.2 percent of cattle 700 lb or greater at placement in 2020 (Table A.2.), percentage of those cattle that received in-feed antibiotics that required a veterinary feed directive (VFD), by antibiotic used, and by feedlot capacity and region:

Antibiotic (trade name examples)	Percent Cattle ¹									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	15.9	(8.3)	5.0	(3.4)	5.6	(3.6)	10.3	(5.7)	6.0	(3.4)
Oxytetracycline (Terramycin®, OTC)	(D) ²	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.6	(1.5)
Chlortetracycline/Sulfamethazine (Aureo S 700®, Aureomix® S 700)	1.6	(1.5)	0.5	(0.3)	0.4	(0.3)	2.2	(1.7)	0.6	(0.3)
Neomycin (Neomix)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tylosin (Tylan, Tylovet)	15.2	(8.9)	63.3	(11.6)	62.4	(11.6)	17.7	(10.2)	58.9	(11.3)
Virginiamycin (Vmax)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Tilmicosin (Pulmotil®, Tilmovet®)	0.0	(—)	0.0	(0.0)	0.0	(0.0)	0.0	(—)	0.0	(0.0)

¹As a percentage of total cattle placed during 2020.

²Values of (D) denote too few to report.

5. Pulse-dosing of chlortetracycline

Chlortetracycline (CTC) is a medically important antibiotic approved for use in feed of feedlot cattle for treatment of bacterial pneumonia or enteritis, control of bacterial pneumonia, control of anaplasmosis, and reduction in the incidence of liver abscesses. The dose for CTC in feed for treatment of bacterial pneumonia is 10 mg/lb/day for not more than 5 days, and the dose for control of bacterial pneumonia is 350 mg/head/day with no limit on the number of days it can be fed. The higher dose is generally viewed as more effective. The treatment dose of 10 mg/lb/day can only be fed for 5 days, so some feedlots developed a strategy where they would feed CTC for 5 days, remove it from the ration for 1 to 2 days, and then put it back in the ration for another 5 days. Each 5-day course of treatment is called a “pulse,” and multiple pulses were often used routinely.

Before the VFD changes went into effect on January 1, 2017, CTC was available over-the-counter, and nutritionists often recommended a strategy of pulse-dosing CTC for feedlots. After the VFD changes went into effect, a VFD from a veterinarian became necessary to use CTC in feed.

This is the first NAHMS study with information about pulse-dosing of CTC in feedlot cattle. The question about pulse-dosing was limited to feedlots using CTC in feed for treatment of respiratory disease, so the percentages in the table below differ from the percentages of feedlots that used CTC in feed for any reason from table H.2.c. since the latter percentages also included feedlots that used chlortetracycline for reasons other than respiratory disease.

Overall, 28.1 percent of feedlots used CTC in feed for treatment of respiratory disease. There were no differences in the use of CTC in feed by feedlot capacity or region.

H.5.a. Percentage of feedlots that used chlortetracycline in feed for treatment of respiratory disease (e.g., bacterial pneumonia, shipping fever), by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
26.7	(5.1)	38.4	(8.7)	29.4	(8.0)	27.4	(5.4)	28.1	(4.5)

For feedlots that gave CTC in feed for treatment of respiratory disease, nearly half (46.4 percent) only gave a single treatment (pulse) of CTC, and 43.2 percent of feedlots gave more than one pulse treatment to at least some cattle.

H.5.b. For the 28.1 percent of feedlots that administered chlortetracycline to any cattle for treatment of respiratory disease (e.g., bacterial pneumonia, shipping fever) in 2020 (Table H.5.a.), percentage of feedlots by proportion of cattle that received more than one pulse treatment:

Percent Feedlots										
Proportion of Cattle That Received More Than One Pulse Treatment										
None (0%)		Some (1 to 50%)		Most (51 to 99%)		All (100%)		Don't know		Total
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.
46.4	(9.4)	23.1	(8.1)	2.7	(1.2)	17.4	(7.7)	10.4	(5.5)	100.0

For feedlots that gave CTC in feed for treatment of respiratory disease, there were no differences by feedlot capacity or region in the percentage of feedlots that administered more than one pulse treatment to at least some cattle. For all feedlots (regardless of whether CTC was used for treatment of respiratory disease) a relatively low percentage (12.1 percent) gave more than one pulse treatment of CTC in cattle feed in 2020 ($43.2 \times 0.281 = 12.1$).

H.5.c. For the 28.1 percent of feedlots that administered chlortetracycline to any cattle for treatment of respiratory disease (e.g., bacterial pneumonia, shipping fever) in 2020 (Table H.5.a.), percentage of feedlots that administered more than one pulse treatment to any cattle*, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)					Region				
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
38.4	(11.1)	66.8	(9.7)	50.8	(15.4)	38.0	(12.0)	43.2	(9.4)

*"Any cattle" means some, most, or all cattle were administered more than one pulse treatment (Table H.5.b).

I. Antibiotic Use in Water

On poultry and swine operations, antibiotics are often used in water for disease treatment, control, or prevention purposes. Past NAHMS studies have shown that antibiotic use in water on feedlot operations is not common.

Overall, 5.9 percent of feedlots used antibiotics in water for any reason in 2020. The only reasons stated for using antibiotics in water were for respiratory disease (5.9 percent) and gastrointestinal disease (0.1 percent).

I.1. Percentage of feedlots that administered antibiotics in water in 2020 by reason for use*:

Reason for use	Percent Feedlots	
	Pct.	Std. error
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	5.9	(2.1)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	0.1	(0.1)
Pinkeye	0.0	(—)
Foot rot	0.0	(—)
Other	0.0	(—)
Any reason	5.9	(2.1)

*Feedlots were able to indicate up to two reasons for administering medically important antibiotics in water. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

A low percentage of cattle received antibiotics in water, with 1.6 percent receiving antibiotics in water for respiratory disease, and 0.1 percent receiving antibiotics in water for gastrointestinal disease.

I.2. Percentage of cattle that received antibiotics in water in 2020 by reason for use¹:

Reason for use	Percent Cattle ²	
	Pct.	Std. error
Respiratory disease (e.g., bacterial pneumonia, shipping fever)	1.6	(0.7)
Gastrointestinal disease (e.g., bacterial enteritis [diarrhea])	0.1	(0.1)
Pinkeye	0.0	(—)
Foot rot	0.0	(—)
Other	0.0	(—)

¹Feedlots were able to indicate up to two reasons for administering medically important antibiotics in water. The percentages above represent the percentages of feedlots that indicated the given reason as either of two reasons for use on the questionnaire.

²As a percentage of total cattle placed during 2020.

There was not a predominant antibiotic used by feedlots in water in 2020.

I.3. Percentage of feedlots that administered antibiotics in water in 2020 by antibiotic used:

Antibiotic (trade name examples)	Percent Feedlots	
	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	0.3	(0.2)
Oxytetracycline (Terramycin®, OTC)	1.9	(1.2)
Tetracycline (Duramycin, Tet-Sol)	0.0	(—)
Sulfamethazine/sulfadimethoxine (Sulfasol)	3.7	(1.6)
Neomycin (Neosol)	0.0	(—)
Spectinomycin (Spectam, SpectoGard)	0.0	(—)
Any of the above antibiotics	5.9	(2.1)

There was not a predominant antibiotic that cattle received in water in 2020.

I.4. Percentage of cattle that received antibiotics in water in 2020 by antibiotic used:

Antibiotic (trade name examples)	Percent Cattle*	
	Pct.	Std. error
Chlortetracycline (Aureomycin®, CTC)	0.2	(0.2)
Oxytetracycline (Terramycin®, OTC)	0.3	(0.1)
Tetracycline (Duramycin, Tet-Sol)	0.0	(—)
Sulfamethazine/sulfadimethoxine (Sulfasol)	1.1	(0.7)
Neomycin (Neosol)	0.0	(—)
Spectinomycin (Spectam, SpectoGard)	0.0	(—)

*As a percentage of total cattle placed during 2020.

J. Nutrition

1. Coccidiostat (other than ionophore) and beta-agonist use

Coccidiosis in cattle can cause diarrhea, loss of appetite, and decreased rate-of-gain, with severe cases leading to death. It primarily affects young cattle 1-2 months of age but can affect cattle up to 1 year in age. Coccidiostats are used for treatment, control, and prevention of coccidiosis. Monensin and lasalocid are ionophore coccidiostats approved for use in cattle. Common non-ionophore coccidiostats used in cattle include decoquinate (Deccox®) and amprolium (Corid®)

Beta-agonists are approved for use in feedlot cattle during the last 28-42 days on feed for increased rate of gain, improved feed efficiency, and increased carcass leanness. Beta-agonists approved for cattle in the U.S. include ractopamine (Optaflexx®, Actogain®, Optigrid®) and zilpaterol (Zilmax®), the latter of which is no longer marketed. The questionnaire used for this study asked specifically about use of beta-agonists. A new product, lubabegron (Experior®), was approved by the FDA in 2018 for reduction of ammonia gas emissions, but this product is a beta-agonist/antagonist (agonist to β_3 receptors and antagonist to β_1 and β_2 receptors), so it is unclear if respondents would have considered use of lubabegron when answering this question on beta-agonist use. While lubabegron has been shown to increase rate of gain and improve feed efficiency in research studies, the product label states it is only approved for reduction of ammonia gas emissions.

About a quarter of feedlots (27.5 percent) used non-ionophore coccidiostats at some point during the feeding period in 2020. There were no differences by feedlot capacity or region in the percentage of feedlots that used non-ionophore coccidiostats. A higher percentage of large feedlots (22.0 percent) than small feedlots (1.9 percent) used a beta-agonist in 2020.

J.1.a. Percentage of feedlots by use of non-ionophore coccidiostats or beta-agonists during the feeding period in 2020, and by feedlot capacity and region:

Feed additive	Percent Feedlots							
	Feedlot capacity (number head)				Region			
	Small (50-999)		Large (1,000 or more)		West		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Non-ionophore coccidiostat, such amprolium (e.g., Corid®) or decoquinate (e.g., Deccox®)	24.8	(5.0)	47.8	(10.3)	35.4	(9.0)	23.0	(5.4)
Beta-agonist (e.g., ractopamine)	1.9	(1.3)	22.0	(5.8)	7.4	(1.6)	2.7	(1.7)
	27.5	(4.7)					4.3	(1.3)

Only 13.4 percent of cattle received a non-ionophore coccidiostat in 2020 while almost half (45.1 percent) received a beta-agonist. A higher percentage of cattle on large (53.2 percent) than on small feedlots (4.2 percent) received a beta-agonist in 2020. In addition, a higher percentage of cattle on feedlots in the West (51.7 percent) than in the East region (5.7 percent) received a beta-agonist in 2020.

J.1.b. Percentage of cattle that received non-ionophore coccidiostats or beta-agonists during the feeding period in 2020, by feedlot capacity and by region:

Feed additive	Percent Cattle*							
	Feedlot capacity (number head)				Region			
	Small (50-999)		Large (1,000 or more)		West		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Non-ionophore coccidiostat, such amprolium (e.g., Corid®) or decoquinate (e.g., Deccox®)	22.7	(6.9)	11.6	(3.4)	13.3	(3.8)	14.1	(5.0)
Beta-agonist (e.g., ractopamine)	4.2	(2.9)	53.2	(9.6)	51.7	(9.6)	5.7	(3.4)
							45.1	(9.3)

*As a percentage of total cattle placed during 2020.

2. Change in beta-agonist use due to COVID-19

In the early days of the pandemic caused by COVID-19, many slaughter plants were closed or operating at reduced capacity, which may have caused some cattle to be held at the feedlot longer than usual. Because of this, feedlots may have elected not to use beta-agonists, which are only approved for use in the 28-42 days before slaughter. Only 0.8 percent of all feedlots and 7.1 percent of large feedlots reported that the percentage of cattle fed a beta-agonist was different in 2020 compared with 2019 due to COVID-19 or its effects.

J.2.a. Percentage of feedlots for which the percentage of cattle that were fed a beta-agonist (e.g., ractopamine) in 2020 was different than the percentage of cattle that were fed a beta-agonist in 2019 due to COVID-19 or its effects, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.0	(—)	7.1	(3.5)	2.3	(1.1)	0.0	(—)	0.8	(0.4)

For feedlots for which the percentage of cattle receiving a beta-agonist (e.g., ractopamine) in 2020 was different than that in 2019 due to COVID-19 or its effects, all feedlots reported that the percentage of cattle fed ractopamine was lower in 2020 compared with 2019.

J.2.b. For the 0.8 percent of feedlots for which the percentage of cattle that were fed a beta-agonist (e.g., ractopamine) in 2020 was different than that in 2019 due to COVID-19 or its effects (Table J.2.a.), percentage of feedlots by change in the percentage of cattle that were fed a beta-agonist in 2020 compared to 2019:

Percent Feedlots		
Change	Pct.	Std. error
More than 2019	0.0	(—)
Less than 2019	100.0	(—)
Total	100.0	

3. Nutritionist use

Meeting the nutritional needs of cattle is key to preserving animal health and growth. Furthermore, the cost of gain for cattle in feedlots is highly dependent on the cost of ingredients in the diet. A nutritionist can help determine the optimum, least-cost rations needed to support growth and finishing objectives for a particular group of cattle.

Overall, 61.2 percent of feedlots used a nutritionist in 2020. A higher percentage of large feedlots (94.6 percent) used a nutritionist compared with small feedlots (56.8 percent).

J.3. Percentage of feedlots that used the services of a nutritionist in 2020, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
56.8	(5.2)	94.6	(4.6)	76.9	(8.4)	52.5	(5.8)	61.2	(4.8)

4. Water sources

Most feedlots (83.7 percent) obtained water for cattle from a well. There were no differences by feedlot capacity in the percentage of feedlots that used ground water, surface water, or a municipal water supply. A higher percentage of feedlots in the West region (48.7 percent) than in the East region (9.6 percent) used a municipal water supply.

J.4. Percentage of feedlots by type of water sources used in 2020, and by feedlot capacity and region:

Percent Feedlots										
Water source	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Ground water (well)	82.6	(4.3)	91.8	(3.9)	76.3	(8.3)	87.8	(4.0)	83.7	(3.9)
Surface water (ponds, lakes, streams, water storage from river flows)	14.1	(3.5)	25.3	(9.9)	14.2	(3.0)	16.1	(4.2)	15.4	(2.9)
Municipal water supply	21.9	(4.2)	35.8	(10.8)	48.7	(7.2)	9.6	(3.4)	23.5	(3.4)

5. Feed additives

Feed additives are substances added to feed for a specific purpose. Medicated feed contains an FDA-approved animal drug as a feed additive, such as an antibiotic, coccidiostat, or beta-agonist. These medicated feed additives are used for purposes such as disease treatment, control, or prevention or for improving feed efficiency. Non-medicated feed can include additives such as vitamins or minerals to balance a ration, or probiotics, prebiotics, essential oils or enzymes used for reasons such as enhancing immunity or improving feed efficiency. Among mineral supplements, organic ones are generally thought to have better gut absorption than inorganic ones, which are lower in cost. Non-medicated feed additives may need FDA approval if they are not generally recognized as safe (GRAS) as described in 21 CFR § 582 and 584. Individual States may have their own regulations for feed additives that need to be met in addition to any FDA regulations.

There were no differences by feedlot capacity or region in the percentage of feedlots using any of the feed additives in the table below. Vitamin supplements and inorganic mineral supplements were used by the highest percentages of feedlots (57.2 and 45.8 percent, respectively). A higher percentage of feedlots used inorganic mineral supplements (45.8 percent) compared with organic mineral supplements (25.8 percent).

J.5.a. Percentage of feedlots by type of feed additives used in 2020, and by feedlot capacity and region:

Percent Feedlots										
Feed additive	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Direct-fed microbial or probiotic (e.g., <i>Lactobacillus acidophilus</i> or yeast)	13.6	(3.8)	21.6	(6.5)	14.4	(5.9)	14.6	(4.2)	14.5	(3.4)
Yeast fermentation products	11.9	(3.4)	7.7	(3.8)	17.1	(6.7)	8.3	(2.9)	11.4	(3.0)
Prebiotics (e.g., mannan-oligosaccharides)	4.6	(2.3)	0.0	(—)	3.9	(3.5)	4.1	(2.5)	4.1	(2.1)
Vitamin supplements	56.4	(4.8)	63.0	(10.3)	60.7	(7.6)	55.3	(5.5)	57.2	(4.5)
Organic mineral supplements	26.0	(4.2)	24.9	(6.7)	33.1	(5.7)	21.8	(4.8)	25.8	(3.7)
Inorganic mineral supplements	44.7	(5.6)	54.3	(10.3)	45.8	(9.5)	45.8	(6.1)	45.8	(5.2)
Enzymes	3.1	(1.9)	4.1	(2.5)	1.3	(0.8)	4.3	(2.6)	3.2	(1.7)
Essential oils and plant-derived products (e.g., yucca extract)	1.4	(1.4)	13.1	(8.9)	4.3	(3.3)	1.9	(1.9)	2.7	(1.7)
Other	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)	0.0	(—)
Any of the above additives	78.1	(4.3)	74.1	(10.6)	82.6	(7.6)	74.7	(4.9)	77.5	(4.1)

For feedlots that used any of the feed additives in the table below, improving growth rate and/or feed efficiency was the reason for use by the highest percentage of feedlots for each of the feed additives below.

J.5.b. For feedlots that used each of the following feed additives in 2020 (Table J.5.a.), percentage of feedlots by type of feed additives used and by reasons for use:

Feed additive	Percent Feedlots											
	Reason for use											
	Improve growth rate and/or feed efficiency		Antibiotic alternative		Bovine respiratory disease		Hoof health		Pre-harvest food safety		Reduce liver abscesses	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Direct-fed microbial or probiotic (e.g., <i>Lactobacillus acidophilus</i> or yeast)	81.3	(10.3)	20.2	(9.9)	21.0	(10.8)	7.1	(6.5)	10.8	(5.3)	3.9	(3.9)
Yeast fermentation products	92.3	(4.3)	23.0	(9.9)	10.6	(7.1)	8.6	(8.2)	5.0	(5.0)	16.0	(11.2)
Prebiotics (e.g., mannan-oligosaccharides)	100.0	(—)	14.1	(13.9)	3.5	(3.7)	0.0	(—)	14.1	(13.9)	14.1	(13.9)
Vitamin supplements	95.9	(2.5)	13.4	(4.4)	26.8	(5.7)	30.6	(6.0)	6.3	(3.2)	10.2	(3.9)
Organic mineral supplements	95.8	(2.0)	12.8	(6.6)	35.3	(8.9)	41.3	(9.6)	3.0	(2.3)	2.5	(2.2)
Inorganic mineral supplements	93.2	(3.0)	13.1	(5.0)	23.0	(6.1)	36.4	(6.9)	9.5	(4.6)	12.4	(4.9)
Enzymes	100.0	(—)	18.8	(18.1)	18.8	(18.1)	51.0	(27.6)	18.8	(18.1)	18.8	(18.1)
Essential oils and plant-derived products (e.g., yucca extract)	100.0	(—)	4.4	(5.0)	89.8	(9.5)	44.3	(30.9)	0.0	(—)	41.0	(30.4)
Other	NA*		NA		NA		NA		NA		NA	

*Values of NA denote no feedlots used “other” feed additives.

K. Biosecurity**1. Biosecurity practices**

Biosecurity practices help to prevent the introduction of bacteria, viruses, and other pathogens that cause disease in cattle onto the feedlot, which can occur via worker's clothing/shoes, vehicle tires, visitor's clothing/shoes, wild birds, rodents, new introductions of animals, and feed, among other routes of disease introduction. Biosecurity practices can also help to prevent the spread of pathogens within a feedlot.

Over three-fourths of feedlots allowed visitors or vehicles onto the feedlot. There were no differences by feedlot capacity or region in the percentage of feedlots that allowed visitors or vehicles onto the feedlot. A higher percentage of feedlots in the West region (57.6 percent) allowed horses onto the feedlot compared with feedlots in the East region (25.2 percent).

K.1.a. Percentage of feedlots by type of traffic allowed onto the feedlot in 2020, and by feedlot capacity and region:

Percent Feedlots										
Traffic type	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Visitors	75.8	(4.8)	84.6	(9.8)	82.9	(7.4)	73.5	(5.4)	76.8	(4.3)
Vehicles	76.0	(4.7)	83.2	(9.9)	83.1	(6.7)	73.3	(5.4)	76.8	(4.2)
Horses	33.5	(5.2)	61.3	(10.3)	57.6	(9.7)	25.2	(5.4)	36.7	(4.9)

There were no differences by feedlot capacity or region in the percentage of feedlots that used the biosecurity practices in the table below. Over 7 in 10 feedlots practiced some form of insect control (71.8 percent) or rodent control (76.2 percent).

K.1.b. Percentage of feedlots by type of biosecurity practices used in 2020, and by feedlot capacity and region:

Biosecurity practice	Percent Feedlots									
	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Control access for visitors entering animal areas ¹	62.6	(6.3)	72.5	(8.8)	69.6	(9.1)	60.2	(6.9)	63.8	(5.5)
Restrict access of visitors onto the feedlot premises ¹	46.7	(6.4)	65.8	(9.3)	54.3	(9.3)	46.0	(6.9)	49.2	(5.6)
Disposable or clean boots for visitors entering animal areas ¹	18.5	(4.9)	20.4	(8.2)	18.8	(7.7)	18.7	(5.3)	18.8	(4.4)
Footbaths for visitors entering animal areas ¹	2.3	(1.5)	10.7	(7.6)	0.4	(0.4)	5.2	(2.7)	3.4	(1.7)
Control access for vehicles entering animal areas ²	54.5	(6.0)	62.6	(8.5)	56.1	(8.8)	55.1	(6.6)	55.5	(5.3)
Restrict access of vehicles onto the feedlot premises ²	40.8	(6.1)	65.2	(8.9)	55.3	(9.1)	36.7	(6.5)	43.8	(5.3)
Restrict movement of horses onto the feedlot premises ³	32.4	(9.3)	52.2	(11.4)	36.2	(10.4)	36.3	(11.9)	36.2	(7.8)
Insect control	70.2	(4.5)	83.2	(7.5)	80.3	(6.7)	67.0	(5.4)	71.8	(4.2)
Rodent control	75.6	(4.6)	80.6	(7.7)	82.6	(6.5)	72.6	(5.5)	76.2	(4.2)
Bird control	20.1	(4.4)	39.3	(10.0)	31.9	(8.4)	17.1	(4.6)	22.4	(4.2)
Have dead cattle picked up at edge of property	35.7	(5.1)	44.0	(9.3)	43.8	(8.4)	32.7	(5.3)	36.7	(4.6)
Compost deads on site	42.1	(5.2)	49.3	(9.9)	41.8	(8.8)	43.6	(5.7)	42.9	(4.8)

¹For the 76.8 percent of feedlots that allowed visitors onto the feedlot (Table K.1.a).

²For the 76.8 percent of feedlots that allowed vehicles onto the feedlot (Table K.1.a).

³For the 36.7 percent of feedlots that allowed horses onto the feedlot (Table K.1.a).

2. Changes in biosecurity practices due to COVID-19

A low percentage of feedlots (3.0 percent) changed biosecurity practices for visitors, vehicles, or horses in 2020 due to COVID-19 or its effects. Feedlots on which biosecurity practices did change due to COVID-19 were given the opportunity to describe the changes that occurred. Eliminating visitors/tours was cited as one of the ways in which biosecurity practices changed.

K.2. Percentage of feedlots for which any of the biosecurity practices for visitors, vehicles, or horses changed in 2020 due to COVID-19 or its effects, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1.7	(1.2)	13.0	(4.9)	4.3	(1.5)	2.3	(1.7)	3.0	(1.2)

3. Biosecurity plan

Feedlots that have a biosecurity plan in place will be more prepared to maintain continuity of business operations in the event of an introduction of a foreign animal disease, such as foot-and-mouth disease. A biosecurity plan for a specific operation should include a map of the operation along with a line of separation, which is an outer control boundary around, or within, the premises to limit the movement of pathogens into areas where cattle can be exposed. A biosecurity plan should also include a map of access points to the operation, the cleaning and disinfection station(s), designated parking areas, vehicle movement pathways, and carcass disposal/pickup locations. Guidance on creating biosecurity plans for feedlots can be found at <https://www.securebeef.org/biosecurity>. An enhanced biosecurity plan will help prevent exposing cattle to a disease like foot-and-mouth disease during an outbreak. More information on enhanced biosecurity can be found at <https://www.securebeef.org/biosecurity/#enhanced-biosecurity>, with a manual available at https://www.securebeef.org/Assets/SBS_Info-Manual-for-Enhanced-Biosecurity-FMD-Feedlots.pdf.

Less than 1 in 10 feedlots (8.5 percent) had a written or electronic biosecurity plan in 2020. A higher percentage of large feedlots (30.3 percent) than small feedlots (5.6 percent) had a written or electronic biosecurity plan in 2020.

K.3. Percentage of feedlots that had a written or electronic biosecurity plan in 2020, by feedlot capacity and by region:

Percent Feedlots									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
5.6	(2.4)	30.3	(6.8)	16.3	(4.6)	4.1	(2.1)	8.5	(2.1)

4. Secure Beef Supply Plan familiarity

If foot-and-mouth disease (FMD) is ever found in United States livestock, Regulatory Officials will limit the movement of cattle to control the spread of this very contagious animal disease. The Secure Beef Supply Plan for Continuity of Business provides opportunities to voluntarily prepare before an outbreak occurs. Guidance includes developing contingency plans for limited animal movement, enhancing biosecurity practices to limit exposure, identifying signs of FMD, and working with Regulatory Officials for movement permits and outbreak response. This will better position feedlots that have no evidence of infection to move cattle to processing or another premises under a movement control permit issued by Regulatory Officials, which maintains business continuity.

About two-thirds of feedlots (66.9 percent) were not familiar with the Secure Beef Supply Plan. A higher percentage of large feedlots (12.5 percent) than small feedlots (1.6 percent) were very familiar with the Secure Beef Supply Plan. It should be noted that after completion of this study, the beef cattle industry received USDA National Animal Disease Preparedness and Response (NADPRP) funding in 2023 to advance cattle producers' participation in the Secure Beef Supply Plan, so the percentages of feedlots familiar with the Secure Beef Supply Plan may now be higher.

K.4. Percentage of feedlots by level of familiarity with the Secure Beef Supply Plan, and by feedlot capacity and region:

Percent Feedlots										
Level of familiarity	Feedlot capacity (number head)				Region				All feedlots	
	Small		Large		West		East			
	(50-999)	(1,000 or more)								
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Very familiar	1.6	(1.1)	12.5	(4.2)	3.7	(1.1)	2.4	(1.6)	2.8	(1.1)
Somewhat familiar	10.2	(3.2)	22.8	(7.8)	6.0	(1.7)	14.8	(4.5)	11.7	(3.0)
Heard of name only	18.1	(4.5)	22.0	(9.0)	20.6	(7.9)	17.4	(4.8)	18.5	(4.2)
Not familiar	70.1	(5.1)	42.7	(10.2)	69.7	(8.0)	65.4	(5.8)	66.9	(4.7)
Total	100.0		100.0		100.0		100.0		100.0	

5. Proximity to other farms with domestic ruminants

Sharing a fence line with another operation where nose-to-nose contact is possible between ruminant species can result in disease spread between operations. The vast majority (91.8 percent) of feedlots did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants in 2020.

K.5.a. Percentage of feedlots that shared a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants in 2020, by feedlot capacity and by region:

Percent Feedlots										
Shared fence line	Feedlot capacity (number head)				Region				All feedlots	
	Small (50-999)		Large (1,000 or more)		West		East			
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Yes	8.0	(2.9)	9.6	(8.8)	7.6	(1.2)	8.6	(3.3)	8.2	(2.2)
No	92.0	(2.9)	90.4	(8.8)	92.4	(1.2)	91.4	(3.3)	91.8	(2.2)
Total	100.0		100.0		100.0		100.0		100.0	

For feedlots that did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants, the average distance to the nearest operation with cattle, bison, or other domestic ruminants was 1.7 miles.

K.5.b. For the 91.8 percent of feedlots that did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants in 2020 (Table K.5.a.), average distance (to the nearest half mile) to another operation with cattle, bison, or other domestic ruminants, by feedlot capacity and by region:

Average Distance (mi)									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
1.7	(0.2)	1.6	(0.3)	1.7	(0.2)	1.8	(0.3)	1.7	(0.2)

For feedlots that did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants, 82.1 percent of feedlots were less than three miles from another operation with cattle, bison, or other domestic ruminants.

K.5.c. For the 91.8 percent of feedlots that did not share a fence line with another operation with the possibility of nose-to-nose contact with other cattle, bison, or other domestic ruminants in 2020 (Table K.5.a.), percentage of feedlots by distance (to the nearest half mile) to another operation with cattle, bison, or other domestic ruminants, and by feedlot capacity and region:

Percent Feedlots										
Distance (mi)	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.5–0.9	42.1	(5.5)	52.6	(9.5)	47.2	(8.3)	41.1	(6.2)	43.4	(5.0)
1.0–2.9	39.6	(5.6)	31.4	(7.6)	34.1	(8.4)	41.4	(6.2)	38.7	(5.0)
3.0–4.9	9.1	(3.3)	5.5	(2.9)	10.5	(5.2)	7.5	(3.4)	8.6	(2.9)
5.0 or more	9.2	(3.0)	10.6	(3.7)	8.2	(4.2)	10.0	(3.3)	9.4	(2.6)
Total	100.0		100.0		100.0		100.0		100.0	

6. Employees

As expected, large feedlots had a higher average number of employees (8.3) directly involved with cattle care than small feedlots (1.8).

K.6.a. Average number of employees directly involved in cattle care on the feedlot in 2020, by feedlot capacity and by region:

Average Number of Employees									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
1.8	(0.2)	8.3	(2.1)	4.0	(0.7)	1.7	(0.2)	2.5	(0.3)

One in five (20.3 percent) small feedlots had no employees directly involved in cattle care, implying that only the owner or non-employee family members were involved in cattle care. About one in five (21.5 percent) large feedlots and no small feedlots had 10 or more employees directly involved in cattle care. Overall, 81.9 percent of feedlots had at least one employee directly involved in cattle care.

K.6.b. Percentage of feedlots by average number of employees directly involved in cattle care on the feedlot in 2020, and by feedlot capacity and region:

Percent Feedlots										
Average number of employees	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	20.3	(4.1)	0.0	(—)	4.5	(4.5)	25.4	(5.1)	18.1	(3.7)
1–4	72.7	(4.8)	69.2	(7.5)	79.8	(6.5)	68.2	(5.7)	72.3	(4.3)
5–9	7.0	(2.7)	9.3	(3.8)	8.9	(4.6)	6.4	(2.9)	7.2	(2.5)
10 or more	0.0	(—)	21.5	(6.3)	6.8	(1.7)	0.0	(—)	2.4	(0.6)
Total	100.0		100.0		100.0		100.0		100.0	

For feedlots with employees directly involved in cattle care, nearly a third of these feedlots (31.5 percent) had employees that had contact with cattle, bison, or other ruminants on other operations, and slightly over a fourth of these feedlots (26.2 percent) had employees that owned cattle, bison, or other ruminants at a location other than the feedlot.

K.6.c. For the 81.9 percent of feedlots with employees directly involved in cattle care in 2020 (Table K.6.b.), percentage of feedlots by employee exposure to ruminants on other operations, and by feedlot capacity and region:

Percent Feedlots										
Employee exposure	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Employees have contact with cattle, bison, or other ruminants on other operations	32.3	(5.7)	26.3	(9.5)	28.6	(8.7)	33.5	(6.3)	31.5	(5.2)
Employees own cattle, bison, or other ruminants at another location	25.3	(4.8)	32.1	(9.7)	25.8	(8.1)	26.5	(5.0)	26.2	(4.5)

7. Re-sorting of cattle

After placement into a pen on a feedlot, cattle at some point may be sorted and moved to different pens based on weight (or another factor) so that the cattle in each pen will be more uniform in size or another characteristic at the time of harvest. Moving cattle to a different pen with other cattle has the possibility of introducing disease to the new pen.

The majority of feedlots (61.2 percent) did some sorting of cattle during the feeding period such that cattle did not stay in the same pen during the entire feeding period.

K.7.a. Percentage of feedlots by pen sorting procedure used in 2020, and by feedlot capacity and region:

Percent Feedlots									
Pen sorting procedure	Feedlot capacity (number head)				Region				
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct. Std. error
Cattle stayed in the same pen during the entire feeding period	41.1	(5.5)	21.5	(6.4)	38.2	(8.8)	39.1	(5.8)	38.8 (4.9)
Cattle did not stay in the same pen during the entire feeding period	58.9	(5.5)	78.5	(6.4)	61.8	(8.8)	60.9	(5.8)	61.2 (4.9)
Total	100.0		100.0		100.0		100.0		100.0

For feedlots on which all cattle did not stay in the same pen during the feeding period, cattle were sorted an average of 2.0 times.

K.7.b. For the 61.2 percent of feedlots on which cattle did not stay in the same pen during the feeding period (Table K.7.a.), average number of times that cattle were re-sorted during the feeding period, by feedlot capacity and by region:

Average Number of Times Re-Sorted									
Feedlot capacity (number head)				Region					
Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
2.0	(0.2)	2.2	(0.4)	2.0	(0.2)	2.0	(0.2)	2.0	(0.2)

For feedlots on which cattle did not stay in the same pen during the feeding period, about a third (32.6 percent) re-sorted cattle 3 times or more, and 10.5 percent moved cattle to a new pen but did not re-sort them, meaning all the cattle in a pen were moved to a new pen.

K.7.c. For the 61.2 percent of feedlots on which cattle did not stay in the same pen during the feeding period (Table K.7.a.), percentage of feedlots by number of times that cattle were re-sorted during the feeding period, and by feedlot capacity and region:

Percent Feedlots										
Number of times re-sorted	Feedlot capacity (number head)				Region					
	Small (50-999)		Large (1,000 or more)		West		East		All feedlots	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	10.2	(4.5)	12.2	(4.7)	12.1	(7.0)	9.6	(4.7)	10.5	(3.9)
1	29.4	(6.4)	27.5	(8.4)	24.5	(9.2)	31.7	(7.0)	29.1	(5.6)
2	28.9	(6.5)	22.1	(12.2)	39.0	(11.8)	21.7	(6.5)	27.9	(6.1)
3 or more	31.6	(6.2)	38.2	(12.4)	24.4	(8.3)	37.1	(7.6)	32.6	(5.8)
Total	100.0		100.0		100.0		100.0		100.0	

Section II: Methodology

A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting industry members about their informational needs and priorities during a needs-assessment phase. A driving force of the needs assessment was the desire of NAHMS to receive as much input as possible from a variety of producers, industry experts, veterinarians, extension specialists, universities, cattle organizations, allied industry groups, and other stakeholders. Information was collected via a needs assessment survey.

The objective of the needs assessment survey for the NAHMS Health Management on U.S. Feedlots 2021 study was to identify critical information needs concerning cattle management and health on feedlots. The online survey gathered opinions from a variety of stakeholders regarding beef feedlot management priorities, health priorities, antibiotic stewardship, industry burdens, and participation incentives for the study. The survey was available online from March 19 through April 30, 2019. The online questionnaire was distributed via email lists and stakeholder announcements. All individuals involved in the cattle industry were encouraged to participate, regardless of cattle ownership. In total, 206 individuals from 36 States completed the study's needs assessment survey.

Respondents to the needs assessment survey represented the following affiliations:

- Veterinary practitioners or consultants—42 percent of respondents.
- Beef producers (feedlot owners/managers, cow-calf producers)—27 percent of respondents.
- Government and university employees—21 percent of respondents.
- Other affiliation—10 percent of respondents.

Based on input from the needs assessment, reviews from the scientific literature, and input from government and industry researchers, the following primary study objectives were identified:

1. Describe health management practices on U.S. feedlots with 50 or more head
2. Estimate the prevalence of important feedlot cattle diseases
3. Describe antibiotic use and stewardship practices on U.S. feedlots
4. Describe trends in feedlot cattle health management practices and important feedlot cattle diseases

B. Sampling and Estimation

1. State selection

The goal for NAHMS national studies is to include states that account for at least 70 percent of the animals and operations being studied. This method helps to ensure that the representation of the sample collected, and the statistical inferences made based on the sample data, can be generalized to the target population.

States were selected for inclusion in the study based on the number of feedlots and the number of cattle in two capacity categories: small feedlots (50 to 999 head capacity) and large feedlots (1,000 or more head capacity). Small feedlots were selected from 18 States and large feedlots from 17 states.

Of the 22 participating States, only small feedlots were selected from 5 States (Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin), only large feedlots were selected from 4 States (Montana, Oklahoma, Utah, and Washington), and both small and large feedlots were selected from 13 States (California, Colorado, Idaho, Illinois, Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota, Texas, and Wyoming).

2. Feedlot selection

The list frame from which feedlots were sampled is managed by NASS and was updated with information from the 2017 Census of Agriculture prior to sample selection. Within each State, a stratified random sample was selected in which strata were defined by cattle on feed inventory. For small feedlots, a total sample of 3,165 feedlots was selected. All large feedlots (2,177) with 1,000 or more head inventories on the NASS list frame in the 17 participating States were selected.

For the small feedlot component of the study, the total sample size was computed to achieve prespecified precision criteria at the 95-percent confidence level, while accounting for the estimated population size, design effect, and expected response rate. The sample size was allocated to strata approximately proportional to feedlot capacity, based on a weighted average number of feedlots and the total inventory within the strata. For the large feedlot component of the study, there was no sample selection because all 2,177 feedlots with 1,000 or more head capacity in the 17 participating States were selected. This sampling design allows for logistical efficiencies in administering the survey and prespecified precision for estimates.

3. Population inferences

Cattle feedlots in the United States with capacities of 50 head or more were the target population for the study. The 18 States for the small feedlot component accounted for at least 95.7 percent of the inventory on feedlots with 50 to 999 head and 94.0 percent of feedlots with 50 to 999 head. The 17 States for the large feedlot component accounted for at least 95.5 percent of the inventory on feedlots with 1,000 or more head, and 94.4 percent of feedlots with 1,000 or more head.

The inverse of the probability of selection (with probabilities being approximately proportional to stratum size) was used as the initial weight. At each phase of the study, nonresponse was accounted for using an additional adjustment according to the proportion of nonrespondents within each stratum, using a propensity score model. Calibration to population totals was performed using information available for respondents and nonrespondents.

SUDAAN software (RTI, version 11.0.4) was used to produce population estimates and their standard errors. The SUDAAN software allows estimation of standard errors for complex sampling designs using Taylor series linearization.

a. Phase I

Estimates for Phase I represent 38.5 percent of feedlots in the 22 participating States (18 States for the 50 to 999 head small feedlot component and 17 States for the 1,000 or more head large feedlot component, with most states participating in both the small and large feedlot components), after taking into account the survey design and weighting (see Section II.E.1. for more information on the calculation of the weighted response rate).

b. Phase II

Estimates for Phase II represent 43.0 percent of feedlots in the 22 participating States (18 States for the 50 to 999 head small feedlot component and 17 States for the 1,000 or more head large feedlot component, with most states participating in both the small and large feedlot components), after taking into account the survey design and weighting (see Section II.E.2. for more information on the calculation of the weighted response rate).

C. Data Collection

1. Phase I: Health Management on U.S. Feedlots 2021 Phase I questionnaire

Due to restrictions in place to prevent the spread of COVID-19, interviews took place over the telephone or through a web survey, rather than the in-person interviews around which the study was originally designed.

From March 1 through April 30, 2021, producers completed the Health Management on U.S. Feedlots 2021 Phase I questionnaire via a self-administered paper survey sent through the mail, a self-administered web survey, or a telephone interview with a NASS enumerator. Producers were provided with a phone number for a NASS enumerator and with a supplemental sheet to help them answer questions on the survey. The interview took an average of 58 minutes to complete.

Upon completion of the interview, producers were asked to provide consent to allow NASS to turn contact information over to APHIS for the opportunity to participate in Phase II of the study. This completed Phase I of the study. NASS provided the list of producers willing to participate in the second phase of the study to NAHMS so that NAHMS coordinators in each state could begin contacting consenting producers for Phase II of the study.

2. Phase II: Health Management on U.S. Feedlots 2021 Phase II questionnaire

Producers who indicated willingness to participate in Phase II of the study were contacted by VS Veterinary Medical Officers (VMOs) and/or Animal Health Technicians (AHTs) from June 14, 2021, through January 25, 2022. The VMOs/AHTs contacted producers to set up a time that was convenient for the producers to complete the interview either face-to-face or over the telephone. Data collected during the interview were entered into an electronic survey instrument or were recorded on paper surveys. The interview took an average of 74 minutes to complete.

D. Data Analysis

1. Validation

Data were entered by NASS staff into a SAS data file and checked for validity. NAHMS staff independently performed data validation checks on the data set to identify consistency and statistical issues. Consistency issues include logical inconsistencies within a survey and were identified using summaries of responses to check for invalid responses (e.g., a response of '3' for a 0/1 response variable); threshold checks (e.g., identifying invalid total sums of cattle on feed inventory); and, if-then checks (e.g., if all cattle were born and raised on the feedlot, then there should not be a source for added cattle).

Statistical issues were identified by investigating summary measures of responses for variables; extreme outliers were investigated by data analysts and subject-matter experts. Inconsistencies were identified using SAS software, and electronic questionnaire data was reviewed by data analysts and subject-matter experts. Identified inconsistencies were addressed using item-level imputation measures if appropriate values could be logically deduced.

In the Feedlot 2021 study, respondents were asked for up to two reasons for using each medically or non-medically important antibiotic in feed. For medically important antibiotics, no instructions were given to take the reason/indication directly from the VFD. The responses received for reasons/indications for using VFD drugs indicated a high likelihood of recall bias or not remembering the reason/indication given by the veterinarian for using the drug. For this reason, indications for using specific VFD antibiotics were not included in this report.

2. Estimation

Summarization and estimation were performed using SUDAAN software, which accounts for the stratified sampling study design. Estimates were generated by one analyst, and numbers and estimation code were reviewed by a second analyst, to ensure accurate reporting of estimates.

E. Sample Evaluation

This section provides counts and percentages of feedlots by response category, which can be used to compute various measures of response. Historically, the term "response rate" was used as a catch-all parameter, but there are many ways to define and calculate response rates. Therefore, counts and percentages of feedlots by response code category are presented below so that response rates can be calculated according to the preferred definition of "response rate."

Additionally, the Office of Management and Budget (OMB) has provided guidance regarding the calculation and reporting of response rates in their Standards and Guidelines for Statistical Surveys (2006), Section 3.2. The response rate advocated in the OMB guidance estimates the percentage of eligible feedlots that completed the questionnaire. The calculation of this specific response rate is presented for Phase I of the study below.

1. Phase I response rates

Of the 5,342 operations selected for participation, 1,300 were ineligible (no cattle on feed, out of business, backgrounder/stocker operation only, or otherwise out of scope). Of the 4,042 eligible operations, 1,967 were not contacted (office holds, purposefully not contacted, and inaccessible operations). Of the 2,075 eligible feedlots that were contacted, 1,025 (390 + 635) provided complete questionnaire data. Of those, 390 feedlots agreed to be contacted for Phase II of the study.

Response category group label	Response category group	Response category	Number of operations	Percent operations	Weighted percent operations*
(a)	In-scope-complete	Completed Phase I interview, signed consent for Phase II	390	7.3	9.5
		Completed Phase I interview, refused consent for Phase II	635	11.9	14.6
(b)	In-scope-refused	Refused	1,050	19.7	16.7
(c)	Out of scope	Zero cattle on feed in 2020	155	2.9	2.9
		Out of business	274	5.1	6.8
		Backgrounder/stocker operation only	632	11.8	9.7
		Out of scope	239	4.5	5.0
(d)	Not contacted	Office hold	233	4.4	2.0
		Inaccessible	1,734	32.5	32.9
		Total	5,342	100.0	100.0

*Weighted percentages calculated using the initial sampling weights.

According to the OMB guidance, the response rate for this study would be calculated according to the following formula:

$$\frac{a}{(a + b) + \rho * (d)}$$

Letters a , b , and d represent the counts (or percentages) of operations in each response-category group in the table above and ρ is the proportion of the noncontacted operations expected to be in-scope.

Specifically,

$$\rho = \frac{(a + b)}{(a + b + c)} = \frac{2,075}{3,375} \approx 0.615$$

Thus, the OMB guidance-based response rate for Phase I of the NAHMS Health Management on U.S. Feedlots 2021 study is calculated as follows:

$$\frac{1,025}{2,075 + 0.615 * 1,967} \approx 0.312$$

Approximately 31.2 percent of eligible feedlots completed the Phase I questionnaire. The weighted OMB guidance-based response rate for Phase I of the NAHMS Health Management on U.S. Feedlots 2021 study is 38.5 percent (calculated using the initial sampling weights), which means that Phase I questionnaire information is available for approximately 38.5 percent of feedlots in the 22 participating States (18 States for the 50 to 999 head small feedlot component and 17 States for the 1,000 or more head large feedlot component, with most States participating in both the small and large feedlot components), after taking into account the survey design and weighting.

Additionally, due to the high number of operations that were not contacted, it is instructive to observe the cooperation rate (the American Association of Public Opinion Research's defined cooperation rate number 3)¹. This rate is defined according to the following formula.

$$\frac{a}{(a + b)} = \frac{1,025}{2,075} \approx 0.494$$

Or approximately 49.4 percent of contacted eligible feedlots were willing to complete the Phase I questionnaire.

2. Phase II response rates

Of the 390 operations that elected to turn their contact information over to participate in Phase II of the NAHMS Health Management on U.S. Feedlots 2021 study, 24 were ineligible (no longer in operation). Of the 366 eligible operations, 85 were not contacted (inaccessible operations). Of the 281 eligible operations that were contacted, 164 provided complete survey data.

Response category group label	Response category group	Response category	Number of operations	Percent operations	Weighted percent operations*
(a)	In-scope-complete	Completed Phase II interview	164	42.1	39.8
(b)	In-scope-refused	Poor time of year or no time available to participate	58	14.9	14.0
		Doesn't want anyone on the operation	0	0.0	0.0
		Bad experience with government veterinarian(s)	1	0.3	0.4
		Doesn't want to do another survey or divulge information	29	7.4	8.8
		Told NASS they didn't want to be contacted by VS	0	0.0	0.0
		Other	29	7.4	8.1
(c)	Out of scope	Ineligible (no longer in operation)	24	6.2	5.8
(d)	Not contacted	Inaccessible	85	21.8	23.1
		Total	390	100.0	100.0

*Weighted percentages calculated using the turnover weights.

Using the calculations given above in section II.E.1, The OMB guidance-based response rate was 45.6, the weighted rate was 43.0 percent, and the cooperation rate was 58.4 percent.

¹ American Association of Public Opinion Research (2023) Standard Definitions, Final Dispositions of Case Codes and Outcome Rates for Surveys. <https://aapor.org/wp-content/uploads/2023/05/Standards-Definitions-10th-edition.pdf>.

3. Communicating response rates

The unweighted response rate (31.2 percent for Phase I and 45.6 percent for Phase II) are the rates that will be used, generally, to communicate the response rate for the NAHMS Health Management on U.S. Feedlots 2021 study, as they represent the likelihood that eligible feedlots completed each phase of the study.

In addition, when communicating specifically about cooperation, the cooperation rates (49.4 percent for Phase I and 58.4 percent for Phase II) will be used to communicate the likelihood that contacted, eligible producers were willing to complete the NAHMS Health Management on U.S. Feedlots 2021 study.

Appendix I: Sample Profile**1. Feedlot capacity**

Feedlot capacity (number head)	Number of responding feedlots
Small (50 – 999)	107
Large (1,000 or more)	57
Total	164

2. Regions

Region	Number of responding feedlots
West (CA, CO, ID, KS, MT, NE, ND, OK, SD, TX, UT, WA, WY)	73
East (IL, IN, IA, MI, MN, MO, OH, PA, WI)	91
Total	164

Appendix II: Target Population

		Number of cattle on feed ¹			Number of feedlots ¹		
Region	State	All feedlots	Feedlots with 1,000 or more cattle on feed	Feedlots with 50-999 cattle on feed	All feedlots	Feedlots with 1,000 or more cattle on feed	Feedlots with 50-999 cattle on feed
West	California	514,226	503,297	>9,777 ²	49	19	28
	Colorado	1,005,237	975,071	28,506	272	73	128
	Idaho	267,766	255,166	11,846	111	18	59
	Kansas	2,445,281	2,304,089	137,481	761	116	503
	Montana	47,215	>19,238	NA ³	151	6	NA
	Nebraska	2,910,262	2,593,968	308,919	1,737	408	1,058
	North Dakota	78,718	(D) ⁴	55,674	348	13	269
	Oklahoma	329,926	>318,218	NA	110	14	NA
	South Dakota	541,201	251,751	282,724	1,308	92	964
	Texas	2,656,923	2,631,279	23,084	360	95	168
	Utah	24,024	6,649	NA	162	4	NA
	Washington	217,509	212,617	NA	88	12	NA
	Wyoming	72,128	53,250	18,358	109	12	69
East	Illinois	243,703	61,527	159,500	1,797	33	858
	Iowa	1,644,497	680,414	927,711	4,942	271	3,316
	Indiana	89,280	NA	58,871	1,082	NA	407
	Michigan	158,925	NA	109,365	1,146	NA	557
	Minnesota	596,367	172,542	388,935	3,220	77	1,784
	Missouri	78,336	15,650	52,759	788	7	357
	Ohio	176,893	NA	138,105	1,600	NA	747
	Pennsylvania	119,911	NA	95,329	1,380	NA	667
	Wisconsin	288,654	NA	230,143	3,070	NA	1,586
Total (included states)		14,506,982	>11,054,726	>3,037,087	24,591	1,270	13,525
Total U.S. (50 states)		15,025,052	11,599,603	3,174,070	25,776	1,345	14,392
Included states as a % of 50 states		96.6	>95.3	>95.7	95.4	94.4	94.0

¹Source: NASS, 2017 Census of Agriculture. State level estimates only available in conjunction with the Census of Agriculture every 5 years. These represent counts of operations by actual inventory of cattle on feed, rather than capacity.

²Values with ">" denote values that are minimum counts. These are calculated by summing NASS 2017 Census of Agriculture estimates where at least one size category within the given inventory range and state was suppressed due to low sample size (suppressed estimates are not included in this count).

³Values of NA denote values that are suppressed because operations with the given inventory were not sampled from the given state in this study.

⁴Values of (D) denote values that are suppressed due to low sample size.

Appendix III: FDA Categories of Antibiotics Mentioned in This Report

Importance to human medicine	Drug/drug class
Not medically important	
Not Ranked	Ionophores (e.g., monensin, lasalocid, laidlomycin)
	Bambermycin
	Bacitracin
Medically important	
Important	Sulfonamides
Highly important	Tetracyclines (e.g., oxytetracycline, chlortetracycline, tetracycline)
	Aminoglycosides (e.g., neomycin, spectinomycin)*
	Beta lactam-natural penicillins (e.g., penicillin G)
	Phenicol (e.g., florfenicol)
	Aminopenicillins (e.g., amoxicillin)*
	Streptogramins (e.g., virginiamycin)
Critically important	Macrolides (e.g., tilmicosin, tylosin, tulathromycin, gamithromycin, tildipirosin)
	Fluoroquinolones (e.g., enrofloxacin, danofloxacin)
	Third generation cephalosporins (e.g., ceftiofur)
	Trimethoprim/sulfamethazine

* At the time this study was conducted, aminoglycosides and aminopenicillins were classified as highly important in FDA's Guidance for Industry (GFI) #152. In August 2026, GFI #152 was updated, and aminoglycosides and aminopenicillins are now classified as critically important.

Appendix IV

Acronyms Used in This Report

AHT	Animal Health Technician
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BQA	Beef Quality Assurance
CEAH	Center for Epidemiology and Animal Health
FDA	Food and Drug Administration
NA	Not applicable
NAHMS	National Animal Health Monitoring System
NASS	National Agricultural Statistics Service
SE	Standard error
USDA	United States Department of Agriculture
VCPR	Veterinarian-client-patient relationship
VMO	Veterinary Medical Officer
VS	Veterinary Services