United States Department of Agriculture

Animal and Plant Health Inspection Service

Veterinary Services

National Animal Health Monitoring System

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# Feedlot 2011

## Part IV: Health and Health Management on U.S. Feedlots with a Capacity of 1,000 or More Head

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## Items of Note

The National Animal Health Monitoring System's (NAHMS) Feedlot 2011 study updates information on the U.S. cattle feedlot industry previously collected during the NAHMS Feedlot '99 study: http://www.aphis.usda.gov/animal_health/nahms/feedlot/index.shtml. As with the Feedlot '99 study, Feedlot 2011 takes a broad look at animal health and management practices on feedlots throughout the major cattle feeding regions of the United States.

One component of Feedlot 2011 focused on large feedlots with a capacity of 1,000 head or more located in 12 States. These feedlots were divided into two groups: those with a capacity of 1,000 to 7,999 head and those with a capacity of 8,000 or more head. The other component of Feedlot 2011 focused on small feedlots (fewer than 1,000 head capacity) in 13 States. This report provides estimates for feedlots with a capacity of 1,000 head or more. Study results for feedlots with a capacity of fewer than 1,000 head are available in "Part II: Management Practices on U.S. Feedlots with Capacity of Fewer than 1,000 Head."

In general, cattle feedlots receive cattle from throughout the United States. Feedlots typically provide cattle with high-energy diets in order to grow them to an acceptable size with an appropriate degree of finish for the slaughter market. Depending on their arrival weight, cattle may spend anywhere from a few months to nearly a year in the feedlot. Typical feedlot stays last slightly less than 6 months.

Vaccination is a cornerstone of disease prevention activities for all livestock operations, including feedlots. Vaccination with products targeting the pathogens most frequently associated with morbidity in the feedlots may lessen the numbers of animals affected as well as the severity of disease. More than 90 percent of feedlots vaccinated at least some cattle against some of the key respiratory pathogens such as bovine viral diarrhea virus and infectious bovine rhinotracheitis virus. More than 90 percent all cattle placed were vaccinated for these pathogens. Other vaccines were used less commonly (p 6).

For nearly all cattle given clostridial vaccines (97.5 percent) vaccinations were given subcutaneously in the neck region, consistent with Beef Quality Assurance guidelines (p 9).

Various pharmaceutical and biological products may be given by injection to cattle in feedlots to manage health. When products are delivered by injection there have been concerns for potential impacts on beef quality, including injection site blemishes and changes in tenderness. The Beef Quality Assurance program has devoted much effort to communicating guidelines for use of injections in cattle so as to minimize impacts on product quality. Other commonly delivered injections such as anthelmintics are nearly always given subcutaneously in the neck region (98.2 percent) [p 14].

Metaphylaxis is the timely mass medication of a group of animals with an antibiotic to eliminate or minimize an expected outbreak of disease. Producers and veterinarians use this tool most commonly to reduce the occurrence of respiratory disease among cattle that have recently arrived at feedlots. Overall, 59.3 percent of feedlots treated some cattle metaphylactically (p 18), resulting in approximately one of five cattle placed (21.3 percent) being treated (p 20).

The most common illness of cattle placed in feedlots was respiratory disease; 16.2 percent of cattle were affected with respiratory disease (p 28). Most cattle with respiratory disease are treated with antibiotics, resulting in 13.4 percent of cattle placed being treated for respiratory disease with an injectable antibiotic (p 34).

For cattle treated for respiratory disease, 81.7 percent responded to treatment (p 53).

Feedlot operators avail themselves of a variety of sources to inform their business decisions. One key decision that producers make is which antibiotics to use to restore the health of their animals. Veterinarians are highly influential in the selection of injectable antibiotics for the treatment of disease in cattle feedlots.

For 87.0 percent of feedlots, veterinarians “strongly” influenced the selection and in another 12.1 percent of feedlots veterinarians “somewhat” influenced the selection (p 62). Accounting for the size of feedlots, veterinarians were “strongly” influential in the selection of injectable antibiotics for disease treatment for 95.1 percent of cattle placed on feed (p 63).

Feedlots use medications in feed and/or water to preserve animal health and improve production. Ionophores act to improve production and control coccidia. Tylosin is an antibiotic used to help control the occurrence of liver abscesses in cattle. Overall, 90.1 percent of cattle placed in feedlots received an ionophore in feed and 71.2 percent received tylosin in feed (p 68). The next most common use of antibiotics in feed was the use of chlortetracycline which 18.4 percent of cattle received.

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## Acknowledgments

This report was a cooperative effort between two U.S. Department of Agriculture (USDA) Agencies: the National Agricultural Statistics Service (NASS) and the Animal and Plant Health Inspection Service (APHIS).

We want to thank the NASS enumerators, State and Federal veterinary medical officers (VMOs), and animal health technicians (AHTs) who visited the operations and collected data for the Feedlot 2011 study. Their hard work and dedication to USDA's National Animal Health Monitoring System (NAHMS) were invaluable. The roles of the producers, Area Veterinarians in Charge, NAHMS coordinators, VMOs, AHTs, and NASS enumerators were critical in providing quality data for the Feedlot 2011 reports. Recognition also goes to the personnel at the USDA–APHIS–Veterinary Services' Centers for Epidemiology and Animal Health for their efforts in generating and distributing this and other reports from the Feedlot 2011 study.

All participants are to be commended, particularly the producers whose voluntary efforts made the Feedlot 2011 study possible.

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**Feedback**
Feedback, comments, and suggestions regarding Feedlot 2011 study reports are welcomed. You may submit feedback via online survey at: http://nahms.aphis.usda.gov (Click on “FEEDBACK on NAHMS reports.”)

## 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. NAHMS is designed to help meet the Nation's animal health information needs and has collected data on management practices on U.S. feedlots via two previous studies.

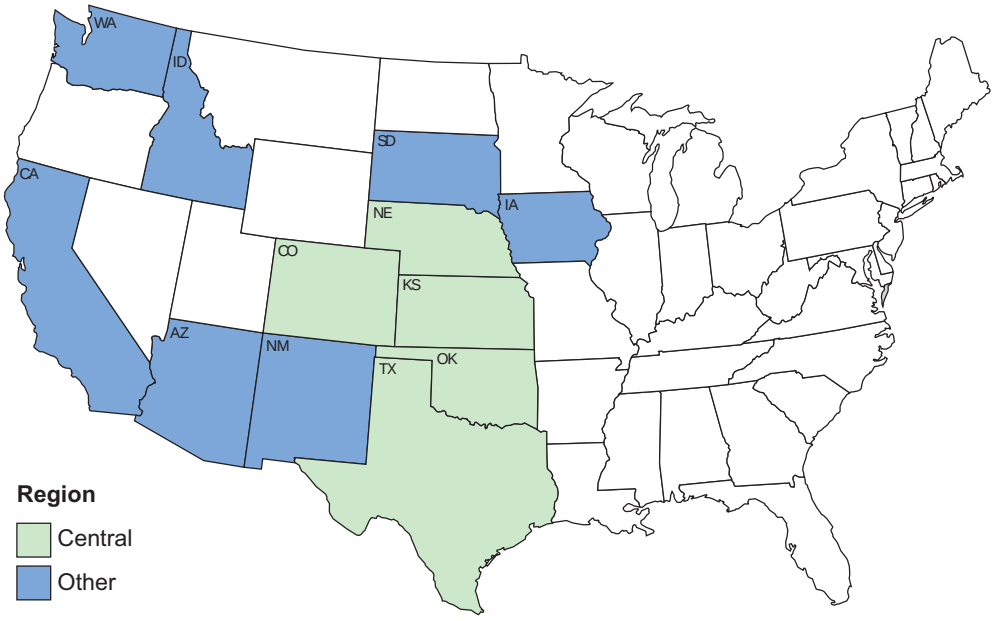
**The NAHMS 1994 Cattle on Feed Evaluation (COFE)** provided the first national information on management practices in U.S. feedlots. Information was collected from 3,214 feedlots from 13 major cattle-on-feed States, which accounted for 85.8 percent of the U.S. cattle-on-feed inventory on January 1,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

**The NAHMS Feedlot '99 study** was designed to provide participants and other stakeholders 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 on operations with a capacity of 1,000 head or more on January 1, 1999, in 12 participating States. These operations represented 82.1 percent of all cattle on feed in the 50 States on January 1, 2000.

**The NAHMS Feedlot 2011 study** takes an in-depth look at feedlots with a capacity of 1,000 or more head in 12 States (see map), the subject of this report, and feedlots with a capacity of fewer than 1,000 head in 13 States (NAHMS Feedlot 2011 "Part II: Management Practices on U.S. Feedlots with Fewer than 1,000 Head Capacity").

Feedlots with 1,000 head or more capacity accounted for 82.1 percent of the January 1, 2011, inventory in all U.S. feedlots and 2.8 percent of all feedlots. The 12 States accounted for over 95 percent of the inventory in these feedlots. (Source NASS: Cattle on Feed February 18, 2011).

## Participating States for feedlots with a capacity of 1,000 or more head



## Terms Used in This Report

**Antibiotic:** A chemical compound generally produced by molds that has the ability to inhibit growth of or kill certain bacteria. They are very effective against illness caused by bacteria, but are ineffective against viruses.

**Cattle on feed:** Cattle or calves on full feed for the slaughter market and expected to produce a carcass grading select or better. Animals being fed a high-energy ration of grain, silage, hay, and/or protein supplement for the slaughter market, excluding cattle being “backgrounded only” for later sale as feeders or later placement in another feedlot.

**Cattle placed/placement:** Cattle put into a feedlot, fed a high-energy ration, and intended for the slaughter market.

**Coccidiostat:** Drug that controls coccidiosis.

**Disease:** Any morbid condition that impairs the full productive potential of an animal.

**Feedlot:** The confined area where animals are fed.

**Ionophore:** A drug given in feed that promotes the efficient use of feedstuffs by altering the fermentation pattern in the rumen.

**Intramuscular (IM) injection:** Injection given in the muscle.

**Metaphylaxis:** The timely administration of injectable antibiotics given to a group of animals to eliminate or minimize an expected disease outbreak.

**Operation:** An area of land managed as a unit by an individual, partnership, or hired manager.

**Operation capacity:** Size groupings based on feedlot capacity on January 1, 2011. The capacity is the total number of head of cattle that could be accommodated in the feedlot at one time.

**Percent cattle:** The total number of cattle with a certain attribute divided by the total number of cattle on all operations (or on all operations within a certain category such as by operation capacity or region).

**Percent operations:** The number of operations with a certain attribute divided by the total number of operations. Percentages will sum to 100 where the attributes are mutually exclusive (e.g., percentage of operations located within each region). Percentages will not sum to 100 where the attributes are **not** mutually exclusive (e.g., the percentage of operations using treatment methods in which operations may have used more than one method).

**Population estimates:** Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created 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. Alternatively, the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (—).

**Ration:** The amount of feed an animal receives in a 24-hour period.

**Realized:** Cattle shipped for slaughter prior to reaching normal slaughter weight.

**Regions:**

**Central:** Colorado, Kansas, Nebraska, Oklahoma, and Texas.

**Other:** Arizona, California, Idaho, Iowa, New Mexico, South Dakota, and Washington.

**Repull:** A feedlot animal that responded favorably to the initial course of treatment for a disease, was returned to a pen, and received additional treatment for the same disease at a later date.

**Residue:** The small amounts of veterinary medicines that can remain in animals after treatment has ceased.

**Retreat:** A feedlot animal that failed to respond to the initial course of treatment for a disease and required a second course of treatment.

***Salmonella*:** A genus of gram-negative, nonlactose fermenting, medium-sized, rod-shaped bacteria that can be the cause of disease (diarrhea) in animals and can be a foodborne pathogen.

**Shrinkage:** The animal weight lost between source and market scales due to transit or other handling processes.

**Subcutaneous (SQ) injection:** An injection given under the skin.

**Vaccination:** An injection of a vaccine to produce immunity or resistance to disease.

# Section I: Population Estimates

Note: Unless otherwise specified, the time period for all tables is July 1, 2010, through June 30, 2011.

Note: Where appropriate, column totals are shown as 100.0 to aid in interpretation; however, estimates may not sum to 100.0 due to rounding.

Throughout this report the population estimates are shown for all feedlots in the inference population (i.e., those with a capacity of 1,000 head or more in the 12 study States) as well as for subpopulations of feedlots based on size or geographic location. The breakouts are related in that feedlots in the Central region tended to be larger than feedlots in the "Other" region. Hence, in some cases differences seen between the breakout categories may be difficult to attribute to size-related factors as opposed to geographic location factors. Sample size issues generally preclude the possibility of full two-way analyses of these data.

## A. Injections

Many different biologics (vaccines) or pharmaceutical products may be given to cattle in feedlots for heath management purposes. In some cases these products are used to prevent disease and in other cases they are used to treat existing diseases.

### 1. Vaccines

Most feedlots gave at least some cattle a vaccination, most commonly for respiratory diseases caused by bovine viral diarrhea (BVD) virus (96.6 percent of feedlots); infectious bovine rhinotracheitis (IBR) virus (93.7 percent of feedlots); parainfluenza 3 (PI3) virus (85.1 percent of feedlots); or bovine respiratory syncytial virus (BRSV) [89.5 percent of feedlots]. Approximately two of three feedlots used vaccines that incorporated the two most common bacterial agents associated with respiratory disease: *Hemophilus somnus* and *Pasteurella*[1]). Only 6.5 percent of feedlots vaccinated at least some cattle for *Salmonella*, a bacterium associated with diarrhea in cattle and a potential food safety pathogen.

*E. coli* O157 has been associated with foodborne illness. The industry has implemented harvest and postharvest procedures to try to control the occurrence of foodborne illness associated with beef (primarily ground beef) due to this agent. Progress has been made in reducing the occurrence of ground-beef-associated illness due to *E. coli* O157, but there are efforts now to incorporate preharvest procedures to decrease the number of animals with *E. coli* O157 or the load of *E. coli* O157 from animals presented for harvest. Recently, a vaccine for *E. coli* O157 received a conditional license in the United States. At this time, 2.4 percent of feedlots are using the *E. coli* vaccine on at least some cattle.

[1] *Pasteurella haemolytica* has been renamed as *Mannheimia haemolytica*. For the purposes of this study and this report *Pasteurella* is meant to include both *Mannheimia haemolytica* and *Pasteurella multocida*.

A high percentage of feedlots (84.4 percent) vaccinated some arriving cattle against clostridial diseases. Historically, the use of vaccines has been associated with injection-site lesions when administered in the muscle tissue of cattle. These lesions produce quality defects for beef products and have been targeted for elimination by the Beef Quality Assurance (BQA) program. Efforts have been made to get producers to administer vaccinations to subcutaneously in the neck area.

A.1.a. Percentage of feedlots that gave cattle placed on feed the following vaccines, by feedlot capacity and by region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Vaccine** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Bovine viral diarrhea (BVD) | 95.7 | (2.2) | 98.7 | (0.1) | 94.9 | (2.6) | 99.0 | (0.1) | 96.6 | (1.6) |
| Injectable infectious bovine rhinotracheitis, red nose (IBR) | 91.7 | (3.0) | 98.6 | (1.3) | 92.6 | (3.0) | 95.5 | (3.0) | 93.7 | (2.2) |
| Intranasal IBR | 52.3 | (5.6) | 51.5 | (6.4) | 46.9 | (5.5) | 60.0 | (7.1) | 52.1 | (4.4) |
| PI3 (parainfluenza 3) | 87.6 | (3.6) | 79.2 | (5.9) | 78.6 | (4.7) | 95.0 | (3.0) | 85.1 | (3.1) |
| Bovine respiratory syncytial virus (BRSV) | 87.8 | (3.6) | 93.5 | (1.8) | 87.7 | (3.6) | 92.2 | (3.6) | 89.5 | (2.6) |
| *Hemophilus somnus* (HS) | 74.0 | (4.8) | 59.3 | (6.6) | 66.2 | (5.2) | 75.0 | (5.9) | 69.7 | (3.9) |
| *Pasteurella* | 66.1 | (5.0) | 58.2 | (7.1) | 68.4 | (5.2) | 56.8 | (6.7) | 63.8 | (4.1) |
| *Leptospira* spp. (lepto) | 19.6 | (4.2) | 27.1 | (5.7) | 28.6 | (4.8) | 11.4 | (4.4) | 21.8 | (3.4) |
| *Salmonella* (e.g., *Salmonella* Newport SRP®) | 4.9 | (2.3) | 10.1 | (4.1) | 8.9 | (3.0) | 2.8 | (2.1) | 6.5 | (2.0) |
| *Mycoplasma bovis* | 22.3 | (4.6) | 20.6 | (5.2) | 20.1 | (4.4) | 24.4 | (6.2) | 21.8 | (3.6) |
| Autogenous vaccine | 4.0 | (2.1) | 8.6 | (3.2) | 5.4 | (1.9) | 5.3 | (3.4) | 5.4 | (1.8) |
| *E. coli* (e.g., Epitopix SRP® or Econiche®) | 1.4 | (1.3) | 4.6 | (4.3) | 4.0 | (2.6) | 0.0 | (—) | 2.4 | (1.6) |
| Clostridial | 85.0 | (3.9) | 82.9 | (6.0) | 83.6 | (4.4) | 85.5 | (4.9) | 84.4 | (3.3) |
| Other vaccine | 7.4 | (2.8) | 1.9 | (1.8) | 4.3 | (2.3) | 8.0 | (3.7) | 5.8 | (2.0) |

Nearly all cattle placed in feedlots received a vaccination for BVD and IBR (95.1 and 93.2 percent of cattle, respectively). Only about one of four cattle was vaccinated for the more common bacterial agents associated with respiratory disease. Combined with the information from table A.1.a, this finding suggests that while nearly all cattle entering most feedlots were vaccinated for the viral causes of respiratory disease, only some cattle entering feedlots were vaccinated against the bacterial agents that cause respiratory disease. The vaccine choice within a feedlot is driven by the attributes of the arriving groups of cattle, and producers make the decision about which of these cattle receive vaccinations for the bacterial agents. In addition, the use of vaccines for some bacterial agents that cause respiratory disease was more common in feedlots with a capacity of 1,000 to 7,999 head compared with feedlots with a capacity of 8,000 or more head. A higher percentage of cattle in feedlots with a capacity of 1,000 to 7,999 head were vaccinated for PI3 and BRSV (81.3 and 88.6 percent, respectively) compared with feedlots with a capacity of 8,000 or more head (51.7 and 57.9 percent, respectively). Only 5.2 percent of cattle arriving in feedlots were vaccinated for *Salmonella*.

Overall, very few cattle (0.1 percent) received the vaccine for *E. coli* O157, which might be because the vaccine is relatively new and there has not been time for widespread adoption. The low level of use may also be due to the recommended three-dose regimen. Handling a group of cattle multiple times does not fit into routine feedlot management strategies. Handling cattle multiple times also carries risk of injury to animals, impacts production, and adds costs for the vaccine and the labor to administer it. Overall, 62.4 percent of cattle were given one or more clostridial vaccinations after arriving at the feedlot.

A.1.b. Percentage of cattle given the following vaccines, by feedlot capacity and by region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Vaccine | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Bovine viral diarrhea (BVD) | 94.5 | (1.9) | 95.1 | (2.0) | 96.3 | (2.1) | 89.5 | (3.0) | 95.1 | (1.8) |
| Injectable infectious bovine rhinotracheitis, red nose (IBR) | 96.6 | (1.4) | 92.7 | (5.3) | 91.9 | (5.7) | 99.1 | (0.5) | 93.2 | (4.7) |
| Intranasal IBR | 23.4 | (4.0) | 12.1 | (3.6) | 12.4 | (3.8) | 18.0 | (5.4) | 13.4 | (3.3) |
| PI3 (parainfluenza 3) | 81.3 | (5.2) | 51.7 | (6.4) | 47.8 | (6.1) | 88.5 | (3.5) | 55.1 | (5.7) |
| Bovine respiratory syncytial virus (BRSV) | 88.6 | (3.9) | 57.9 | (6.5) | 55.7 | (6.5) | 87.7 | (3.7) | 61.4 | (5.8) |
| *Hemophilus somnus* (HS) | 55.0 | (6.9) | 24.3 | (5.2) | 27.2 | (5.5) | 30.9 | (9.0) | 27.8 | (4.8) |
| *Pasteurella* | 42.7 | (5.9) | 26.8 | (4.3) | 24.4 | (4.4) | 47.9 | (7.0) | 28.6 | (3.9) |
| *Leptospira* spp. (lepto) | 14.4 | (4.2) | 12.0 | (3.1) | 11.1 | (3.3) | 17.7 | (5.1) | 12.3 | (2.8) |
| *Salmonella* (e.g., *Salmonella* Newport (SRP) | 2.6 | (1.4) | 5.6 | (2.2) | 4.5 | (2.4) | 8.5 | (2.5) | 5.2 | (2.0) |
| *Mycoplasma bovis* | 14.3 | (5.8) | 5.1 | (1.5) | 6.1 | (1.7) | 6.2 | (3.3) | 6.1 | (1.5) |
| Autogenous vaccine | 2.1 | (1.3) | 4.0 | (2.0) | 4.4 | (2.2) | 1.1 | (0.9) | 3.8 | (1.8) |
| *E. coli* (e.g., Epitopix SRP or Econiche) | 1.1 | (1.1) | 0.0 | (0.0) | 0.2 | (0.2) | 0.0 | (—) | 0.1 | (0.1) |
| Clostridial | 80.6 | (4.7) | 60.0 | (7.6) | 61.4 | (7.5) | 66.9 | (17.8) | 62.4 | (6.8) |
| Other vaccine | 3.8 | (1.9) | 0.8 | (0.7) | 1.1 | (0.8) | 1.4 | (1.0) | 1.1 | (0.7) |

Nearly all cattle given clostridial vaccines (97.5 percent) received a subcutaneous (SQ) vaccination in the neck region, which is consistent with BQA guidelines. No feedlots used the intramuscular (IM) route to administer clostridial vaccines in locations other than the neck.

A.1.c. For cattle given any clostridial vaccines, percentage of cattle by route and location of administration, and by feedlot capacity and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Route and location | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| IM in neck region | 7.9 | (3.4) | 1.5 | (0.2) | 0.9 | (0.5) | 9.0 | (2.2) | 2.5 | (0.6) |
| SQ in neck region | 92.1 | (3.4) | 98.5 | (0.2) | 99.1 | (0.5) | 91.0 | (2.2) | 97.5 | (0.6) |
| IM in other location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Any other route or location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

A.1.d. For feedlots that administered any clostridial vaccines, percentage of feedlots that gave cattle more than one vaccination for clostridia via injection, by feedlot capacity and by region:

**Percent Feedlots**

| Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| 39.2 | (5.8) | 23.4 | (5.7) | 28.4 | (5.3) | 43.9 | (7.8) | 34.6 | (4.5) |

A.1.e. For cattle given any clostridial vaccines, percentage of cattle given more than one vaccination for clostridia via injection, by feedlot capacity and by region:

**Percent Cattle**

| Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| 21.5 | (4.1) | 13.7 | (5.1) | 15.1 | (5.3) | 13.8 | (3.8) | 14.9 | (4.4) |

**2. Injections for prevention and treatment**

Pharmaceutical (drugs) and biological (vaccines) products are administered via injection to feedlot cattle for various reasons. Approximately one of two feedlots (54.8 percent) injected an anthelmintic to at least some cattle after arrival. Use of an injectable anthelmintic product was more common in feedlots with a capacity of 8,000 or more head than in feedlots with a capacity of 1,000 to 7,999 head (82.4 and 43.1 percent of operations, respectively).

Most feedlots (77.7 percent) placed some heifers on feed,[2] 7.9 percent of which were pregnant on arrival. Pregnant heifers are an economic liability for feedlots in terms of production efficiency and value at harvest. In addition, if the heifers calve while in the feedlot there are associated health risks. Approximately one-third of all feedlots (36.4 percent) and nearly half of feedlots that placed some heifers (44.5 percent, data not shown) used prostaglandin injections on some animals, presumably to cause them to abort. Use of prostaglandin injections was more common in feedlots with a capacity of 8,000 or more head than in feedlots with a capacity of 1,000 to 7,999 head (68.2 and 23.0 percent of operations, respectively). However, placement of any heifers was more common in feedlots with a capacity of 8,000 or more head (93.7 percent of operations) compared with feedlots with a capacity of 1,000 to 7,999 head (71.2 percent).[1] Approximately one of two feedlots (56.3 percent) injected some animals with a corticosteroid, in some cases as co-treatment to cause heifers to abort.

[2]See NAHMS report: “Part I: Management Practices on U.S. Feedlots with a Capacity of 1,000 or more head.”

Nonsteroidal anti-inflammatory drugs are sometimes used to treat respiratory disease or to manage pain in some animals. The use of a nonsteroidal anti-inflammatory drug was more common in feedlots with a capacity of 1,000 to 7,999 head than in feedlots with a capacity of 8,000 or more head (70.5 and 46.4 percent of operations, respectively).

A.2.a. Percentage of feedlots that gave the following injections as either a preventive or treatment measure, by feedlot capacity and by region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Injection** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Anthelmintic (e.g., Ivomec®) | 43.1 | (5.5) | 82.4 | (5.8) | 62.1 | (5.5) | 43.6 | (7.0) | 54.8 | (4.3) |
| Prostaglandin (e.g., Lutalyse®) | 23.0 | (4.5) | 68.2 | (6.9) | 48.4 | (5.4) | 18.2 | (5.2) | 36.4 | (3.9) |
| Corticosteroid (e.g., dexamethasone, Azium®) | 53.9 | (5.3) | 62.1 | (7.0) | 64.1 | (5.2) | 44.5 | (7.2) | 56.3 | (4.3) |
| Nonsteroidal anti-inflammatory (e.g., Banamine®) | 70.5 | (4.8) | 46.4 | (7.3) | 63.5 | (5.1) | 63.1 | (7.0) | 63.4 | (4.1) |
| Other* | 2.7 | (1.8) | 2.6 | (2.2) | 1.7 | (1.5) | 4.2 | (2.7) | 2.7 | (1.4) |

*Excluding vitamins, vaccines, and antibiotics.

A higher percentage of cattle in feedlots with a capacity of 8,000 or more head (80.5 percent) received an anthelmintic injection compared with cattle in feedlots with a capacity of 1,000 to 7,999 head (39.3 percent). Few cattle overall received a prostaglandin or corticosteroid injection (7.5 and 3.3 percent, respectively).

A.2.b. Percentage of cattle by injections given at the feedlot as either a preventive or treatment measure, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Injection** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Anthelmintic (e.g., Ivomec) | 39.3 | (6.6) | 80.5 | (4.2) | 77.1 | (4.5) | 69.7 | (7.8) | 75.8 | (3.8) |
| Prostaglandin (e.g., Lutalyse) | 3.3 | (0.9) | 8.1 | (1.5) | 8.3 | (1.5) | 4.1 | (1.9) | 7.5 | (1.3) |
| Corticosteroid (e.g., dexamethasone, Azium) | 3.4 | (0.8) | 3.2 | (0.6) | 3.7 | (0.7) | 1.4 | (0.4) | 3.3 | (0.6) |
| Nonsteroidal anti-inflammatory (e.g., Banamine) | 4.3 | (0.9) | 1.8 | (0.6) | 2.1 | (0.6) | 2.0 | (0.6) | 2.1 | (0.5) |
| Other* | 0.1 | (0.1) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |

*Excluding vitamins, vaccines, and antibiotics.

BQA guidelines encourage producers to administer all injections in the neck region to minimize quality defects in beef products. Nearly all feedlots used the neck region for injections of anthelmintics or prostaglandins (either SQ or IM) when these products were used. It is likely that the use of any other route or location for corticosteroids and nonsteroidal anti-inflammatory drugs indicates these were being given intravenously.

A.2.c. For feedlots that gave cattle the following injections as either a preventive or treatment measure, percentage of feedlots by route and location of injection, feedlot capacity, and region:

| | Percent Feedlots | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Route and location | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Anthelmintic (e.g., Ivomec) | | | | | | | | | | |
| IM in neck region | 11.7 | (5.2) | 2.6 | (2.4) | 6.4 | (3.4) | 10.3 | (6.5) | 7.7 | (3.1) |
| SQ in neck region | 80.7 | (6.6) | 97.4 | (2.4) | 90.9 | (4.1) | 82.2 | (8.7) | 88.1 | (3.9) |
| IM in other location | 3.3 | (3.0) | 0.0 | (—) | 2.7 | (2.5) | 0.0 | (—) | 1.9 | (1.7) |
| Any other route or location | 4.2 | (3.8) | 0.0 | (—) | 0.0 | (—) | 7.4 | (6.4) | 2.4 | (2.1) |
| Prostaglandin (e.g., Lutalyse) | | | | | | | | | | |
| IM in neck region | 64.1 | (10.8) | 54.7 | (7.8) | 59.9 | (7.1) | 55.8 | (14.5) | 59.0 | (6.4) |
| SQ in neck region | 35.9 | (10.8) | 43.8 | (7.8) | 39.1 | (7.1) | 44.2 | (14.5) | 40.2 | (6.4) |
| IM in other location | 0.0 | (—) | 1.5 | (0.2) | 1.1 | (0.1) | 0.0 | (—) | 0.8 | (0.1) |
| Any other route or location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Coricosteroids (e.g., dexamethasone, Azium) | | | | | | | | | | |
| IM in neck region | 58.8 | (7.5) | 54.6 | (9.8) | 56.5 | (7.2) | 59.7 | (11.0) | 57.5 | (6.0) |
| SQ in neck region | 34.4 | (7.2) | 42.8 | (9.9) | 40.4 | (7.1) | 29.4 | (10.1) | 37.2 | (5.9) |
| IM in other location | 0.0 | (—) | 4.8 | (2.9) | 2.2 | (1.3) | 0.0 | (—) | 1.6 | (0.9) |
| Any other route or location | 14.6 | (5.3) | 0.0 | (—) | 7.1 | (3.7) | 16.3 | (8.2) | 9.8 | (3.6) |
| Nonsteroidal anti-inflammatory (e.g., Banamine) | | | | | | | | | | |
| IM in neck region | 48.8 | (6.7) | 14.9 | (6.6) | 36.5 | (6.8) | 48.0 | (9.2) | 41.0 | (5.5) |
| SQ in neck region | 38.2 | (6.5) | 47.2 | (10.7) | 38.9 | (7.0) | 42.2 | (9.4) | 40.2 | (5.6) |
| IM in other location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Any other route or location | 20.3 | (5.1) | 37.0 | (10.2) | 29.1 | (6.2) | 15.6 | (6.5) | 24.0 | (4.6) |

A.2.d. For cattle given the following injections at the feedlot as either a preventive or treatment measure, percentage of cattle by route and location of injection, feedlot capacity, and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Route and location | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Anthelmintic (e.g., Ivomec) | | | | | | | | | | |
| IM in neck region | 12.4 | (6.5) | 0.8 | (0.8) | 1.4 | (1.0) | 2.0 | (1.5) | 1.5 | (0.8) |
| SQ in neck region | 82.3 | (7.7) | 99.2 | (0.8) | 98.6 | (1.0) | 96.1 | (2.6) | 98.2 | (0.9) |
| IM in other location | 0.1 | (0.1) | 0.0 | (—) | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (0.0) |
| Any other route or location | 5.2 | (4.5) | 0.0 | (—) | 0.0 | (—) | 1.9 | (1.8) | 0.3 | (0.3) |
| Prostaglandin (e.g., Lutalyse) | | | | | | | | | | |
| IM in neck region | 63.2 | (17.2) | 75.8 | (8.7) | 78.3 | (8.3) | 46.6 | (23.8) | 75.2 | (8.4) |
| SQ in neck region | 36.8 | (17.2) | 21.2 | (8.3) | 18.6 | (7.8) | 53.4 | (23.8) | 22.0 | (8.0) |
| IM in other location | 0.0 | (—) | 3.0 | (0.6) | 3.1 | (0.7) | 0.0 | (—) | 2.8 | (0.6) |
| Any other route or location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Coricosteroids (e.g., dexamethasone, Azium) | | | | | | | | | | |
| IM in neck region | 53.1 | (16.7) | 63.5 | (15.5) | 61.5 | (14.9) | 71.7 | (18.2) | 62.3 | (13.8) |
| SQ in neck region | 43.9 | (17.8) | 36.5 | (15.5) | 38.2 | (14.9) | 27.2 | (18.2) | 37.4 | (13.8) |
| IM in other location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Any other route or location | 2.9 | (1.6) | 0.0 | (—) | 0.3 | (0.2) | 1.0 | (0.8) | 0.4 | (0.2) |
| Nonsteroidal anti-inflammatory (e.g., Banamine) | | | | | | | | | | |
| IM in neck region | 56.7 | (13.7) | 12.6 | (7.2) | 21.4 | (9.2) | 31.0 | (12.8) | 23.0 | (8.1) |
| SQ in neck region | 28.3 | (13.3) | 52.3 | (16.3) | 51.5 | (15.2) | 21.6 | (11.7) | 46.6 | (13.8) |
| IM in other location | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Any other route or location | 15.1 | (6.1) | 35.1 | (14.0) | 27.2 | (11.1) | 46.7 | (17.7) | 30.4 | (10.3) |

Historically, concerns have arisen about giving cattle injections of more than 10 mL in one site, as doing so might result in quality defects in beef products. The move to SQ injection routes in the neck region, however, has lessened these concerns. Only 10.9 percent of feedlots, representing just 0.7 percent of cattle, gave any injections of more than 10 mL in one site.

A.2.e. Percentage of feedlots that gave cattle an IM or SQ injection of more than 10 mL in one site, by feedlot capacity and by region:

**Percent Feedlots**

| Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| 12.7 | (3.6) | 6.7 | (3.6) | 9.5 | (3.2) | 13.1 | (4.8) | 10.9 | (2.7) |

Very few cattle (0.7 percent) received injections of more than 10 mL in one site.

A.2.f. Percentage of cattle given an IM or SQ injection of more than 10 mL in one site, by feedlot capacity and by region:

**Percent Cattle**

| Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| 1.3 | (0.8) | 0.6 | (0.5) | 0.8 | (0.5) | 0.3 | (0.2) | 0.7 | (0.4) |

### 3. Recorded information

Most feedlots kept some records regarding healthy cattle that were given injectable compounds. More than three of four feedlots recorded the date, type, and volume of injections given. Recording other information was less common, which may be a reflection of existing overall protocols for the treatment of all animals (e.g., route and location of injections).

A.3.a. Percentage of feedlots by frequency that information on healthy cattle given any injectable compounds such as vaccines or vitamins was recorded, and by type of information recorded:

| | Percent Feedlots | | | | | | |
|---|---|---|---|---|---|---|---|
| | Frequency | | | | | | |
| | Always or most of the time | | Some of the time | | Never | | |
| Type of information | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Date the injection was given | 86.1 | (3.1) | 7.0 | (2.4) | 6.9 | (2.4) | 100.0 |
| Type of injectable compound given | 86.1 | (3.1) | 5.0 | (2.1) | 8.8 | (2.6) | 100.0 |
| Amount given | 75.8 | (3.7) | 4.0 | (1.8) | 20.2 | (3.5) | 100.0 |
| Route of injection (e.g., IM or SQ) | 39.4 | (4.3) | 6.9 | (2.1) | 53.8 | (4.3) | 100.0 |
| Location of injection (e.g., neck region or shoulder) | 39.4 | (4.3) | 7.5 | (2.1) | 53.1 | (4.3) | 100.0 |
| Product lot number/ serial number | 25.9 | (3.7) | 12.1 | (2.6) | 62.0 | (4.0) | 100.0 |
| Other | 3.8 | (1.5) | 0.0 | (—) | 96.2 | (1.5) | 100.0 |

Information, including date, type of injectable, and amount injected, was recorded for nearly all cattle that received injectable compounds.

A.3.b. Percentage of cattle by frequency that information on healthy cattle given any injectable compounds (e.g., vaccines or vitamins) was recorded, and by type of information recorded:

| | Percent Cattle | | | | | | |
|---|---|---|---|---|---|---|---|
| | Frequency | | | | | | |
| | Always or most of the time | | Some of the time | | Never | | |
| Type of information | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Date the injection was given | 98.5 | (0.4) | 1.0 | (0.4) | 0.5 | (0.2) | 100.0 |
| Type of injectable compound given | 98.6 | (0.4) | 0.6 | (0.3) | 0.8 | (0.3) | 100.0 |
| Amount given | 97.3 | (0.6) | 0.4 | (0.2) | 2.3 | (0.6) | 100.0 |
| Route of injection (e.g., IM or SQ) | 51.0 | (7.1) | 7.9 | (2.2) | 41.1 | (7.2) | 100.0 |
| Location of injection (e.g., neck region or shoulder) | 42.9 | (6.6) | 17.7 | (5.7) | 39.4 | (7.2) | 100.0 |
| Product lot number/ serial number | 40.2 | (6.5) | 34.8 | (7.3) | 25.0 | (5.4) | 100.0 |
| Other | 5.1 | (2.5) | 0.0 | (—) | 94.9 | (2.5) | 100.0 |

## B. Shipping Fever Prevention

Shipping fever, or bovine respiratory disease complex, is the most common morbidity and mortality event among feedlot cattle. Many management practices implemented in feedlots focus on prevention or treatment of shipping fever. The occurrence of shipping fever in groups of cattle is associated with various factors, including previous vaccination, age, nutrition status, source, and transport.

### 1. Metaphylaxis

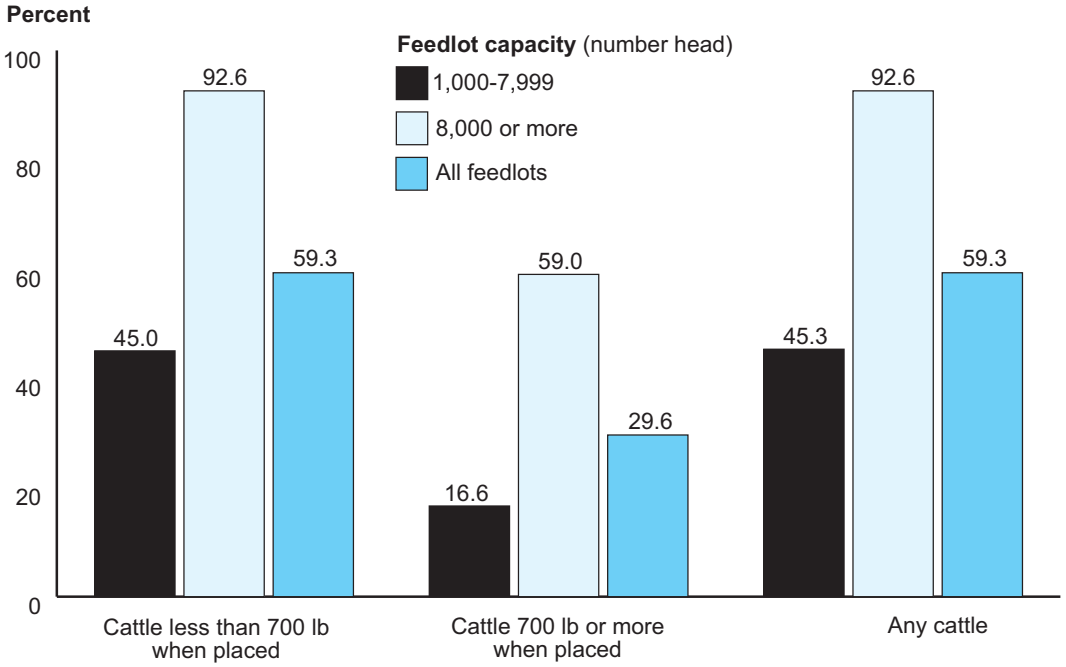
When an arriving or recently arrived group of cattle exhibit signs of respiratory disease or are at high risk of developing shipping fever, feedlots sometimes treat all animals in the group with an antibiotic to stop or prevent an outbreak. Over half of feedlots (59.3 percent) used metaphylaxis for some cattle. For cattle less than 700 lb when placed, a higher percentage of feedlots with a capacity of 8,000 or more head used metaphylaxis than feedlots with a capacity of 1,000 to 7,999 head (92.6 and 45.0 percent, respectively). Only 29.6 percent of all feedlots used metaphylaxis for some animals 700 lb or more when placed.

B.1.a. Percentage of feedlots that treated cattle as a group with any injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever, by cattle weight, feedlot capacity, and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | All feedlots | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | | |
| Cattle weight | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Less than 700 lb when placed | 45.0 | (5.4) | 92.6 | (4.5) | 69.2 | (5.3) | 44.2 | (7.2) | 59.3 | (4.2) |
| 700 lb or more when placed | 16.6 | (4.3) | 59.0 | (6.0) | 38.9 | (5.1) | 16.4 | (5.6) | 29.6 | (3.7) |
| Any cattle | 45.3 | (5.4) | 92.6 | (4.5) | 68.1 | (5.2) | 46.0 | (7.2) | 59.3 | (4.2) |

**Percentage of feedlots that mass treated with any injectable antibiotic to prevent or reduce an outbreak of shipping fever, by feedlot capacity**



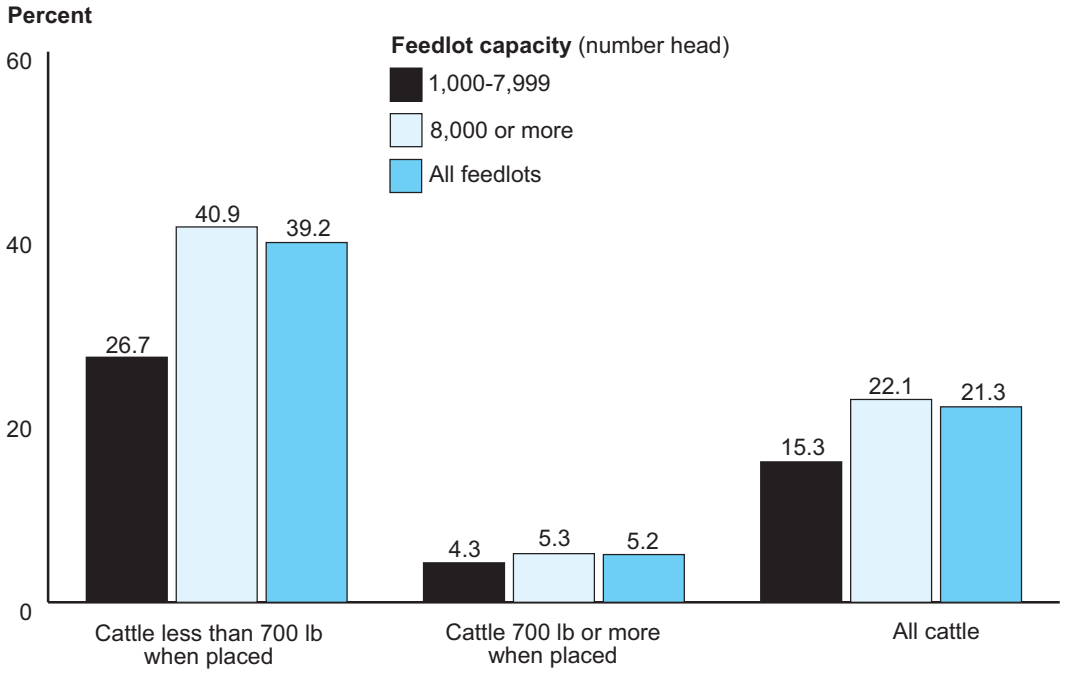
Approximately two of five animals less than 700 lb when placed (39.2 percent) were treated metaphylactically for shipping fever. Only 5.2 percent of cattle 700 lb or more when placed were treated metaphylactically. Overall, 21.3 percent of cattle placed in feedlots were treated metaphylactically.

B.1.b. Percentage of cattle treated as a group with any injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever, by cattle weight, feedlot capacity, and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Cattle weight** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Less than 700 lb when placed | 26.7 | (5.3) | 40.9 | (3.8) | 37.8 | (4.2) | 45.1 | (4.1) | 39.2 | (3.4) |
| 700 lb or more when placed | 4.3 | (2.0) | 5.3 | (1.3) | 4.8 | (1.2) | 7.0 | (2.8) | 5.2 | (1.2) |
| Any cattle | 15.3 | (3.0) | 22.1 | (2.6) | 20.5 | (2.8) | 25.1 | (2.9) | 21.3 | (2.3) |

**Percentage of cattle that were mass treated with any injectable antibiotic to prevent or reduce an outbreak of shipping fever, by feedlot capacity**



Several antibiotics can be used to treat cattle metaphylactically for shipping fever. The three most common antibiotics used to treat an entire group of cattle to prevent or minimize an outbreak of shipping fever were tilmicosin (57.6 percent of feedlots), tulathromycin (45.3 percent), and ceftiofur (39.7 percent). Tulathromycin was more commonly used for metaphylactic treatment of cattle less than 700 lb at placement than for cattle 700 lb or more at placement (data not shown). Otherwise, the selection of antibiotics for metaphylactic treatments did not differ by cattle weight.

B.1.c. For feedlots that treated cattle as a group with an injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever, percentage of feedlots by antibiotics used, feedlot capacity, and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Tilmicosin (Micotil®) | 54.5 | (8.4) | 61.2 | (7.1) | 65.7 | (6.2) | 38.5 | (10.2) | 57.6 | (5.5) |
| Gamithromycin (Zactran®) | 6.6 | (4.4) | 1.7 | (1.5) | 3.0 | (1.9) | 7.5 | (6.8) | 4.3 | (2.5) |
| Florfenicol (Nuflor®) | 8.7 | (4.6) | 9.7 | (4.7) | 8.3 | (3.8) | 11.3 | (6.5) | 9.2 | (3.3) |
| Ceftiofur (Naxcel®, Excenel®, Excede®) | 33.9 | (8.1) | 46.3 | (6.7) | 44.7 | (6.3) | 28.0 | (10.0) | 39.7 | (5.3) |
| Oxytetracycline (e.g., Oxy-Tet100™, LA200®, Biomycin®) | 16.1 | (6.3) | 19.0 | (6.3) | 21.8 | (5.8) | 7.2 | (5.6) | 17.4 | (4.5) |
| Penicillin (e.g., Aquacillin) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Amoxicillin (e.g., Amoxi-Inject®) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Tulathromycin (Draxxin®) | 43.4 | (8.4) | 47.6 | (6.8) | 44.3 | (6.3) | 47.7 | (10.8) | 45.3 | (5.5) |
| Other | 2.9 | (2.7) | 0.0 | (0.0) | 0.0 | (0.0) | 5.2 | (4.8) | 1.5 | (1.4) |

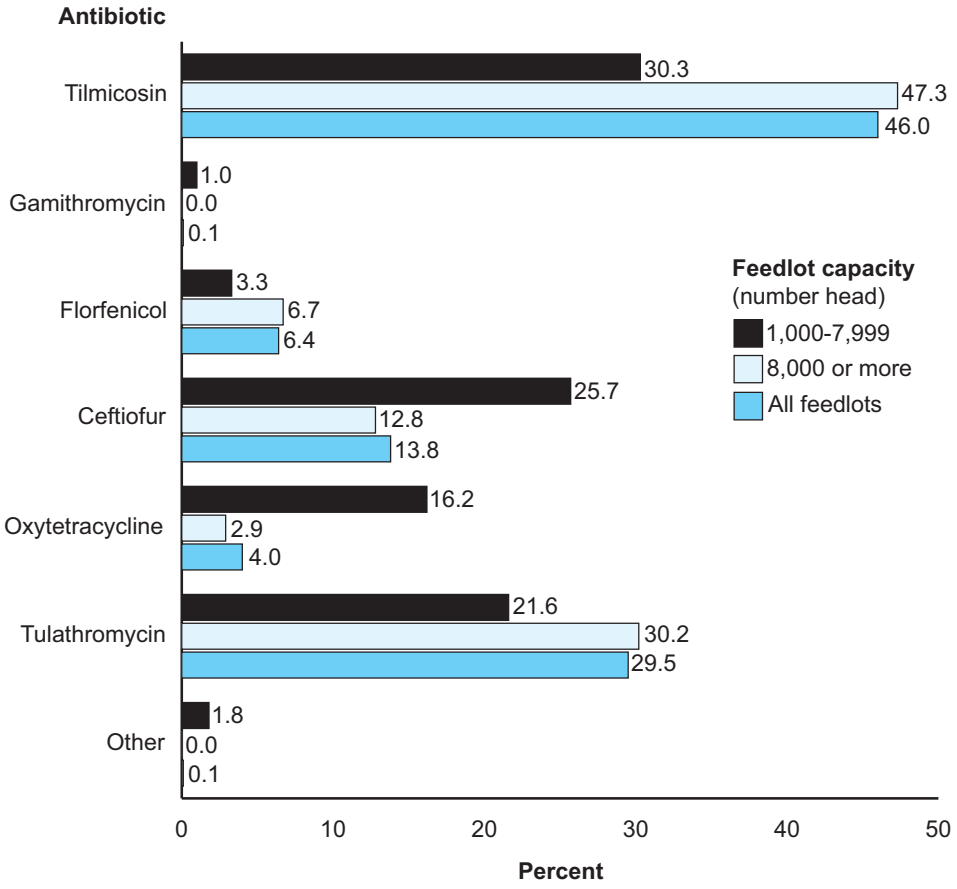
Nearly half of the cattle treated metaphylactically for shipping fever (46.0 percent) were treated with tilmicosin, and nearly one-third (29.5 percent) were treated with tulathromycin.

B.1.d. For cattle treated as a group with an injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever, percentage of cattle by antibiotic used, feedlot capacity, and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Tilmicosin (Micotil) | 30.3 | (9.4) | 47.3 | (8.9) | 41.0 | (9.9) | 64.1 | (9.2) | 46.0 | (8.2) |
| Gamithromycin (Zactran) | 1.0 | (0.8) | 0.0 | (0.0) | 0.1 | (0.0) | 0.3 | (0.3) | 0.1 | (0.1) |
| Florfenicol (Nuflor) | 3.3 | (2.8) | 6.7 | (1.3) | 0.9 | (0.7) | 26.6 | (6.7) | 6.4 | (1.2) |
| Ceftiofur (Naxcel, Excenel®, Excede) | 25.7 | (8.4) | 12.8 | (3.5) | 17.0 | (4.5) | 2.2 | (1.3) | 13.8 | (3.4) |
| Oxytetracycline (e.g., Oxy-Tet100, LA200, Biomycin) | 16.2 | (8.4) | 2.9 | (1.2) | 4.2 | (1.8) | 3.0 | (0.8) | 4.0 | (1.4) |
| Penicillin (e.g., Aquacillin) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Tulathromycin (Draxxin) | 21.6 | (8.4) | 30.2 | (8.6) | 36.9 | (9.6) | 3.0 | (1.6) | 29.5 | (7.9) |
| Other | 1.8 | (1.7) | 0.0 | (—) | 0.0 | (—) | 0.7 | (0.7) | 0.1 | (0.1) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

**For cattle that were mass treated with an injectable antibiotic to prevent or reduce an outbreak of shipping fever, percentage of cattle that were treated**



Feedlots treat cattle as a group (metaphylaxis) against shipping fever for a variety of reasons. The criteria most commonly cited by feedlots as very important when deciding to mass treat cattle with an injectable antibiotic were: a known history of a lack of vaccination for respiratory pathogens (74.3 percent of feedlots) and appearance of the cattle (74.1 percent). Since many of the following criteria were rated as very or somewhat important, it is apparent that feedlots base the decision to mass treat on several factors.

B.1.e. Percentage of feedlots by level of importance placed on the following criteria when deciding to treat cattle as a group with an injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever:

| | Percent Feedlots | | | | | | |
|---|---|---|---|---|---|---|---|
| | Level of Importance | | | | | | |
| | Very | | Somewhat | | Not | | |
| Criterion | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Long shipping distance (increased stress and shrinkage) | 56.4 | (4.6) | 31.2 | (4.3) | 12.3 | (3.1) | 100.0 |
| Arrival weight | 27.1 | (3.8) | 46.9 | (4.6) | 26.0 | (4.2) | 100.0 |
| Appearance of cattle at arrival | 74.1 | (4.2) | 19.0 | (3.7) | 6.8 | (2.6) | 100.0 |
| Shipping fever problems in cattle previously received from the same source | 64.2 | (4.4) | 24.8 | (4.0) | 11.0 | (3.1) | 100.0 |
| Occurrence of respiratory disease in some of the cattle from the pen/group | 58.8 | (4.5) | 32.8 | (4.3) | 8.5 | (2.8) | 100.0 |
| Source of cattle, such as a sale barn | 66.7 | (4.3) | 25.4 | (4.0) | 7.9 | (2.7) | 100.0 |
| Known history of lack of vaccination against respiratory pathogens | 74.3 | (4.1) | 18.6 | (3.5) | 7.1 | (2.4) | 100.0 |
| Season (e.g., winter vs. summer) | 33.3 | (4.2) | 49.0 | (4.7) | 17.7 | (3.6) | 100.0 |
| Other | 8.4 | (2.6) | 0.5 | (0.4) | 91.1 | (2.7) | 100.0 |

B.1.f. Percentage of cattle by level of importance placed on the following criteria when deciding to treat cattle as a group with an injectable antibiotic (metaphylaxis) to prevent or minimize an outbreak of shipping fever:

| | Percent Cattle | | | | | | |
|---|---|---|---|---|---|---|---|
| | Level of Importance | | | | | | |
| | Very | | Somewhat | | Not | | |
| Criterion | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Long shipping distance (increased stress and shrinkage) | 65.3 | (6.8) | 33.6 | (6.8) | 1.2 | (0.4) | 100.0 |
| Arrival weight | 48.6 | (7.2) | 44.6 | (7.2) | 6.8 | (2.6) | 100.0 |
| Appearance of cattle at arrival | 88.4 | (2.8) | 10.0 | (2.5) | 1.6 | (1.2) | 100.0 |
| Shipping fever problems in cattle previously received from the same source | 83.8 | (3.2) | 15.2 | (3.2) | 1.0 | (0.3) | 100.0 |
| Occurrence of respiratory disease in some of the cattle from the pen/group | 70.5 | (6.6) | 26.3 | (6.4) | 3.2 | (1.6) | 100.0 |
| Source of cattle, such as a sale barn | 88.3 | (2.9) | 11.3 | (2.9) | 0.4 | (0.2) | 100.0 |
| Known history of lack of vaccination against respiratory pathogens | 75.9 | (5.8) | 23.0 | (5.8) | 1.1 | (0.2) | 100.0 |
| Season (e.g., winter vs. summer) | 51.4 | (7.1) | 44.3 | (7.2) | 4.3 | (2.3) | 100.0 |
| Other | 10.4 | (5.1) | 2.3 | (1.9) | 87.4 | (5.5) | 100.0 |

## C. Occurrence of and Treatment for Cattle Conditions

### 1. Cattle affected

Nearly all feedlots had at least some cattle affected by shipping fever or lameness.

C.1.a. Percentage of feedlots with cattle affected by the following conditions after arrival, by feedlot capacity and by region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | All feedlots | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | | |
| Condition | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Respiratory disease (e.g., shipping fever) | 95.6 | (2.3) | 100.0 | (0.0) | 96.6 | (2.1) | 97.3 | (2.5) | 96.9 | (1.6) |
| Acute interstitial pneumonia | 60.9 | (5.1) | 97.4 | (2.2) | 88.2 | (3.9) | 46.5 | (7.1) | 71.8 | (3.8) |
| Digestive problems (excluding noneaters) | 58.6 | (5.3) | 98.9 | (0.6) | 82.9 | (4.3) | 51.7 | (7.2) | 70.6 | (3.9) |
| Bullers | 59.3 | (5.4) | 91.4 | (4.9) | 74.0 | (5.1) | 61.0 | (7.1) | 68.8 | (4.1) |
| Lameness | 90.2 | (3.3) | 99.0 | (0.1) | 91.6 | (3.3) | 94.7 | (3.0) | 92.8 | (2.3) |
| Central nervous system problems (e.g., polio and brainers) | 56.7 | (5.5) | 77.2 | (6.2) | 73.9 | (5.2) | 45.8 | (7.3) | 62.7 | (4.3) |

Shipping fever was the most common illness among cattle in feedlots (16.2 percent of cattle placed). Feedlots in the Central region had twice the percentage of cattle affected with respiratory disease compared with feedlots in the Other region (17.9 and 8.8 percent of cattle, respectively). Less than 5 percent of cattle were affected by each of the other conditions listed.

C.1.b. Percentage of cattle affected by the following conditions after arrival, by feedlot capacity and by region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Condition | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Respiratory disease (e.g., shipping fever) | 9.0 | (1.1) | 17.2 | (1.6) | 17.9 | (1.6) | 8.8 | (0.6) | 16.2 | (1.4) |
| Acute interstitial pneumonia | 3.1 | (0.8) | 2.8 | (0.4) | 2.9 | (0.4) | 2.3 | (0.4) | 2.8 | (0.3) |
| Digestive problems (excluding noneaters) | 1.2 | (0.3) | 4.7 | (1.0) | 5.0 | (1.0) | 1.0 | (0.1) | 4.3 | (0.9) |
| Bullers | 0.7 | (0.1) | 3.0 | (0.5) | 3.2 | (0.5) | 1.0 | (0.1) | 2.8 | (0.5) |
| Lameness | 1.8 | (0.3) | 1.8 | (0.2) | 1.9 | (0.2) | 1.1 | (0.1) | 1.8 | (0.2) |
| Central nervous system problems (e.g., polio and brainers) | 0.4 | (0.1) | 1.1 | (0.4) | 1.2 | (0.4) | 0.2 | (0.1) | 1.1 | (0.3) |

C.1.c. For feedlots with cattle affected by the following conditions after arrival, percentage of feedlots that treated those cattle, by feedlot capacity and by region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Condition | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Respiratory disease (e.g., shipping fever) | 100.0 | (0.0) | 100.0 | (0.0) | 100.0 | (0.0) | 100.0 | (0.0) | 100.0 | (0.0) |
| Acute interstitial pneumonia | 97.2 | (2.5) | 95.3 | (2.1) | 96.9 | (2.2) | 87.7 | (4.3) | 95.5 | (1.9) |
| Digestive problems (excluding noneaters) | 98.5 | (1.2) | 93.8 | (2.6) | 93.7 | (2.9) | 96.9 | (1.2) | 94.2 | (2.4) |
| Bullers | 58.2 | (9.7) | 81.4 | (5.1) | 81.6 | (5.2) | 68.4 | (12.0) | 79.3 | (4.7) |
| Lameness | 99.2 | (0.5) | 99.0 | (0.9) | 98.9 | (1.0) | 99.6 | (0.3) | 99.0 | (0.8) |
| Central nervous system problems (e.g., polio and brainers) | 97.4 | (2.6) | 96.0 | (3.3) | 95.9 | (3.2) | 100.0 | (—) | 96.1 | (3.0) |

C.1.d. For cattle affected by the following conditions after arrival, percentage of cattle treated, by feedlot capacity and by region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Condition | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Respiratory disease (e.g., shipping fever) | 96.7 | (1.5) | 86.4 | (3.4) | 86.6 | (3.5) | 92.2 | (4.6) | 87.5 | (3.0) |
| Acute interstitial pneumonia | 94.4 | (3.0) | 56.8 | (4.5) | 55.0 | (4.0) | 87.7 | (4.3) | 60.2 | (4.0) |
| Digestive problems (excluding noneaters) | 88.2 | (3.4) | 50.9 | (5.1) | 46.3 | (4.6) | 92.1 | (3.2) | 53.9 | (4.7) |
| Bullers | 57.6 | (9.7) | 72.3 | (5.7) | 72.5 | (5.9) | 63.8 | (12.9) | 71.0 | (5.3) |
| Lameness | 94.2 | (2.8) | 84.4 | (4.7) | 84.4 | (5.0) | 90.6 | (4.7) | 85.5 | (4.2) |
| Central nervous system problems (e.g., polio and brainers) | 92.9 | (3.5) | 72.8 | (4.7) | 74.4 | (4.6) | 81.2 | (3.6) | 74.8 | (4.3) |

C.1.e. For feedlots with cattle affected with the following conditions after arrival, feedlot average cost per treatment, by feedlot capacity and by region:

**Feedlot Average Cost per Treatment** (dollars)

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Condition** | **Avg.** | **Std. error** | **Avg.** | **Std. error** | **Avg.** | **Std. error** | **Avg.** | **Std. error** | **Avg.** | **Std. error** |
| Respiratory disease (e.g., shipping fever) | 23.4 | (1.2) | 23.9 | (2.0) | 23.1 | (1.4) | 24.4 | (1.5) | 23.6 | (1.1) |
| Acute interstitial pneumonia | 22.4 | (1.8) | 20.7 | (3.0) | 21.8 | (2.0) | 21.3 | (2.4) | 21.7 | (1.6) |
| Digestive problems (excluding noneaters) | 11.2 | (2.2) | 8.0 | (0.5) | 8.8 | (0.8) | 12.7 | (4.4) | 9.9 | (1.4) |
| Bullers | 9.6 | (3.4) | 3.3 | (0.5) | 4.2 | (1.0) | 14.7 | (7.0) | 6.9 | (2.0) |
| Lameness | 14.4 | (1.7) | 11.6 | (1.0) | 13.7 | (1.4) | 12.9 | (2.0) | 13.4 | (1.2) |
| Central nervous system problems (e.g., polio and brainers) | 23.3 | (3.3) | 14.7 | (2.3) | 16.9 | (1.9) | 28.5 | (6.5) | 20.1 | (2.3) |

### 2. Cattle treatments

Nearly all feedlots (99.0 percent) used an injectable antibiotic as part of an initial treatment for respiratory disease of at least some cattle. Overall, 55.9 percent of feedlots used a nonsteroidal anti-inflammatory drug in the initial treatment program for some cattle, and 39.3 percent used a respiratory vaccination (e.g., for IBR) in the initial treatment of some cattle. Feedlots with a capacity of 1,000 to 7,999 head were more likely to use an oral antibiotic, a nonsteroidal anti-inflammatory drug, or a probiotic paste for initial treatment than feedlots with a capacity of 8,000 or more head.

C.2.a. Percentage of feedlots by treatment usually given to cattle as part of an initial course of treatment for **respiratory disease**, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 98.5 | (1.3) | 100.0 | (0.0) | 98.3 | (1.6) | 100.0 | (—) | 99.0 | (0.9) |
| Oral antibiotic | 20.2 | (4.5) | 2.2 | (2.0) | 11.9 | (3.9) | 19.5 | (5.8) | 14.9 | (3.3) |
| Vitamin C injection | 4.7 | (2.5) | 14.9 | (5.2) | 12.4 | (3.8) | 0.9 | (0.9) | 7.8 | (2.3) |
| Vitamin B injection | 21.2 | (4.7) | 6.1 | (3.2) | 17.0 | (4.5) | 16.6 | (5.5) | 16.8 | (3.5) |
| Respiratory vaccination (e.g., IBR) | 34.2 | (5.2) | 51.2 | (7.2) | 45.7 | (5.7) | 29.6 | (6.3) | 39.3 | (4.3) |
| Corticosteroid (e.g., dexamethasone, Azium) | 35.6 | (5.4) | 19.5 | (6.1) | 34.4 | (5.5) | 25.4 | (6.2) | 30.9 | (4.2) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 64.8 | (5.4) | 35.0 | (6.6) | 50.8 | (5.7) | 63.4 | (6.8) | 55.9 | (4.4) |
| Antihistamine | 16.5 | (4.1) | 17.2 | (6.5) | 16.8 | (4.7) | 16.5 | (5.1) | 16.7 | (3.5) |
| Anthelmintic (dewormer) | 4.5 | (2.4) | 1.6 | (1.4) | 6.0 | (2.8) | 0.0 | (—) | 3.6 | (1.7) |
| Probiotic paste | 22.6 | (4.8) | 7.9 | (2.8) | 19.2 | (4.5) | 16.6 | (5.5) | 18.2 | (3.5) |
| Oral electrolyte, fluids, drenches | 18.4 | (4.3) | 11.8 | (3.9) | 20.3 | (4.5) | 10.7 | (4.5) | 16.4 | (3.2) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

Essentially, all cattle with respiratory disease received an injectable antibiotic. Nearly half the cattle with respiratory disease were vaccinated (e.g., for IBR) as part of their treatment. About one of three cattle with respiratory disease (34.1 percent) were treated with vitamin C. Overall, very few cattle with respiratory disease (3.0 percent) received oral antibiotics as a treatment.

C.2.b. For cattle treated for respiratory disease, percentage of cattle by treatment given as part of an initial course of treatment for **respiratory disease**, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 99.9 | (0.1) | 100.0 | (0.0) | 100.0 | (0.0) | 100.0 | (0.0) | 100.0 | (0.0) |
| Oral antibiotic | 20.7 | (10.2) | 1.6 | (1.5) | 3.1 | (1.8) | 1.9 | (1.2) | 3.0 | (1.6) |
| Vitamin C injection | 10.8 | (7.7) | 35.8 | (11.1) | 34.0 | (11.4) | 34.4 | (21.0) | 34.1 | (10.5) |
| Vitamin B injection | 35.0 | (11.9) | 3.1 | (1.6) | 5.7 | (2.1) | 3.0 | (1.9) | 5.4 | (1.9) |
| Respiratory vaccination (e.g., IBR) | 48.8 | (11.9) | 48.5 | (9.3) | 47.5 | (9.5) | 56.2 | (14.4) | 48.5 | (8.6) |
| Corticosteroid (e.g., dexamethasone, Azium) | 46.7 | (12.0) | 7.2 | (3.2) | 10.6 | (3.7) | 5.9 | (3.2) | 10.1 | (3.3) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 58.8 | (11.5) | 16.6 | (4.5) | 19.2 | (5.0) | 23.6 | (8.0) | 19.6 | (4.6) |
| Antihistamine | 5.7 | (3.0) | 5.4 | (2.7) | 5.5 | (2.8) | 4.8 | (2.8) | 5.4 | (2.5) |
| Anthelmintic (dewormer) | 2.1 | (1.5) | 1.5 | (1.4) | 1.7 | (1.4) | 0.0 | (0.0) | 1.5 | (1.3) |
| Probiotic paste | 39.3 | (11.7) | 4.1 | (1.5) | 7.0 | (2.1) | 4.0 | (2.1) | 6.7 | (1.8) |
| Oral electrolyte, fluids, drenches | 33.4 | (12.1) | 4.7 | (1.8) | 7.5 | (2.4) | 0.9 | (0.5) | 6.8 | (2.1) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

Overall, 13.4 percent of all cattle placed in feedlots received an injectable antibiotic as part of an initial treatment for respiratory disease, and only 0.4 received an oral antibiotic. After accounting for the number of cattle affected with respiratory disease and the percentage of feedlots that used different treatments for animals with respiratory disease, a relatively low percentage of cattle overall received any of the other treatments as part of an initial treatment for respiratory disease, which is the most common disease condition of cattle in feedlots and the most commonly treated disease condition in feedlots.

C.2.c. Percentage of all cattle by treatment given as part of an initial treatment for **respiratory disease**, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 8.5 | (1.1) | 14.0 | (1.5) | 14.5 | (1.5) | 8.2 | (0.8) | 13.4 | (1.3) |
| Oral antibiotic | 1.8 | (1.0) | 0.2 | (0.2) | 0.5 | (0.3) | 0.2 | (0.1) | 0.4 | (0.2) |
| Vitamin C injection | 1.0 | (0.7) | 5.1 | (1.9) | 5.0 | (2.1) | 2.9 | (1.9) | 4.6 | (1.7) |
| Vitamin B injection | 3.0 | (1.2) | 0.4 | (0.2) | 0.8 | (0.3) | 0.3 | (0.2) | 0.7 | (0.2) |
| Respiratory vaccination (e.g., IBR) | 4.2 | (1.3) | 6.8 | (1.5) | 6.9 | (1.7) | 4.6 | (1.5) | 6.5 | (1.4) |
| Corticosteroid (e.g., dexamethasone, Azium) | 4.0 | (1.3) | 1.0 | (0.4) | 1.6 | (0.5) | 0.5 | (0.3) | 1.4 | (0.4) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 5.0 | (1.1) | 2.3 | (0.5) | 2.8 | (0.6) | 1.9 | (0.6) | 2.6 | (0.5) |
| Antihistamine | 0.5 | (0.2) | 0.8 | (0.4) | 0.8 | (0.4) | 0.4 | (0.2) | 0.7 | (0.3) |
| Anthelmintic (dewormer) | 0.2 | (0.1) | 0.2 | (0.2) | 0.2 | (0.2) | 0.0 | (0.0) | 0.2 | (0.2) |
| Probiotic paste | 3.3 | (1.1) | 0.6 | (0.2) | 1.0 | (0.3) | 0.3 | (0.2) | 0.9 | (0.2) |
| Oral electrolyte, fluids, drenches | 2.8 | (1.2) | 0.7 | (0.2) | 1.1 | (0.3) | 0.1 | (0.0) | 0.9 | (0.3) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

The commonly used treatments for digestive disease in feedlot cattle included probiotics (35.3 percent of feedlots) and oral electrolyte, fluids, drenches (28.4 percent of feedlots).

C.2.d. Percentage of feedlots by treatment usually given to cattle as part of an initial treatment for **digestive disorders,** and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 15.2 | (3.8) | 26.5 | (6.3) | 26.2 | (4.9) | 7.2 | (3.4) | 18.9 | (3.3) |
| Oral antibiotic | 18.6 | (4.4) | 30.5 | (7.1) | 26.1 | (5.3) | 16.0 | (5.1) | 22.3 | (3.8) |
| Vitamin C injection | 1.4 | (1.3) | 1.3 | (1.2) | 0.0 | (—) | 3.5 | (2.5) | 1.4 | (1.0) |
| Vitamin B injection | 21.1 | (4.7) | 7.7 | (3.4) | 13.1 | (3.9) | 23.2 | (6.3) | 17.1 | (3.4) |
| Corticosteroid (e.g., dexamethasone, Azium) | 7.2 | (3.0) | 13.5 | (5.8) | 10.3 | (3.7) | 7.4 | (3.9) | 9.2 | (2.8) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 19.4 | (4.3) | 9.2 | (4.2) | 16.5 | (4.1) | 16.0 | (5.3) | 16.3 | (3.3) |
| Antihistamine | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Anthelmintic (dewormer) | 11.2 | (3.5) | 5.2 | (2.3) | 6.9 | (2.4) | 13.2 | (5.1) | 9.3 | (2.5) |
| Probiotic paste | 41.0 | (5.8) | 22.9 | (5.8) | 35.8 | (5.6) | 34.6 | (7.2) | 35.3 | (4.4) |
| Oral electrolyte, fluids, drenches | 31.5 | (5.5) | 21.5 | (6.1) | 29.1 | (5.4) | 27.3 | (6.7) | 28.4 | (4.2) |
| Other | 3.6 | (2.4) | 2.4 | (1.3) | 2.5 | (1.8) | 4.4 | (3.3) | 3.2 | (1.7) |

An oral antibiotic was used for half the cattle treated for digestive disorders (50.6 percent). One of three cattle treated for digestive disorders received an injectable antibiotic or probiotic paste (29.8 and 31.2 percent, respectively).

C.2.e. For cattle treated for digestive disorders, percentage of cattle by treatment given as part of an initial treatment for **digestive disorders**, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 27.4 | (12.9) | 30.0 | (8.5) | 30.1 | (8.8) | 27.6 | (9.3) | 29.8 | (7.9) |
| Oral antibiotic | 49.3 | (13.8) | 50.7 | (12.9) | 49.2 | (13.5) | 63.0 | (18.5) | 50.6 | (12.1) |
| Vitamin C injection | 0.5 | (0.5) | 3.3 | (3.0) | 0.0 | (0.0) | 29.4 | (19.9) | 3.1 | (2.8) |
| Vitamin B injection | 19.6 | (8.5) | 5.7 | (1.2) | 6.1 | (1.4) | 10.8 | (5.5) | 6.7 | (1.4) |
| Corticosteroid (e.g., dexamethasone, Azium) | 5.3 | (5.2) | 2.4 | (1.6) | 1.4 | (0.8) | 12.5 | (11.0) | 2.6 | (1.5) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 29.3 | (11.7) | 0.9 | (0.5) | 3.0 | (1.3) | 1.6 | (1.2) | 2.8 | (1.1) |
| Antihistamine | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Anthelmintic (dewormer) | 7.0 | (4.6) | 7.5 | (2.3) | 7.2 | (2.4) | 9.2 | (3.1) | 7.4 | (2.2) |
| Probiotic paste | 56.6 | (13.0) | 29.3 | (7.9) | 31.4 | (8.5) | 29.5 | (9.8) | 31.2 | (7.6) |
| Oral electrolyte, fluids, drenches | 28.6 | (12.1) | 7.4 | (2.0) | 8.2 | (2.0) | 14.5 | (11.0) | 8.9 | (2.3) |
| Other | 5.3 | (4.5) | 1.8 | (1.6) | 2.1 | (1.7) | 1.8 | (0.8) | 2.0 | (1.5) |

As a percentage of cattle placed, relatively few cattle (generally less than 1.0 percent) received any of the listed treatments as part of an initial treatment for digestive disease, after accounting for the occurrence of digestive disease in feedlot cattle and the likelihood that a feedlot would treat cattle with a digestive disease.

C.2.f. Percentage of all cattle by treatment given as part of an initial treatment for **digestive disorders**, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 0.3 | (0.1) | 0.5 | (0.1) | 0.5 | (0.2) | 0.3 | (0.1) | 0.5 | (0.1) |
| Oral antibiotic | 0.5 | (0.2) | 0.9 | (0.3) | 0.9 | (0.3) | 0.6 | (0.2) | 0.8 | (0.3) |
| Vitamin C injection | 0.0 | (0.0) | 0.1 | (0.1) | 0.0 | (0.0) | 0.3 | (0.2) | 0.1 | (0.0) |
| Vitamin B injection | 0.2 | (0.1) | 0.1 | (0.0) | 0.1 | (0.0) | 0.1 | (0.1) | 0.1 | (0.0) |
| Corticosteroid (e.g., dexamethasone, Azium) | 0.1 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.1 | (0.1) | 0.0 | (0.0) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 0.3 | (0.1) | 0.0 | (0.0) | 0.1 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Antihistamine | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Anthelmintic (dewormer) | 0.1 | (0.0) | 0.1 | (0.0) | 0.1 | (0.0) | 0.1 | (0.0) | 0.1 | (0.0) |
| Probiotic paste | 0.6 | (0.2) | 0.5 | (0.1) | 0.6 | (0.1) | 0.3 | (0.1) | 0.5 | (0.1) |
| Oral electrolyte, fluids, drenches | 0.3 | (0.1) | 0.1 | (0.0) | 0.1 | (0.0) | 0.1 | (0.1) | 0.1 | (0.0) |
| Other | 0.1 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |

When lameness occurred in feedlot cattle, most feedlots (89.2 percent) used an injectable antibiotic as part of an initial treatment for at least some of those cattle. The use of the various treatments for lameness was similar by feedlot capacity.

C.2.g. Percentage of feedlots by treatment usually given to cattle as part of an initial treatment for **lameness**, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 90.6 | (3.4) | 86.1 | (4.8) | 87.4 | (3.7) | 92.0 | (4.2) | 89.2 | (2.8) |
| Oral antibiotic | 17.1 | (4.2) | 20.6 | (7.0) | 22.4 | (5.1) | 11.4 | (4.5) | 18.2 | (3.6) |
| Vitamin C injection | 1.6 | (1.5) | 1.3 | (1.2) | 1.8 | (1.7) | 1.0 | (0.9) | 1.5 | (1.1) |
| Vitamin B injection | 6.0 | (2.7) | 6.2 | (4.6) | 8.4 | (3.5) | 2.5 | (2.3) | 6.1 | (2.4) |
| Corticosteroid (e.g., dexamethasone, Azium) | 36.5 | (5.3) | 60.9 | (7.2) | 55.0 | (5.8) | 26.7 | (6.3) | 43.9 | (4.4) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 38.3 | (5.6) | 47.2 | (7.2) | 47.0 | (5.8) | 32.0 | (6.9) | 41.0 | (4.5) |
| Antihistamine | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Probiotic paste | 6.5 | (3.0) | 9.1 | (5.0) | 6.4 | (3.1) | 8.8 | (4.5) | 7.3 | (2.6) |
| Oral electrolyte, fluids, drenches | 3.3 | (2.1) | 7.9 | (4.8) | 7.7 | (3.4) | 0.0 | (—) | 4.7 | (2.1) |
| Other | 1.6 | (1.4) | 0.0 | (—) | 1.7 | (1.6) | 0.0 | (—) | 1.1 | (1.0) |

Most cattle treated for lameness (95.3 percent) received an injectable antibiotic. Nearly three of four lame cattle (73.9 percent) were treated with a corticosteroid.

C.2.h. For cattle treated for lameness, percentage of cattle by treatment given as part of an initial treatment for **lameness,** and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 94.3 | (4.1) | 95.5 | (2.6) | 95.5 | (2.6) | 94.1 | (4.5) | 95.3 | (2.4) |
| Oral antibiotic | 17.0 | (6.4) | 34.1 | (11.7) | 33.9 | (11.6) | 17.4 | (6.9) | 31.9 | (10.3) |
| Vitamin C injection | 2.3 | (2.3) | 4.1 | (3.7) | 0.3 | (0.3) | 28.3 | (19.4) | 3.8 | (3.2) |
| Vitamin B injection | 4.1 | (2.7) | 2.9 | (1.8) | 3.5 | (1.8) | 0.4 | (0.4) | 3.1 | (1.6) |
| Corticosteroid (e.g., dexamethasone, Azium) | 60.3 | (9.7) | 76.0 | (8.0) | 78.7 | (7.3) | 41.2 | (13.8) | 73.9 | (7.1) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 41.3 | (11.6) | 49.3 | (10.4) | 49.4 | (10.4) | 41.5 | (13.9) | 48.3 | (9.3) |
| Antihistamine | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Probiotic paste | 7.8 | (4.6) | 2.1 | (1.7) | 2.9 | (1.8) | 2.6 | (2.5) | 2.9 | (1.6) |
| Oral electrolyte, fluids, drenches | 13.0 | (11.0) | 4.3 | (2.3) | 6.2 | (3.0) | 0.0 | (0.0) | 5.4 | (2.6) |
| Other | 1.3 | (1.3) | 0.0 | (—) | 0.2 | (0.2) | 0.0 | (0.1) | 0.2 | (0.2) |

Given the relatively low occurrence of lameness in feedlots, and despite the high likelihood that such animals would be treated, very few animals overall received any of the listed treatments for lameness.

C.2.i. Percentage of all cattle by treatment given as part an initial treatment for **lameness**, and by feedlot capacity and region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Treatment** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Injectable antibiotic | 1.5 | (0.3) | 1.3 | (0.2) | 1.4 | (0.2) | 1.0 | (0.1) | 1.4 | (0.2) |
| Oral antibiotic | 0.3 | (0.1) | 0.5 | (0.2) | 0.5 | (0.2) | 0.2 | (0.1) | 0.5 | (0.2) |
| Vitamin C injection | 0.0 | (0.0) | 0.1 | (0.0) | 0.0 | (0.0) | 0.3 | (0.2) | 0.1 | (0.0) |
| Vitamin B injection | 0.1 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Corticosteroid (e.g., dexamethasone, Azium) | 1.0 | (0.3) | 1.1 | (0.2) | 1.2 | (0.2) | 0.4 | (0.2) | 1.0 | (0.2) |
| Nonsteroidal anti-inflammatory (e.g., Banamine, aspirin) | 0.6 | (0.2) | 0.7 | (0.2) | 0.7 | (0.2) | 0.4 | (0.2) | 0.7 | (0.2) |
| Antihistamine | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Probiotic paste | 0.1 | (0.1) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Oral electrolyte, fluids, drenches | 0.2 | (0.2) | 0.1 | (0.0) | 0.1 | (0.0) | 0.0 | (—) | 0.1 | (0.0) |
| Other | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (0.0) |

### 3. Hospital pens

Half of feedlots (51.0 percent) always or usually treated sick cattle in a hospital area, and sick cattle remained in a hospital pen for 24 hours or more. Only 14.5 percent of feedlots always or usually treated sick cattle in the home pen or alley.

C.3.a. Percentage of feedlots by how often sick cattle were usually treated in the following locations:

| | Percent Feedlots Treated. . . | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Always | | Usually | | Sometimes | | Never | | No hospital pen or area | | |
| Location | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Hospital area and left in a hospital pen for 24 hr or more | 24.2 | (3.8) | 26.8 | (3.9) | 40.0 | (4.5) | 5.3 | (2.0) | 3.7 | (1.7) | 100.0 |
| Hospital area and removed from the hospital pen in less than 24 hr | 7.5 | (2.3) | 21.0 | (3.6) | 39.1 | (4.2) | 28.7 | (4.0) | 3.7 | (1.7) | 100.0 |
| Home pen or alley | 6.1 | (2.3) | 8.4 | (2.6) | 28.2 | (3.9) | 57.3 | (4.5) | NA | | 100.0 |

Seven of 10 sick cattle (70.1 percent) were always or usually treated in a hospital area and remained there for 24 hours or more. Only 5.1 percent of sick cattle were always or usually treated in the home pen or alley.

C.3.b. Percentage of cattle by how often sick cattle were treated in the following locations:

| | Percent Cattle Treated . . . | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Always | | Usually | | Sometimes | | Never | | No hospital pen or area | | |
| Location | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Hospital area and left in a hospital pen for 24 hr or more | 23.5 | (6.1) | 46.6 | (7.4) | 27.2 | (5.4) | 2.5 | (1.2) | 0.2 | (0.1) | 100.0 |
| Hospital area and removed from the hospital pen in less than 24 hr | 4.7 | (1.4) | 21.1 | (5.9) | 50.1 | (7.1) | 23.9 | (6.4) | 0.2 | (0.1) | 100.0 |
| Home pen or alley | 1.6 | (1.2) | 3.5 | (1.6) | 30.0 | (6.3) | 65.0 | (6.4) | NA | | 100.0 |

In addition to providing treatments for underlying disease, many feedlots provide other resources to sick cattle to support their recovery. The majority of feedlots (95.5 percent) provided some hay to cattle in hospital pens to stimulate appetite. In addition, nearly 9 of 10 feedlots provided sick cattle extra space at the bunk (88.5 percent) and at the water trough (86.8 percent) to decrease competition for access. About 7 of 10 feedlots also provided wind breaks (73.5 percent), shade (65.0 percent), or additional bedding (70.7 percent).

C.3.c. Percentage of feedlots by resources provided to cattle in hospital pens, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Resource** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Wind breaks | 84.0 | (3.9) | 50.5 | (6.7) | 65.6 | (4.8) | 86.7 | (5.0) | 73.5 | (3.5) |
| Shade | 62.4 | (5.5) | 70.6 | (5.9) | 61.8 | (5.4) | 70.4 | (6.9) | 65.0 | (4.2) |
| Sprinklers/misters to keep cattle cool | 30.6 | (5.4) | 34.1 | (6.5) | 29.2 | (5.2) | 36.0 | (7.2) | 31.7 | (4.2) |
| Additional bedding (e.g., straw, newspaper) compared to home pen | 80.1 | (4.2) | 50.1 | (7.3) | 60.3 | (5.3) | 88.3 | (4.5) | 70.7 | (3.8) |
| Additional hay to eat compared to home pen | 94.1 | (2.7) | 98.5 | (1.3) | 95.8 | (2.3) | 94.9 | (3.4) | 95.5 | (1.9) |
| Increased waterer space per animal compared to home pen | 90.0 | (3.3) | 79.9 | (6.1) | 82.9 | (4.2) | 93.4 | (3.5) | 86.8 | (3.0) |
| Increased bunk space per animal compared to home pen | 90.7 | (3.3) | 83.8 | (6.1) | 87.1 | (4.0) | 90.9 | (4.2) | 88.5 | (3.0) |
| Other | 5.9 | (2.7) | 5.6 | (3.1) | 7.8 | (3.0) | 2.5 | (2.3) | 5.8 | (2.1) |

Most cattle were placed in feedlots that provided additional hay (96.4 percent of cattle), increased waterer space (85.2 percent), and increased bunk space (86.8 percent) to cattle in hospital pens. Sprinklers/misters were a more common resource for sick cattle in feedlots in the Other region compared with sick cattle in feedlots in the Central region (74.9 and 26.4 percent, respectively).

C.3.d. Percentage of cattle by resources provided to cattle in hospital pens, and by feedlot capacity and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Resource | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Wind breaks | 80.4 | (4.8) | 34.3 | (6.4) | 36.9 | (6.5) | 51.6 | (15.0) | 39.4 | (5.9) |
| Shade | 62.4 | (7.8) | 60.0 | (8.1) | 54.5 | (8.3) | 87.6 | (5.4) | 60.3 | (7.3) |
| Sprinklers/misters to keep cattle cool | 28.6 | (7.0) | 35.7 | (7.4) | 26.4 | (7.1) | 74.9 | (8.5) | 34.9 | (6.6) |
| Additional bedding (e.g., straw, newspaper) compared to home pen | 79.1 | (4.6) | 43.1 | (7.7) | 46.0 | (7.9) | 52.4 | (15.1) | 47.2 | (7.0) |
| Additional hay to eat compared to home pen | 93.0 | (3.3) | 96.8 | (2.7) | 96.0 | (2.9) | 98.1 | (1.4) | 96.4 | (2.4) |
| Increased waterer space per animal compared to home pen | 82.8 | (6.3) | 85.4 | (4.8) | 85.2 | (4.8) | 84.8 | (9.3) | 85.2 | (4.3) |
| Increased bunk space per animal compared to home pen | 89.8 | (4.3) | 86.5 | (5.1) | 84.5 | (5.5) | 97.7 | (1.4) | 86.8 | (4.5) |
| Other | 6.0 | (3.8) | 2.5 | (1.2) | 2.5 | (1.1) | 4.7 | (4.4) | 2.8 | (1.2) |

## D. Therapeutic Treatment

### 1. Treatment for respiratory disease

Respiratory disease is the most common type of illness experienced by cattle entering feedlots. While many management practices implemented in feedlots and prior to the cattle's arrival are aimed at preventing respiratory disease, nearly all feedlots had at least some animals develop respiratory disease while in the feedlot.

D.1.a. Percentage of feedlots with cattle affected by and treated for **respiratory disease**, by feedlot capacity and by region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Affected by respiratory disease (shipping fever) | 95.6 | (2.3) | 100.0 | (0.0) | 98.2 | (1.7) | 95.3 | (3.1) | 97.0 | (1.6) |
| Treated for respiratory disease | 95.6 | (2.3) | 100.0 | (0.0) | 98.2 | (1.7) | 95.3 | (3.1) | 97.0 | (1.6) |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Affected by respiratory disease (shipping fever) | 88.4 | (3.7) | 100.0 | (0.0) | 92.6 | (3.3) | 91.5 | (4.1) | 92.1 | (2.6) |
| Treated for respiratory disease | 88.4 | (3.7) | 100.0 | (0.0) | 92.6 | (3.3) | 91.5 | (4.1) | 92.1 | (2.6) |

Although nearly all feedlots had some cattle that developed respiratory disease while in the feedlot, only a minority of cattle developed respiratory disease. Approximately one of five cattle less than 700 lb when placed (21.2 percent) developed respiratory disease in the feedlot, and nearly all of these cattle (19.0/21.2=89.6 percent) were treated. Among cattle 700 lb or more when placed, 8.8 percent developed respiratory disease, and 84.1 percent (7.4/8.8) of these cattle were treated.

The higher incidence of respiratory disease among cattle less than 700 lb when placed is likely due to the lighter cattle being younger and having less mature immune systems than cattle 700 lb or more. The lighter, younger cattle have also been exposed to fewer pathogens than the heavier, older cattle. In addition, some of the lighter cattle could have come directly from ranch sources and may not have been weaned prior to shipment to the feedlot, which might induce more stress and impaired immune responses, possibly decreasing the cattle's resistance to disease.

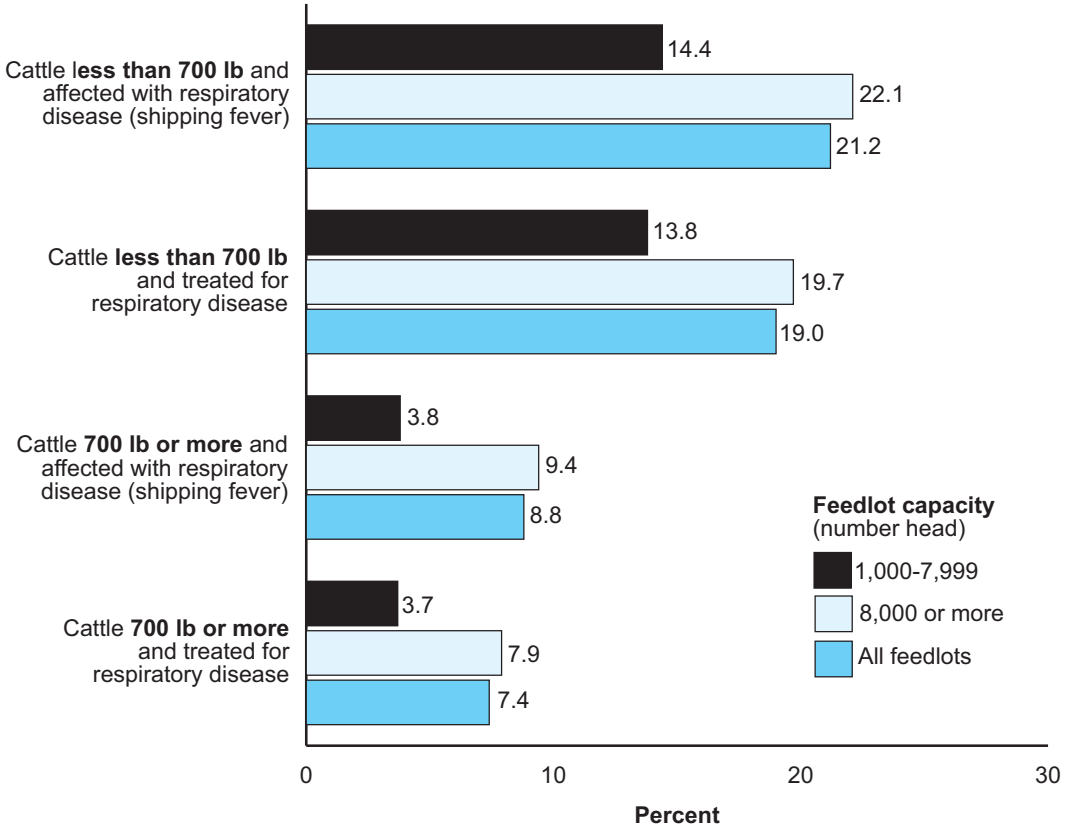
Depending on the perceived cause of the disease, cattle with respiratory disease may not receive treatment. Cases of shipping fever likely involve multiple etiologic agents, including bacteria and viruses, and likely warrant treatment. Feedlots may elect not to treat respiratory disease due to other causes (allowing the disease to resolve on its own without treatment) or may send affected cattle to slaughter early.

D.1.b. Percentage of cattle affected by and treated for **respiratory disease**, by feedlot capacity and by region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Affected by respiratory disease (shipping fever) | 14.4 | (1.7) | 22.1 | (2.2) | 23.2 | (2.2) | 12.1 | (0.9) | 21.2 | (2.0) |
| Treated for respiratory disease | 13.8 | (1.7) | 19.7 | (2.0) | 20.6 | (2.0) | 11.9 | (0.8) | 19.0 | (1.8) |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Affected by respiratory disease (shipping fever) | 3.8 | (0.7) | 9.4 | (1.0) | 9.8 | (1.0) | 4.2 | (0.9) | 8.8 | (0.9) |
| Treated for respiratory disease | 3.7 | (0.6) | 7.9 | (0.9) | 8.2 | (0.9) | 4.1 | (0.9) | 7.4 | (0.8) |

**Of the cattle placed on feed, percentage of cattle affected with and treated for respiratory disease, by weight class and by feedlot capacity**



As shown in table C.2.a, nearly all feedlots treated cattle with respiratory disease using some type of injectable antibiotic. For cattle with respiratory illness that weighed less than 700 lb when placed, the highest percentages of feedlots treated these cattle with tulathromycin or a fluoroquinolone (66.3 and 43.1 percent of feedlots, respectively). These same antibiotics were favored for treating cattle 700 lb or more with respiratory illness. There were no differences by feedlot capacity in the choice of antibiotic products.

Since the percentages of feedlots using various products for treating respiratory disease sum to more than 100 percent, it is apparent that feedlots did not use just a single product for treating all cattle, even within a placement weight class. Choosing specific products might depend on the perceived etiologic cause of the disease being treated (e.g., which bacterial pathogen is involved).

D.1.c. For feedlots with cattle that showed signs of **respiratory disease**, percentage of feedlots by injectable antibiotic given to cattle as part of an initial treatment for respiratory disease, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil®) | 27.7 | (5.4) | 23.1 | (6.6) | 23.4 | (5.3) | 30.4 | (7.0) | 26.2 | (4.2) |
| Gamithromycin (e.g., Zactran®) | 2.9 | (1.9) | 4.7 | (2.3) | 5.9 | (2.5) | 0.0 | (0.0) | 3.5 | (1.5) |
| Florfenicol (i.e., Nuflor®) | 37.1 | (5.6) | 30.1 | (6.6) | 35.1 | (5.6) | 34.5 | (6.9) | 34.8 | (4.4) |
| Tetracyclines (e.g., Oxy-Tet100™, LA200®, Biomycin®) | 26.7 | (4.9) | 30.9 | (6.8) | 32.7 | (5.4) | 21.3 | (6.0) | 28.1 | (4.0) |
| Cephalosporins (e.g., Naxcel®, Excenel®, Excede®) | 31.1 | (5.4) | 42.7 | (6.7) | 42.1 | (5.7) | 24.1 | (6.3) | 34.8 | (4.3) |
| Penicillins (e.g., PenG, Aquacillin™) | 7.2 | (3.0) | 4.7 | (4.4) | 5.4 | (3.0) | 7.8 | (4.2) | 6.4 | (2.5) |
| Amoxicillin (e.g., Amoxi-Inject®) | 1.7 | (1.6) | 0.0 | (0.0) | 0.0 | (0.0) | 2.9 | (2.8) | 1.2 | (1.1) |
| Macrolides (e.g., Gallimycin®, Tylan®200) | 3.2 | (2.1) | 4.7 | (4.4) | 2.5 | (2.4) | 5.3 | (3.6) | 3.7 | (2.0) |
| Tulathromycin (i.e., Draxxin®) | 63.4 | (5.8) | 72.3 | (5.0) | 70.6 | (5.0) | 59.9 | (7.5) | 66.3 | (4.3) |
| Fluoroquinolones (e.g., Baytril®, A180®) | 40.5 | (5.5) | 48.6 | (7.1) | 47.0 | (5.7) | 37.4 | (6.8) | 43.1 | (4.4) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

D.1.c. (cont'd.) For feedlots with cattle that showed signs of **respiratory disease**, percentage of feedlots by injectable antibiotic given to cattle as part of an initial treatment for respiratory disease, and by feedlot capacity and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 27.2 | (5.6) | 16.5 | (5.2) | 19.4 | (4.9) | 29.7 | (7.0) | 23.5 | (4.1) |
| Gamithromycin (e.g., Zactran) | 5.6 | (3.0) | 3.0 | (1.9) | 5.2 | (2.5) | 3.8 | (3.6) | 4.7 | (2.1) |
| Florfenicol (i.e., Nuflor) | 36.6 | (6.0) | 31.5 | (6.8) | 40.1 | (6.0) | 26.7 | (7.0) | 34.8 | (4.6) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 28.3 | (5.4) | 42.4 | (6.4) | 38.9 | (5.5) | 24.6 | (6.5) | 33.2 | (4.3) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 25.1 | (5.4) | 57.3 | (6.2) | 44.8 | (5.8) | 23.5 | (6.6) | 36.3 | (4.4) |
| Penicillins (e.g., PenG, Aquacillin) | 8.1 | (3.3) | 6.3 | (4.5) | 8.6 | (3.7) | 5.8 | (3.8) | 7.5 | (2.7) |
| Amoxicillin (e.g., Amoxi-Inject) | 1.8 | (1.7) | 2.2 | (2.0) | 3.2 | (2.1) | 0.0 | (0.0) | 1.9 | (1.3) |
| Macrolides (e.g., Gallimycin, Tylan200) | 3.5 | (2.4) | 4.6 | (4.3) | 2.7 | (2.5) | 5.8 | (3.8) | 3.9 | (2.2) |
| Tulathromycin (i.e., Draxxin) | 50.4 | (6.3) | 60.0 | (6.8) | 54.9 | (6.0) | 52.0 | (7.8) | 53.7 | (4.8) |
| Fluoroquinolones (e.g., Baytril, A180) | 39.8 | (5.8) | 43.9 | (7.1) | 41.9 | (5.8) | 40.2 | (7.4) | 41.2 | (4.5) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

The highest percentage of cattle treated for respiratory disease were treated with tulathromycin, regardless of weight class when placed. Although fluoroquinolones were the second most common antibiotic chosen by feedlots to treat respiratory disease (table D.1.c), only 15.8 percent of cattle less than 700 lb when placed that had subsequent respiratory disease received this antibiotic; 25.0 percent of these cattle were treated with florfenicol. For cattle 700 lb or more when placed that subsequently were treated for respiratory disease, cephalosporins were the second most common antibiotic used.

D.1.d. For cattle treated for **respiratory disease**, percentage of cattle given injectable antibiotics as part of an initial treatment for respiratory disease, by feedlot capacity and by region:

**Percent Cattle**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 7.3 | (2.1) | 5.2 | (2.0) | 4.6 | (1.8) | 11.8 | (6.7) | 5.4 | (1.8) |
| Gamithromycin (e.g., Zactran) | 0.6 | (0.4) | 0.0 | (0.0) | 0.1 | (0.0) | 0.0 | (—) | 0.1 | (0.0) |
| Florfenicol (i.e., Nuflor) | 29.9 | (8.2) | 24.5 | (13.2) | 26.0 | (13.4) | 17.4 | (3.6) | 25.0 | (12.0) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 15.9 | (8.7) | 9.3 | (4.2) | 10.8 | (4.4) | 2.6 | (0.8) | 9.9 | (3.9) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 8.3 | (2.4) | 9.0 | (2.6) | 7.5 | (2.5) | 19.4 | (3.9) | 8.9 | (2.4) |
| Penicillins (e.g., PenG, Aquacillin) | 7.2 | (5.2) | 0.5 | (0.5) | 1.2 | (0.8) | 0.5 | (0.5) | 1.1 | (0.7) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.1 | (0.1) | 0.0 | (—) | 0.0 | (—) | 0.1 | (0.1) | 0.0 | (0.0) |
| Macrolides (e.g., Gallimycin, Tylan200) | 0.0 | (0.0) | 0.9 | (0.9) | 1.0 | (1.0) | 0.0 | (0.0) | 0.9 | (0.9) |
| Tulathromycin (i.e., Draxxin) | 19.6 | (4.8) | 41.3 | (9.1) | 38.8 | (9.1) | 43.7 | (9.0) | 39.4 | (8.1) |
| Fluoroquinolones (e.g., Baytril, A180) | 16.9 | (4.9) | 15.7 | (5.3) | 14.7 | (5.4) | 23.9 | (4.9) | 15.8 | (4.9) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

D.1.d. (cont'd.) For cattle treated for **respiratory disease**, percentage of cattle given injectable antibiotics as part of an initial treatment for respiratory disease, by feedlot capacity and by region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 10.5 | (4.6) | 3.9 | (2.1) | 3.8 | (2.1) | 8.7 | (3.2) | 4.3 | (1.9) |
| Gamithromycin (e.g., Zactran) | 1.0 | (0.8) | 0.0 | (0.0) | 0.1 | (0.1) | 0.1 | (0.1) | 0.1 | (0.1) |
| Florfenicol (i.e., Nuflor) | 24.7 | (8.3) | 5.7 | (2.6) | 6.2 | (2.8) | 12.6 | (7.8) | 6.9 | (2.6) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 3.7 | (1.4) | 10.7 | (3.4) | 9.6 | (3.3) | 15.9 | (9.4) | 10.3 | (3.1) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 14.8 | (6.9) | 16.9 | (3.2) | 17.5 | (3.1) | 11.0 | (6.4) | 16.8 | (3.0) |
| Penicillins (e.g., PenG, Aquacillin) | 6.0 | (5.5) | 1.4 | (1.4) | 1.9 | (1.5) | 0.0 | (—) | 1.7 | (1.4) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.2 | (0.2) | 0.2 | (0.2) | 0.2 | (0.2) | 0.0 | (—) | 0.2 | (0.2) |
| Macrolides (e.g., Gallimycin, Tylan200) | 0.3 | (0.3) | 2.6 | (2.5) | 2.7 | (2.7) | 0.2 | (0.2) | 2.4 | (2.4) |
| Tulathromycin (i.e., Draxxin) | 17.4 | (5.4) | 55.9 | (6.1) | 58.8 | (5.4) | 9.5 | (5.3) | 53.6 | (5.9) |
| Fluoroquinolones (e.g., Baytril, A180) | 28.5 | (9.8) | 9.1 | (3.2) | 9.3 | (3.3) | 18.0 | (9.8) | 10.2 | (3.2) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

### 2. Retreats and repulls

For cattle less than 700 lb when placed that were treated for respiratory disease, 81.7 percent responded to treatment. For cattle 700 lb or more that were treated for respiratory disease, 86.5 percent responded to treatment. When cattle treated for respiratory disease fail to respond within a time frame in which the treatment would be expected to be effective, a decision is made whether or not to retreat the cattle, usually with a different product. Less than 15 percent of cattle affected and treated for respiratory disease were treated again, regardless of weight class.

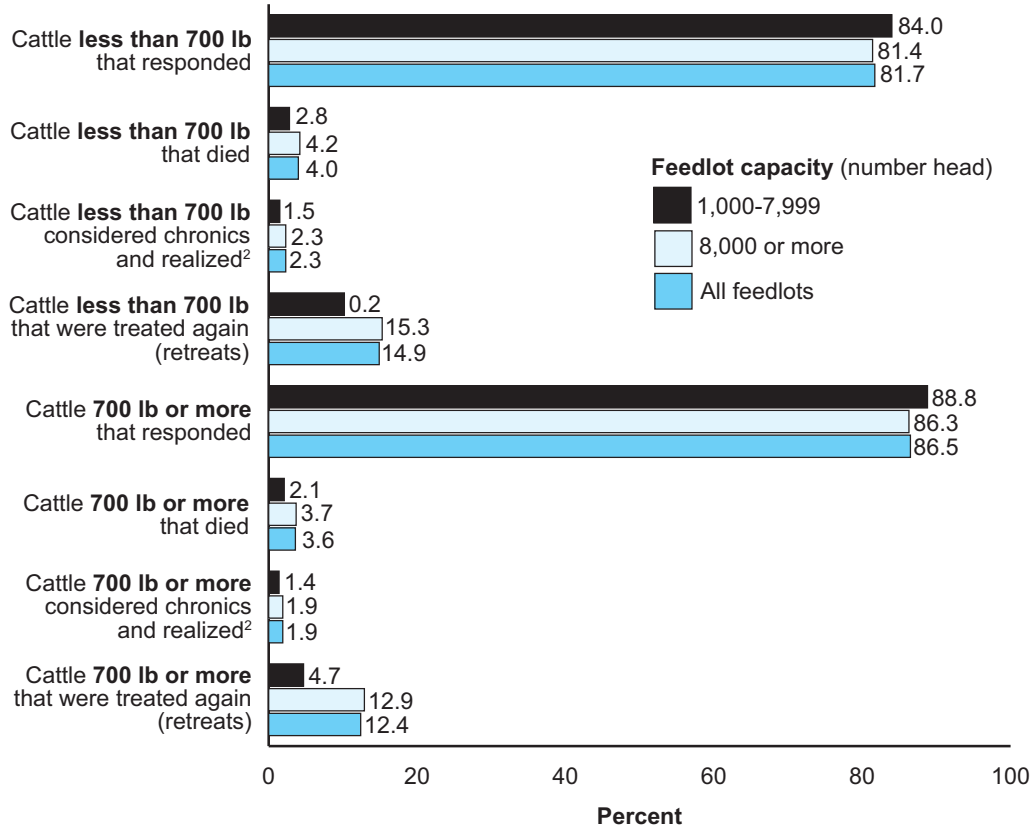
D.2.a. For cattle **treated for respiratory disease**, percentage of cattle by result of initial treatment, feedlot capacity, and region:

**Percent Cattle**[1]

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Responded | 84.0 | (3.4) | 81.4 | (1.4) | 81.5 | (1.5) | 82.9 | (0.7) | 81.7 | (1.3) |
| Died | 2.8 | (0.6) | 4.2 | (0.4) | 4.2 | (0.4) | 2.9 | (0.4) | 4.0 | (0.4) |
| Considered chronics and realized[2] | 1.5 | (0.4) | 2.3 | (0.6) | 2.3 | (0.6) | 1.7 | (0.6) | 2.3 | (0.5) |
| Treated again (retreats) | 10.2 | (2.4) | 15.3 | (2.1) | 15.1 | (2.2) | 13.4 | (0.5) | 14.9 | (2.0) |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Responded | 88.8 | (1.7) | 86.3 | (0.8) | 86.1 | (0.8) | 89.1 | (1.1) | 86.5 | (0.7) |
| Died | 2.1 | (0.9) | 3.7 | (0.5) | 3.9 | (0.5) | 1.3 | (0.2) | 3.6 | (0.5) |
| Considered chronics and realized[2] | 1.4 | (0.5) | 1.9 | (0.6) | 1.8 | (0.6) | 2.4 | (1.0) | 1.9 | (0.5) |
| Treated again (retreats) | 4.7 | (1.3) | 12.9 | (3.0) | 12.9 | (3.2) | 8.3 | (1.0) | 12.4 | (2.8) |

[1]May not add to 100 percent due to multiple responses or unspecified.
[2]Cattle shipped for slaughter prior to reaching normal slaughter weight.

**For cattle treated for respiratory disease, percentage[1] of cattle by result of initial treatment and by feedlot capacity**




[1]May not add to 100 percent due to multiple responses or unspecified.

[2]Cattle shipped for slaughter prior to reaching normal slaughter weight.

For cattle less than 700 lb when placed that were retreated for respiratory disease, 63.1 percent responded to the second treatment. For cattle 700 lb or more when placed that were retreated for respiratory disease, 69.5 percent responded to the second treatment. Regardless of weight class, a lower percentage of retreated cattle responded to retreatment than cattle that received the initial treatment. In addition, the mortality rate for retreated cattle was higher than cattle that responded to the initial treatment.

D.2.b. For cattle **retreated for respiratory disease**, percentage of cattle by result of second treatment, and by feedlot capacity and region:

**Percent Cattle**[1]

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Responded | 63.3 | (4.6) | 63.1 | (4.6) | 63.1 | (4.8) | 63.0 | (1.7) | 63.1 | (4.3) |
| Died | 12.4 | (3.6) | 13.4 | (3.8) | 12.7 | (3.9) | 18.3 | (3.9) | 13.3 | (3.6) |
| Considered chronics and realized[2] | 9.6 | (3.3) | 5.9 | (1.1) | 6.3 | (1.3) | 3.9 | (0.8) | 6.1 | (1.1) |
| Were treated a third time (retreats) | 18.7 | (8.1) | 11.6 | (2.1) | 11.9 | (2.3) | 13.6 | (2.6) | 12.0 | (2.1) |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Responded | 75.6 | (3.0) | 69.4 | (7.8) | 68.9 | (8.3) | 77.2 | (2.4) | 69.5 | (7.6) |
| Died | 8.2 | (2.7) | 13.3 | (1.6) | 13.8 | (1.7) | 5.4 | (2.6) | 13.2 | (1.6) |
| Considered chronics and realized[2] | 4.8 | (1.3) | 8.3 | (2.1) | 8.7 | (2.3) | 2.3 | (1.0) | 8.2 | (2.1) |
| Were treated a third time (retreats) | 6.1 | (2.8) | 17.3 | (4.3) | 17.0 | (4.4) | 17.6 | (4.2) | 17.1 | (4.1) |

[1]May not add to 100 percent due to multiple responses or unspecified.
[2]Cattle shipped for slaughter prior to reaching normal slaughter weight.

Most feedlots changed the antibiotic used for retreats and repulls (89.9 and 86.6 percent, respectively).

D.2.c. Percentage of feedlots by treatment strategies used for respiratory disease in retreat and repull cattle:

**Percent Feedlots**

| | Strategy | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Change antibiotic | | Use same antibiotic | | Use treatment other than antibiotic | | No retreats/ repulls | | |
| Cattle type | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Retreats | 89.9 | (2.7) | 7.5 | (2.4) | 0.0 | (—) | 2.6 | (1.4) | 100.0 |
| Repulls | 86.6 | (3.0) | 8.5 | (2.4) | 1.1 | (1.1) | 3.8 | (1.7) | 100.0 |

Most cattle retreated and repulled (93.5 and 92.8 percent, respectively) received a different antibiotic when retreated or repulled.

D.2.d. Percentage of cattle by treatment strategies used for respiratory disease in retreat and repull cattle:

**Percent Cattle**

| | Strategy | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Change antibiotic | | Use same antibiotic | | Use treatment other than antibiotic | | No retreats/ repulls | | |
| Cattle type | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Retreats | 93.5 | (3.1) | 5.2 | (2.9) | 0.0 | (—) | 1.3 | (1.0) | 100.0 |
| Repulls | 92.8 | (2.8) | 6.5 | (2.7) | 0.3 | (0.3) | 0.4 | (0.2) | 100.0 |

A similar percentage of feedlots selected florfenicol to retreat cattle less than 700 lb and cattle 700 lb or more, when placed, for respiratory disease (50.3 and 46.5 percent, respectively). However, other injectable antibiotics were also widely used, suggesting a lack of consensus on any particular antibiotic for retreatments.

D.2.e. For feedlots that retreated cattle for respiratory disease, percentage of feedlots by class of injectable antibiotics used as part of the retreatment, and by feedlot capacity and by region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Injectable antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 31.9 | (5.6) | 13.2 | (5.7) | 18.6 | (5.0) | 36.9 | (7.5) | 25.8 | (4.2) |
| Gamithromycin (e.g., Zactran) | 3.5 | (2.3) | 3.1 | (2.0) | 5.6 | (2.7) | 0.0 | (—) | 3.4 | (1.7) |
| Florfenicol (i.e., Nuflor®) | 49.0 | (5.9) | 53.0 | (7.3) | 55.3 | (5.8) | 42.6 | (7.5) | 50.3 | (4.6) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 18.5 | (4.7) | 32.8 | (6.6) | 29.8 | (5.3) | 13.0 | (5.1) | 23.1 | (3.9) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 23.3 | (4.9) | 66.5 | (5.7) | 46.6 | (5.5) | 23.1 | (6.0) | 37.3 | (4.2) |
| Penicillins (e.g., PenG, Aquacillin) | 9.1 | (3.4) | 6.5 | (4.7) | 7.8 | (3.3) | 8.8 | (4.7) | 8.2 | (2.7) |
| Amoxicillin (e.g., Amoxi-Inject) | 1.7 | (1.6) | 0.0 | (—) | 1.9 | (1.7) | 0.0 | (—) | 1.2 | (1.1) |
| Macrolides (e.g., Gallimycin, Tyland200) | 3.1 | (2.1) | 4.8 | (4.5) | 4.0 | (2.7) | 3.1 | (3.0) | 3.6 | (2.0) |
| Tulathromycin (i.e., Draxxin) | 38.8 | (5.7) | 40.9 | (7.2) | 35.3 | (5.5) | 45.8 | (7.7) | 39.5 | (4.5) |
| Fluoroquinolones (e.g., Baytril, A180) | 37.1 | (5.7) | 61.1 | (7.3) | 56.8 | (6.0) | 26.8 | (6.7) | 44.9 | (4.6) |
| Other | 1.3 | (1.1) | 0.0 | (—) | 1.4 | (1.2) | 0.0 | (—) | 0.9 | (0.8) |

D.2.e. (cont'd.) For feedlots that retreated cattle for respiratory disease, percentage of feedlots by class of injectable antibiotics used as part of the retreatment, and by feedlot capacity and by region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Injectable antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 34.1 | (6.2) | 8.3 | (3.8) | 17.0 | (4.8) | 36.7 | (7.7) | 24.9 | (4.3) |
| Gamithromycin (e.g., Zactran) | 2.0 | (1.9) | 3.1 | (2.0) | 4.0 | (2.3) | 0.0 | (—) | 2.4 | (1.4) |
| Florfenicol (i.e., Nuflor®) | 43.1 | (6.3) | 52.5 | (7.1) | 47.7 | (6.1) | 44.7 | (7.9) | 46.5 | (4.8) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 27.6 | (5.7) | 36.2 | (6.5) | 41.2 | (5.8) | 15.0 | (5.5) | 30.7 | (4.4) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 24.8 | (5.4) | 69.4 | (5.6) | 51.3 | (6.0) | 25.1 | (6.5) | 40.8 | (4.6) |
| Penicillins (e.g., PenG, Aquacillin) | 10.6 | (3.9) | 4.8 | (4.4) | 9.7 | (3.9) | 6.8 | (4.5) | 8.5 | (3.0) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Macrolides (e.g., Gallimycin, Tyland200) | 5.3 | (2.9) | 4.8 | (4.4) | 4.4 | (3.0) | 6.2 | (4.1) | 5.1 | (2.4) |
| Tulathromycin (i.e., Draxxin) | 33.8 | (6.1) | 39.4 | (7.1) | 32.2 | (5.7) | 41.3 | (8.0) | 35.8 | (4.7) |
| Fluoroquinolones (e.g., Baytril, A180) | 33.3 | (5.9) | 61.9 | (7.2) | 55.7 | (6.2) | 25.3 | (6.5) | 43.5 | (4.7) |
| Other | 1.4 | (1.3) | 2.2 | (2.0) | 2.9 | (1.8) | 0.0 | (—) | 1.7 | (1.1) |

While many antibiotics were used to some extent for retreatment of respiratory disease, fluoroquinolones were used to retreat the highest percentage of cattle less than 700 lb when placed (53.5 percent) and cattle 700 lb or more when placed (42.9 percent).

D.2.f. Of cattle that required retreatment for respiratory disease, percentage of cattle by class of injectable antibiotics used as part of the retreatment, and by feedlot capacity and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Injectable antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 11.7 | (4.1) | 1.2 | (1.0) | 0.6 | (0.4) | 12.0 | (6.3) | 1.8 | (1.0) |
| Gamithromycin (e.g., Zactran) | 2.1 | (2.0) | 0.0 | (0.0) | 0.1 | (0.1) | 0.0 | (—) | 0.1 | (0.1) |
| Florfenicol (i.e., Nufro) | 28.1 | (8.7) | 24.0 | (9.4) | 20.2 | (9.9) | 59.3 | (11.1) | 24.2 | (8.9) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 12.7 | (3.6) | 9.2 | (1.4) | 8.4 | (1.5) | 18.5 | (0.6) | 9.4 | (1.3) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 14.1 | (3.1) | 11.6 | (4.2) | 10.2 | (4.2) | 25.5 | (2.4) | 11.8 | (3.9) |
| Penicillins (e.g., PenG, Aquacillin) | 6.2 | (5.0) | 0.4 | (0.4) | 0.8 | (0.5) | 0.2 | (0.1) | 0.7 | (0.5) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.1 | (0.1) | 0.0 | (—) | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (—) |
| Macrolides (e.g., Gallimycin, Tylan®200) | 4.4 | (3.4) | 0.8 | (0.8) | 1.1 | (0.9) | 0.0 | (0.0) | 1.0 | (0.8) |
| Tulathromycin (i.e., Draxxin) | 17.0 | (5.5) | 11.4 | (6.8) | 12.5 | (7.3) | 4.8 | (1.3) | 11.7 | (6.4) |
| Fluoroquinolones (e.g., Baytril, A180) | 26.3 | (3.4) | 55.2 | (12.0) | 53.1 | (12.8) | 56.9 | (9.5) | 53.5 | (11.4) |
| Other | 0.2 | (0.2) | 0.0 | (—) | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (0.0) |

D.2.f. (cont'd.) Of cattle that required retreatment for respiratory disease, percentage of cattle by class of injectable antibiotics used as part of the retreatment, and by feedlot capacity and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Injectable antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Tilmicosin (i.e., Micotil) | 17.4 | (8.7) | 3.4 | (3.1) | 0.3 | (0.2) | 48.4 | (15.7) | 3.7 | (3.0) |
| Gamithromycin (e.g., Zactran) | 0.9 | (0.9) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (—) | 0.0 | (0.0) |
| Florfenicol (i.e., Nufro) | 22.0 | (9.4) | 27.7 | (16.0) | 28.9 | (16.5) | 10.6 | (6.0) | 27.6 | (15.7) |
| Tetracyclines (e.g., Oxy-Tet100, LA200, Biomycin) | 28.0 | (9.5) | 8.2 | (2.7) | 7.7 | (2.8) | 21.8 | (4.4) | 8.7 | (2.7) |
| Cephalosporins (e.g., Naxcel, Excenel, Excede) | 11.8 | (6.2) | 14.4 | (4.2) | 14.2 | (4.4) | 15.7 | (3.6) | 14.3 | (4.1) |
| Penicillins (e.g., PenG, Aquacillin) | 15.4 | (9.9) | 1.1 | (1.1) | 1.5 | (1.2) | 1.0 | (1.0) | 1.5 | (1.2) |
| Amoxicillin (e.g., Amoxi-Inject) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Macrolides (e.g., Gallimycin, Tylan®200) | 2.0 | (1.2) | 2.7 | (2.6) | 2.8 | (2.8) | 0.3 | (0.3) | 2.6 | (2.6) |
| Tulathromycin (i.e., Draxxin) | 7.0 | (2.6) | 8.9 | (5.4) | 9.4 | (5.8) | 1.0 | (0.7) | 8.8 | (5.3) |
| Fluoroquinolones (e.g., Baytril, A180) | 10.8 | (4.2) | 43.6 | (11.3) | 43.7 | (11.7) | 32.0 | (19.1) | 42.9 | (10.9) |
| Other | 0.1 | (0.1) | 0.6 | (0.6) | 0.6 | (0.6) | 0.0 | (—) | 0.6 | (0.6) |

Some cattle fail to respond to the initial treatment and to the first retreatment for respiratory disease. In these cases, a decision is made whether to pursue further treatment or to salvage the animal once it is safe to do so (e.g., after an appropriate withdrawal period to avoid antibiotic residues). The response rate to a second retreatment was lower for cattle less than 700 lb when placed and for cattle 700 lb or more when placed (37.9 and 45.2 percent, respectively) than the response rate to either an initial treatment (more than 80 percent) or the first retreatment (from 60 and 70 percent). Additionally, the mortality rate for cattle that required a second retreatment was higher for cattle less than 700 lb when placed and for cattle 700 lb or more when placed (30.5 and 31.4 percent, respectively). A higher mortality rate is to be expected in these refractory cases, perhaps because of infections with drug-resistant pathogens, or because the disease has progressed to a point of severity in which the animal cannot adequately respond to the infection or resolve the damage to the respiratory system.

D.2.g. For cattle that required a second retreatment for respiratory disease, percentage of cattle by outcome, feedlot capacity, and region:

**Percent Cattle***

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Outcome** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Cattle less than 700 lb when placed | | | | | | | | | | |
| Responded | 31.5 | (3.3) | 38.5 | (5.0) | 34.1 | (3.9) | 66.3 | (11.1) | 37.9 | (4.5) |
| Died | 54.7 | (12.4) | 28.0 | (4.2) | 32.6 | (5.2) | 15.0 | (5.9) | 30.5 | (4.7) |
| Were considered chronics and were realized | 6.3 | (4.7) | 23.8 | (4.2) | 22.8 | (4.4) | 17.5 | (5.0) | 22.1 | (3.9) |
| Cattle 700 lb or more when placed | | | | | | | | | | |
| Responded | 47.3 | (15.5) | 45.2 | (4.6) | 41.8 | (3.8) | 87.5 | (7.4) | 45.2 | (4.6) |
| Died | 20.0 | (7.6) | 31.5 | (3.8) | 33.5 | (3.4) | 4.8 | (3.2) | 31.4 | (3.7) |
| Were considered chronics and were realized | 26.8 | (9.7) | 29.4 | (4.0) | 31.1 | (3.8) | 7.7 | (4.1) | 29.3 | (3.9) |

*The sum of percent cattle by outcome of retreatment may not equal 100.0 due to question interpretation.

A veterinarian's recommendation was a strong influence for feedlot operators when selecting injectable antibiotics to treat disease in most feedlots (87.0 percent). Personal experiences with past response rates were also a key influence on the selection of antibiotics for treatment. While withdrawal times and cost were important considerations, they do not appear to be as strong influences as others.

D.2.h. Percentage of feedlots by extent to which the following items influenced the selection of injectable antibiotics for treatment of disease:

| | Percent Feedlots | | | | | | |
|---|---|---|---|---|---|---|---|
| | Extent of Influence | | | | | | |
| | Strongly | | Somewhat | | Little or no | | |
| Item | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Veterinarian recommendations | 87.0 | (3.0) | 12.1 | (2.9) | 0.9 | (0.8) | 100.0 |
| Other producers' recommendations | 11.9 | (2.7) | 46.6 | (4.2) | 41.4 | (4.2) | 100.0 |
| Lab test results | 24.8 | (3.9) | 38.3 | (4.2) | 36.9 | (4.1) | 100.0 |
| Drug company advertisement or representative's recommendation | 2.1 | (1.4) | 41.7 | (4.4) | 56.2 | (4.5) | 100.0 |
| Personal experience (past response rates) | 76.2 | (3.6) | 19.2 | (3.4) | 4.6 | (1.7) | 100.0 |
| Cost of antibiotic | 20.3 | (3.6) | 54.0 | (4.4) | 25.8 | (3.9) | 100.0 |
| Approved route by which antibiotic is to be given | 32.9 | (4.0) | 36.2 | (4.3) | 30.9 | (4.0) | 100.0 |
| Duration of action of antibiotics (e.g., the need to give only once) | 63.2 | (4.3) | 31.6 | (4.3) | 5.1 | (1.9) | 100.0 |
| Drug withdrawal time | 44.5 | (4.3) | 43.9 | (4.5) | 11.6 | (2.9) | 100.0 |
| Other | 3.2 | (1.2) | 0.9 | (0.8) | 95.9 | (1.4) | 100.0 |

Nearly all cattle (95.1 percent) were in facilities in which the recommendations of a veterinarian were a strong influence on the selection of antibiotics.

D.2.i. Percentage of cattle by extent to which the following items influenced the selection of injectable antibiotics for treatment of disease:

| | Percent Cattle | | | | | | |
|---|---|---|---|---|---|---|---|
| | Extent of Influence | | | | | | |
| | Strongly | | Somewhat | | Little or no | | |
| Item | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Veterinarian recommendations | 95.1 | (1.8) | 4.7 | (1.8) | 0.1 | (0.1) | 100.0 |
| Other producers' recommendations | 27.1 | (7.3) | 26.1 | (4.0) | 46.9 | (7.2) | 100.0 |
| Lab test results | 12.7 | (2.4) | 44.9 | (7.0) | 42.4 | (7.0) | 100.0 |
| Drug company advertisement or representative's recommendation | 0.2 | (0.2) | 28.0 | (5.9) | 71.8 | (5.9) | 100.0 |
| Personal experience (past response rates) | 59.8 | (6.9) | 32.5 | (6.6) | 7.8 | (3.5) | 100.0 |
| Cost of antibiotic | 36.8 | (7.2) | 52.0 | (7.2) | 11.3 | (3.8) | 100.0 |
| Approved route by which antibiotic is to be given | 47.2 | (7.3) | 38.8 | (7.0) | 13.9 | (3.8) | 100.0 |
| Duration of action of antibiotics (e.g., the need to give only once) | 76.2 | (6.0) | 23.0 | (6.1) | 0.8 | (0.2) | 100.0 |
| Drug withdrawal time | 58.2 | (7.2) | 37.7 | (7.1) | 4.0 | (1.6) | 100.0 |
| Other | 9.4 | (3.0) | 0.1 | (0.1) | 90.4 | (3.0) | 100.0 |

Fewer than 9 of 10 feedlots provided employees with some training or written guidelines related to disease diagnosis or the use of antibiotics. Many feedlots (more than 50 percent) provided written guidelines along with training for some key protocols, including route and location of injections, adhering to label instructions, and drug residue avoidance.

D.2.j. Percentage of feedlots by training provided to employees on the following topics related to the use of injectable antibiotics, and by training type:

**Percent Feedlots**

**Training Type**

| | With written guidelines | | Without written guidelines | | No training | | |
|---|---|---|---|---|---|---|---|
| **Training topic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Total** |
| Disease diagnosis | 26.4 | (3.7) | 64.6 | (4.2) | 9.0 | (2.6) | 100.0 |
| Appropriate antibiotic selection for specific disease | 44.4 | (4.2) | 49.6 | (4.3) | 6.0 | (2.3) | 100.0 |
| Label use of antibiotic agents | 53.1 | (4.1) | 38.0 | (4.1) | 8.9 | (2.7) | 100.0 |
| Drug residue avoidance | 56.2 | (4.2) | 36.0 | (4.1) | 7.8 | (2.5) | 100.0 |
| Handling/storage of antibiotics | 35.5 | (4.0) | 58.5 | (4.3) | 6.0 | (2.3) | 100.0 |
| Route and location of antibiotic injection | 50.2 | (4.2) | 44.8 | (4.2) | 5.1 | (2.1) | 100.0 |
| Other | 1.6 | (0.8) | 0.0 | (—) | 98.4 | (0.8) | 100.0 |

Very few cattle (2 percent or less) were placed in feedlots that did not provided employees training related to disease diagnosis or the use of injectable antibiotics.

D.2.k. Percentage of cattle by training provided to employees on the following topics related to the use of injectable antibiotics, and by training type:

| | Percent Cattle | | | | | | |
|---|---|---|---|---|---|---|---|
| | Training Type | | | | | | |
| | With written guidelines | | Without written guidelines | | No training | | |
| Training topic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Disease diagnosis | 61.7 | (6.0) | 36.3 | (6.0) | 2.0 | (0.8) | 100.0 |
| Appropriate antibiotic selection for specific disease | 77.3 | (4.8) | 22.1 | (4.8) | 0.6 | (0.3) | 100.0 |
| Label use of antibiotic agents | 89.8 | (1.7) | 8.7 | (1.5) | 1.5 | (0.7) | 100.0 |
| Drug residue avoidance | 89.9 | (2.2) | 9.3 | (2.2) | 0.8 | (0.4) | 100.0 |
| Handling/storage of antibiotics | 64.0 | (6.5) | 35.3 | (6.5) | 0.6 | (0.3) | 100.0 |
| Route and location of antibiotic injection | 85.8 | (3.2) | 13.6 | (3.1) | 0.5 | (0.3 | 100.0 |
| Other | 7.5 | (4.4) | 0.0 | (—) | 92.5 | (4.4) | 100.0 |

## E. Antibiotic Use in Feed and Water

Antibiotic products are incorporated into the feed and/or water of feedlot cattle for a variety of reasons, including disease treatment, disease prevention, and enhanced productivity. The use of antibiotic products in feed or water is regulated by the Food and Drug Administration Center for Veterinary Medicine through labeling of the products with regard to appropriate indications (reasons for use) and levels of inclusion in the feed. Using antibiotics in feed for other reasons or at levels other than those approved on the label is not allowed under any circumstances.

### 1. All cattle

Ionophores influence the fermentation patterns in the rumen of cattle and enhance production efficiency. In addition, ionophores help control coccidiosis in cattle. Ionophores are added to feed throughout the feeding period, until shortly before harvest. More than 90 percent of feedlots used ionophores in feed and more than 90 percent of cattle in feedlots received ionophores (table E.1.b). A total of 31.0 percent of feedlots used tylosin in feed and 71.2 percent of cattle received tylosin (table E.1.b). A higher percentage of feedlots with a capacity of 8,000 or more head (67.5 percent) added tylosin to cattle feed compared with feedlots with a capacity of 1,000 to 7,999 head (15.6 percent). Overall, 71.7 percent of feedlots used chlortetracycline for some cattle, but only 18.4 percent of all cattle received chlortetracycline (table E.1.b).

E.1.a. Percentage of feedlots that added any antibiotics in cattle feed and/or water, by antibiotic used, feedlot capacity, and region:

| | Percent Feedlots | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Ionophores (e.g., Rumensin®, Cattlyst®) | 90.2 | (3.3) | 94.7 | *(2.2)* | 89.3 | (3.5) | 94.8 | (2.7) | 91.5 | (2.4) |
| Coccidiostats (e.g., Corid®, Deccox®) | 32.6 | (5.2) | 35.2 | (7.4) | 29.7 | (5.3) | 39.0 | (7.1) | 33.3 | (4.3) |
| Bacitracin (BMD®, Fortracin®, Albac®) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Chlortetracycline (Aureomycin®100, CTC) | 76.4 | (4.4) | 60.7 | (6.9) | 66.5 | (5.1) | 79.7 | (5.3) | 71.7 | (3.7) |
| Chlortetracycline/ sulfamethazine (Aureo S 700®, MoorMan's®, Beef Cattle Boost) | 11.2 | (3.4) | 14.1 | (5.8) | 17.1 | (4.5) | 4.4 | (2.9) | 12.1 | (3.0) |
| Neomycin (Biosol®, Neomix®325) | 1.3 | (1.2) | 0.0 | (0.0) | 0.0 | (0.0) | 2.3 | (2.1) | 0.9 | (0.8) |
| Oxytetracycline (OTC, Terramycin®, TM50) | 9.7 | (3.3) | 2.4 | (2.2) | 2.9 | (1.9) | 14.6 | (5.2) | 7.5 | (2.4) |
| Sulfamethazine/ sulfadimethoxine (Albon®, Sulmet®) | 6.6 | (2.7) | 2.6 | (2.1) | 0.0 | (0.0) | 13.7 | (5.0) | 5.4 | (2.0) |
| Tetracycline (Tetrasure™, T-Vet®) | 1.8 | (1.7) | 0.0 | (0.0) | 2.0 | (1.9) | 0.0 | (0.0) | 1.2 | (1.2) |
| Tylosin (Tylan®) | 15.6 | (3.8) | 67.5 | (6.9) | 50.2 | (5.5) | 1.9 | (1.1) | 31.0 | (3.5) |
| Virginiamycin (V Max®) | 0.0 | (0.0) | 1.6 | (1.4) | 0.8 | (0.7) | 0.0 | (0.0) | 0.5 | (0.4) |
| Other | 1.1 | (0.9) | 0.0 | (0.0) | 1.2 | (1.1) | 0.0 | (0.0) | 0.7 | (0.7) |

E.1.b. Percentage of all cattle that received antibiotics in feed and/or water, by antibiotic used, feedlot capacity, and region:

| | Percent Cattle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Ionophores (e.g., Rumensin®, Cattlyst®) | 89.7 | (3.4) | 90.2 | (2.9) | 95.3 | (2.5) | 67.6 | (10.8) | 90.1 | (2.6) |
| Coccidiostats (e.g., Corid®, Deccox®) | 23.8 | (6.5) | 9.9 | (3.4) | 12.3 | (3.8) | 7.9 | (3.1) | 11.5 | (3.1) |
| Bacitracin (BMD®, Fortracin®, Albac®) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) | 0.0 | (0.0) |
| Chlortetracycline (Aureomycin®100, CTC) | 46.5 | (6.1) | 14.7 | (3.7) | 17.0 | (3.9) | 24.7 | (8.4) | 18.4 | (3.4) |
| Chlortetracycline/ sulfamethazine (Aureo S 700®, MoorMan's®, Beef Cattle Boost) | 5.0 | (2.2) | 1.8 | (1.1) | 2.4 | (1.3) | 1.2 | (1.1) | 2.2 | (1.0) |
| Neomycin (Biosol®, Neomix®325) | 0.9 | (0.8) | 0.0 | (0.0) | 0.0 | (0.0) | 0.5 | (0.5) | 0.1 | (0.1) |
| Oxytetracycline (OTC, Terramycin®, TM50) | 4.0 | (1.6) | 0.0 | (0.0) | 0.1 | (0.1) | 2.2 | (1.1) | 0.5 | (0.2) |
| Sulfamethazine/ sulfadimethoxine (Albon®, Sulmet®) | 1.7 | (1.0) | 0.0 | (0.0) | 0.0 | (0.0) | 1.1 | (0.7) | 0.2 | (0.1) |
| Tetracycline (Tetrasure™, T-Vet®) | 1.1 | (1.1) | 0.0 | (0.0) | 0.2 | (0.2) | 0.0 | (0.0) | 0.1 | (0.1) |
| Tylosin (Tylan®) | 26.0 | (7.1) | 77.2 | (4.7) | 79.9 | (4.5) | 33.1 | (18.0) | 71.2 | (4.4) |
| Virginiamycin (V Max®) | 0.0 | (0.0) | 0.3 | (0.2) | 0.3 | (0.3) | 0.0 | (0.0) | 0.2 | (0.2) |
| Other | 0.6 | (0.5) | 0.0 | (0.0) | 0.1 | (0.1) | 0.0 | (0.0) | 0.1 | (0.1) |

### 2. Cattle less than 700 lb when placed

More than 9 of 10 feedlots (90.9 percent) added ionophores to the feed of at least some cattle less than 700 lb when placed. Other coccidiostats were used by about one of three feedlots (33.5 percent). Overall, 81.1 percent (69.0 percent+12.1 percent) of feedlots used a chlortetracycline product in the feed and/or water of at least some cattle less than 700 lb when placed. In many cases, the use of these products was associated with the treatment or prevention of disease and would, therefore, be fed for shorter periods (table E.2.c). Tylosin was used for some lighter placed cattle in 33.6 percent of feedlots, most likely to control liver abscesses.

E.2.a. Percentage of feedlots that added antibiotics to the feed and/or water of cattle less than 700 lb when placed as a health or production management tool, by antibiotic used, feedlot capacity, and region: (table revised 3/24/2014)

| | Percent Feedlots | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Ionophores (e.g., Rumensin®, Cattlyst®) | 90.5 | (3.4) | 91.7 | (3.1) | 90.1 | (3.5) | 91.9 | (3.5) | 90.9 | (2.5) |
| Coccidiostats (e.g., Corid®, Deccox®) | 32.5 | (5.5) | 35.6 | (7.4) | 30.7 | (5.6) | 37.7 | (7.5) | 33.5 | (4.5) |
| Bacitracin (BMD®, Fortracin®, Albac®) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Chlortetracycline (Aureomycin®100, CTC) | 73.3 | (4.9) | 60.0 | (7.0) | 61.8 | (5.5) | 80.0 | (5.4) | 69.0 | (4.0) |
| Chlortetracycline/ sulfamethazine (Aureo S 700®, MoorMan's®, Beef Cattle Boost) | 11.1 | (3.7) | 14.2 | (5.9) | 16.9 | (4.7) | 4.9 | (3.2) | 12.1 | (3.1) |
| Neomycin (Biosol®, Neomix®325) | 1.5 | (1.4) | 0.0 | (—) | 0.0 | (—) | 2.5 | (2.3) | 1.0 | (0.9) |
| Oxytetracycline (OTC, Terramycin®, TM50) | 9.5 | (3.5) | 2.5 | (2.3) | 3.2 | (2.1) | 13.5 | (5.4) | 7.3 | (2.5) |
| Sulfamethazine/ sulfadimethoxine (Albon®, Sulmet®) | 7.5 | (3.1) | 2.6 | (2.1) | 0.0 | (—) | 15.0 | (5.4) | 5.9 | (2.2) |
| Tetracycline (Tetrasure™, T-Vet®) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Tylosin (Tylan®) | 17.8 | (4.3) | 67.0 | (7.0) | 55.0 | (5.7) | 1.0 | (0.9) | 33.6 | (3.8) |
| Virginiamycin (V Max®) | 0.0 | (—) | 1.6 | (1.4) | 0.9 | (0.8) | 0.0 | (—) | 0.5 | (0.5) |
| Other | 1.2 | (1.1) | 0.0 | (—) | 1.4 | (1.2) | 0.0 | (—) | 0.8 | (0.7) |

More than 9 of 10 cattle less than 700 lb when placed (91.1 percent) received ionophores in their feed. Although 69.0 percent of feedlots used chlortetracycline in feed and/or water (table E.2.a), only 26.1 percent of cattle less than 700 lb received chlortetracycline. Cattle in feedlots with a capacity of 1,000 to 7,999 head were more likely to receive chlortetracycline (53.3 percent) compared with cattle in feedlots with a capacity of 8,000 or more head (22.4 percent). Overall, 73.8 percent of cattle less than 700 lb received tylosin in feed.

E.2.b. Percentage of cattle less than 700 lb when placed that received antibiotics in feed and/or water as a health or production management tool, by antibiotic used, feedlot capacity, and region:

| | Percent Cattle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Ionophores (e.g., Rumensin®, Cattlyst®) | 92.4 | (3.9) | 90.9 | (2.2) | 97.8 | (1.3) | 61.6 | (10.3) | 91.1 | (2.0) |
| Coccidiostats (e.g., Corid®, Deccox®) | 30.7 | (8.8) | 12.7 | (5.0) | 15.5 | (5.5) | 12.0 | (5.0) | 14.8 | (4.6) |
| Bacitracin (BMD®, Fortracin®, Albac®) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Chlortetracycline (Aureomycin®100, CTC) | 53.3 | (7.7) | 22.4 | (4.6) | 27.0 | (4.6) | 22.5 | (7.0) | 26.1 | (4.0) |
| Chlortetracycline/ sulfamethazine (Aureo S 700®, MoorMan's®, Beef Cattle Boost) | 8.6 | (4.1) | 3.9 | (2.5) | 5.0 | (2.7) | 1.8 | (1.6) | 4.4 | (2.2) |
| Neomycin (Biosol®, Neomix®325) | 1.8 | (1.7) | 0.0 | (—) | 0.0 | (—) | 1.2 | (1.2) | 0.2 | (0.2) |
| Oxytetracycline (OTC, Terramycin®, TM50) | 3.3 | (1.7) | 0.1 | (0.1) | 0.2 | (0.2) | 1.5 | (0.9) | 0.5 | (0.2) |
| Sulfamethazine/ sulfadimethoxine (Albon®, Sulmet®) | 3.5 | (2.0) | 0.0 | (0.0) | 0.0 | (—) | 2.3 | (1.4) | 0.4 | (0.2) |
| Tetracycline (Tetrasure™, T-Vet®) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Tylosin (Tylan®) | 29.2 | (8.3) | 80.0 | (4.6) | 84.8 | (4.7) | 25.6 | (17.8) | 73.8 | (4.6) |
| Virginiamycin (V Max®) | 0.0 | (—) | 0.3 | (0.3) | 0.3 | (0.3) | 0.0 | (—) | 0.3 | (0.3) |
| Other | 1.2 | (1.2) | 0.0 | (—) | 0.2 | (0.2) | 0.0 | (—) | 0.1 | (0.1) |

In general, ionophores and tylosin were included in the feed of cattle less than 700 lb when placed throughout the feeding period, whereas other products were typically included for less than 20 days, on average.

E.2.c. Feedlot average number of days cattle less than 700 lb when placed received antibiotics in feed and/or water, by antibiotic used, feedlot capacity, and region:

**Feedlot Average Number of Days[1]**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error |
| Ionophores (e.g., Rumensin, Cattlyst) | 180 | (8) | 176 | (10) | 172 | (6) | 190 | (14) | 179 | (7) |
| Coccidiostats (e.g., Corid®, Deccox) | 15 | (3) | 24 | (7) | 16 | (5) | 21 | (4) | 18 | (3) |
| Bacitracin (BMD, Fortracin, Albac) | NA | | | | | | | | | |
| Chlortetracycline (Aureomycin100, CTC) | 11 | (2) | 8 | (1) | 10 | (1) | 10 | (2) | 10 | (1) |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost) | 10 | (2) | 9 | (4) | 8 | (2) | 17 | (7) | 9 | (2) |
| Neomycin (Biosol, Neomix325)[2] | | | | | | | | | | |
| Oxytetracycline (OTC, Terramycin, TM50)[2] | | | | | | | | | | |
| Sulfamethazine/ sulfadimethoxine (Albon®, Sulmet)[2] | | | | | | | | | | |
| Tetracycline (Tetrasure™, T-Vet) | NA | | | | | | | | | |
| Tylosin (Tylan) | 165 | (8) | 168 | (4) | 167 | (4) | 145 | (0) | 167 | (4) |
| Virginiamycin (V Max)[2] | | | | | | | | | | |
| Other[2] | | | | | | | | | | |

[1]Average number of days of feeding reported by feedlots, and not weighted by the number of cattle placed.
[2]Too few to report.

More than 8 of 10 feedlots (83.3 percent) added ionophores to the feed of cattle less than 700 lb for promoting growth. Other products (coccidiostats, chlortetracycline, chlortetracycline/sulfamethazine, tylosin) were used by a higher percentage of feedlots for disease prevention than disease treatment. Reasons for use were similar, regardless of feedlot capacity or region (data not shown).

E.2.d. For feedlots that added antibiotics in the feed and/or water of cattle less than 700 lb when placed, percentage of feedlots by antibiotic used and by primary reason for using the antibiotics:

| | Percent Feedlots | | | | | | |
|---|---|---|---|---|---|---|---|
| | Primary Reason | | | | | | |
| | Disease prevention | | Disease treatment | | Growth promotion | | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Ionophores (e.g., Rumensin, Cattlyst) | 16.2 | (3.4) | 0.6 | (0.5) | 83.3 | (3.4) | 100.0 |
| Coccidiostats (e.g., Corid, Deccox) | 61.4 | (8.1) | 35.6 | (8.0) | 3.0 | (2.8) | 100.0 |
| Bacitracin (BMD, Fortracin, Albac) | NA | | | | | | |
| Chlortetracycline (Aureomycin100, CTC) | 74.1 | (4.9) | 23.7 | (4.8) | 2.2 | (1.5) | 100.0 |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost) | 82.0 | (9.3) | 18.0 | (9.3) | 0.0 | (—) | 100.0 |
| Neomycin (Biosol, Neomix325)* | | | | | | | |
| Oxytetracycline (OTC, Terramycin, TM50)* | | | | | | | |
| Sulfamethazine/ sulfadimethoxine (Albon, Sulmet)* | | | | | | | |
| Tetracycline (Tetrasure, T-Vet) | NA | | | | | | |
| Tylosin (Tylan) | 68.0 | (6.8) | 3.7 | (2.4) | 28.3 | (6.8) | 100.0 |
| Virginiamycin (V Max)* | | | | | | | |
| Other* | | | | | | | |

*Too few to report.

### 3. Cattle 700 lb or more when placed

Most feedlots (90.3 percent) added ionophores to the feed of at least some cattle weighing 700 lb or more at placement. About 1 of 3 feedlots (30.8 percent) used tylosin in the feed of some of these cattle; tylosin was used by a higher percentage of feedlots with a capacity of 8,000 or more head (66.2 percent) compared with feedlots with a capacity of 1,000 to 7,999 head (14.5 percent).

E.3.a. Percentage of feedlots that added antibiotics to the feed and/or water of cattle 700 lb or more when placed as a health or production management tool, by antibiotic used, feedlot capacity, and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Antibiotic** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Ionophores (e.g., Rumensin, Cattlyst) | 88.3 | (3.9) | 94.4 | (2.3) | 89.8 | (3.7) | 90.9 | (4.1) | 90.3 | (2.8) |
| Coccidiostats (e.g., Corid, Deccox) | 20.6 | (4.8) | 29.1 | (7.3) | 23.7 | (5.3) | 22.6 | (6.4) | 23.2 | (4.1) |
| Bacitracin (BMD, Fortracin, Albac) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Chlortetracycline (Aureomycin100, CTC) | 58.9 | (5.8) | 46.1 | (7.3) | 50.7 | (5.8) | 61.0 | (7.3) | 54.9 | (4.6) |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost) | 4.4 | (2.3) | 3.4 | (3.2) | 5.2 | (2.7) | 2.4 | (2.3) | 4.1 | (1.9) |
| Neomycin (Biosol, Neomix325) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Oxytetracycline (OTC, Terramycin, TM50) | 7.9 | (3.2) | 0.0 | (—) | 0.0 | (—) | 13.2 | (5.3) | 5.4 | (2.2) |
| Sulfamethazine/ sulfadimethoxine (Albon, Sulmet) | 3.2 | (2.1) | 0.0 | (—) | 0.0 | (—) | 5.3 | (3.6) | 2.2 | (1.5) |
| Tetracycline (Tetrasure, T-Vet) | 2.0 | (1.9) | 0.0 | (—) | 2.3 | (2.2) | 0.0 | (—) | 1.4 | (1.3) |
| Tylosin (Tylan) | 14.5 | (4.0) | 66.2 | (7.2) | 50.7 | (5.9) | 2.0 | (1.2) | 30.8 | (3.7) |
| Virginiamycin (V Max) | 0.0 | (—) | 1.7 | (1.5) | 0.9 | (0.8) | 0.0 | (—) | 0.5 | (0.5) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

As was the case with lighter placed cattle, the vast majority of cattle 700 lb or more (90.6 percent) received ionophores in their feed, whereas a relatively small percentage of these cattle (11.9 percent) received a product containing chlortetracycline, indicating that while ionophores are used for almost all cattle in feedlots, only selected groups of cattle receive chlortetracycline products. The use of chlortetracycline products (alone or in combination) was more common in feedlots with a capacity of 1,000 to 7,999 head than in feedlots with a capacity of 8,000 head or more (42.0 and 7.9 percent, respectively), and the use of tylosin was more common in feedlots with a capacity of 8,000 or more head (75.9 percent) compared with feedlots with a capacity of 1,000 to 7,999 head (23.2 percent).

E.3.b. Percentage of cattle 700 lb or more when placed that received antibiotics in their feed and/or water as a health or production management tool, by antibiotic used, feedlot capacity, and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Ionophores (e.g., Rumensin, Cattlyst) | 88.0 | (4.5) | 91.0 | (4.2) | 94.5 | (4.0) | 73.7 | (12.6) | 90.6 | (3.8) |
| Coccidiostats (e.g., Corid, Deccox) | 17.5 | (6.8) | 7.5 | (3.5) | 9.6 | (4.0) | 4.4 | (2.2) | 8.6 | (3.3) |
| Bacitracin (BMD, Fortracin, Albac) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Chlortetracycline (Aureomycin100, CTC) | 40.5 | (7.2) | 7.9 | (2.6) | 8.1 | (2.4) | 27.0 | (10.7) | 11.7 | (2.7) |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost) | 1.5 | (1.2) | 0.0 | (0.0) | 0.0 | (0.0) | 0.7 | (0.7) | 0.2 | (0.1) |
| Neomycin (Biosol, Neomix325) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Oxytetracycline (OTC, Terramycin, TM50) | 4.7 | (2.6) | 0.0 | (—) | 0.0 | (—) | 2.9 | (1.8) | 0.5 | (0.3) |
| Sulfamethazine/ sulfadimethoxine (Albon, Sulmet) | 0.1 | (0.0) | 0.0 | (—) | 0.0 | (—) | 0.0 | (0.0) | 0.0 | (0.0) |
| Tetracycline (Tetrasure, T-Vet) | 2.3 | (2.2) | 0.0 | (—) | 0.3 | (0.3) | 0.0 | (—) | 0.3 | (0.3) |
| Tylosin (Tylan) | 23.2 | (8.0) | 75.9 | (5.1) | 76.7 | (4.8) | 40.2 | (18.5) | 69.8 | (4.6) |
| Virginiamycin (V Max) | 0.0 | (—) | 0.2 | (0.2) | 0.2 | (0.2) | 0.0 | (—) | 0.2 | (0.2) |
| Other | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |

As was the case with lighter placed cattle, cattle 700 lb or more when placed received ionophores and tylosin throughout the feeding period, whereas the other products were typically used for shorter periods. Cattle 700 lb or more received ionophores and tylosin for shorter periods than cattle weighing less than 700 lb, probably because the heavier cattle did not take as long to reach harvest weight.

E.3.c. Feedlot average number of days cattle 700 lb or more when placed received antibiotics in feed and/or water, by antibiotic used, feedlot capacity, and region:

| | Feedlot Average Number of Days | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Feedlot capacity (number head) | | | | Region | | | | | |
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Antibiotic | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error | Avg. | Std. error |
| Ionophores (e.g., Rumensin, Cattlyst) | 152 | (5) | 138 | (7) | 140 | (5) | 158 | (6) | 147 | (4) |
| Coccidiostats (e.g., Corid, Deccox) | 24 | (11) | 26 | (8) | 31 | (11) | 15 | (3) | 25 | (7) |
| Bacitracin (BMD, Fortracin, Albac) | NA | | | | | | | | | |
| Chlortetracycline (Aureomycin100, CTC) | 8 | (1) | 8 | (1) | 9 | (1) | 6 | (1) | 8 | (1) |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost)* | | | | | | | | | | |
| Neomycin (Biosol, Neomix325)* | NA | | | | | | | | | |
| Oxytetracycline (OTC, Terramycin, TM50)* | | | | | | | | | | |
| Sulfamethazine/ sulfadimethoxine (Albon, Sulmet)* | | | | | | | | | | |
| Tetracycline (Tetrasure, T-Vet)* | | | | | | | | | | |
| Tylosin (Tylan) | 148 | (3) | 141 | (5) | 146 | (4) | 62 | (33) | 143 | (4) |
| Virginiamycin (V Max)* | | | | | | | | | | |
| Other | NA | | | | | | | | | |

*Too few to report.

Most operations (85.5 percent) used ionophores for cattle 700 lb or more when placed to promote growth. Other products were used by a higher percentage of feedlots for disease prevention than for disease treatment. The reasons for use of the various products were similar, regardless of feedlot capacity or region (data not shown).

E.3.d. For feedlots that gave the following antibiotics in feed and/or water to cattle 700 lb or more when placed, percentage of feedlots by primary reason for using the following antibiotics in feed and/or water:

| | Percent Feedlots | | | | | | |
|---|---|---|---|---|---|---|---|
| | Primary Reason | | | | | | |
| | Disease prevention | | Disease treatment | | Growth promotion | | |
| Antibiotic | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Ionophores (e.g., Rumensin, Cattlyst) | 14.0 | (3.0) | 0.6 | (0.5) | 85.5 | (3.0) | 100.0 |
| Coccidiostats (e.g., Corid, Deccox) | 70.3 | (9.2) | 29.7 | (9.2) | 0.0 | (—) | 100.0 |
| Bacitracin (BMD, Fortracin, Albac) | NA | | | | | | |
| Chlortetracycline (Aureomycin100, CTC) | 74.9 | (5.3) | 24.1 | (5.2) | 1.0 | (0.9) | 100.0 |
| Chlortetracycline/ sulfamethazine (Aureo S 700, MoorMan's, Beef Cattle Boost)* | | | | | | | |
| Neomycin (Biosol, Neomix325) | NA | | | | | | |
| Oxytetracycline (OTC, Terramycin, TM50)* | | | | | | | |
| Sulfamethazine/ sulfadimethoxine (Albon, Sulmet)* | | | | | | | |
| Tetracycline (Tetrasure, T-Vet)* | | | | | | | |
| Tylosin (Tylan) | 63.7 | (7.5) | 3.7 | (2.3) | 32.6 | (7.6) | 100.0 |
| Virginiamycin (V Max)* | | | | | | | |
| Other | NA | | | | | | |

*Too few to report.

## F. Implant Strategy

Growth promoting implants are typically placed under the skin of the ear and are associated with improvements on average daily gain and/or feed efficiency. Since these implants typically contain some form of hormonal products, the selection of particular implant types is related to the sex of the cattle. Different growth promoting implants have different periods of activity; thus, the frequency of reapplication of implants during the feeding period depends on the choice of the implant product and the remaining projected days to reach harvest weight. At least 80 percent of feedlots implanted at least some steers or heifers with growth promoting implants at least once while they were in the feedlot (tables F.1.a and F.2.a). Overall, more than 90 percent of steers and heifers received a growth promoting implant at least once (tables F.1.b and F.2.b). The number of times an animal is implanted while in the feedlot depends on placement weight and gender (tables F.1.c and F.2.c).

### 1. Steers

F.1.a. From the time of placement until marketing, percentage of feedlots that gave steers any implants for growth promotion, by cattle weight at placement, feedlot capacity, and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Cattle weight | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Less than 700 lb when placed | 80.9 | (4.6) | 91.7 | (4.7) | 83.6 | (4.5) | 85.5 | (5.4) | 84.3 | (3.5) |
| 700 lb or more when placed | 86.0 | (4.0) | 100.0 | (—) | 87.3 | (4.0) | 95.1 | (3.2) | 90.4 | (2.8) |

F.1.b. From the time of placement until marketing, percentage of steers given any implants for growth promotion, by cattle weight at placement, feedlot capacity, and region:

**Percent Steers**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Cattle weight | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Less than 700 lb when placed | 91.9 | (3.7) | 91.0 | (4.3) | 97.4 | (1.5) | 71.0 | (10.5) | 91.2 | (3.8) |
| 700 lb or more when placed | 94.3 | (2.9) | 94.1 | (4.2) | 93.8 | (4.5) | 95.3 | (2.4) | 94.1 | (3.7) |

Steers less than 700 lb when placed were most likely to receive two implants (62.7 percent), and steers 700 lb or more when placed were most likely to receive one implant (77.8 percent). About one of five steers less than 700 lb when placed (17.1 percent) received three or more implants; virtually no steers 700 lb or more when placed received more than two implants.

F.1.c. For implanted steers, percentage of steers by number of implants given, feedlot capacity, and region:

**Percent Steers**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Number of implants | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Steers less than 700 lb when placed | | | | | | | | | | |
| 1 | 18.2 | (5.2) | 20.5 | (4.4) | 23.0 | (5.0) | 7.8 | (2.2) | 20.2 | (3.9) |
| 2 | 73.1 | (6.9) | 61.2 | (6.1) | 57.5 | (6.3) | 86.1 | (3.7) | 62.7 | (5.5) |
| 3 or more | 8.6 | (4.7) | 18.3 | (7.8) | 19.6 | (8.2) | 6.0 | (3.4) | 17.1 | (6.9) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |
| Steers 700 lb or more when placed | | | | | | | | | | |
| 1 | 67.7 | (6.9) | 79.2 | (4.5) | 77.2 | (4.7) | 80.6 | (6.7) | 77.8 | (4.1) |
| 2 | 32.3 | (6.9) | 20.7 | (4.4) | 22.7 | (4.7) | 19.4 | (6.7) | 22.1 | (4.0) |
| 3 or more | 0.0 | (—) | 0.1 | (0.1) | 0.1 | (0.1) | 0.0 | (—) | 0.1 | (0.1) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

Revalor was the product chosen by the highest percentage of feedlots for steers receiving a single implant and as the terminal implant for steers receiving two or more implants (71.7 and 57.9 percent of feedlots, respectively).

F.1.d. For feedlots that implanted any steers with **just once,** percentage of feedlots by products used, feedlot capacity, and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Product** | **Pct.** | **Std error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Component | 24.8 | (5.8) | 16.1 | (4.4) | 23.4 | (5.1) | 19.3 | (6.9) | 21.8 | (4.1) |
| Revalor | 69.9 | (6.3) | 75.2 | (5.3) | 72.6 | (5.4) | 70.4 | (8.0) | 71.7 | (4.5) |
| Synovex | 17.2 | (5.3) | 17.4 | (4.5) | 19.2 | (4.8) | 14.1 | (6.1) | 17.2 | (3.8) |
| Other | 6.4 | (3.3) | 3.9 | (1.8) | 3.6 | (1.9) | 8.6 | (4.9) | 5.5 | (2.3) |

F.1.e. For feedlots that implanted any steers **two or more times,** percentage of feedlots by product used as the terminal implant, feedlot capacity, and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Product** | **Pct.** | **Std error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Component | 13.0 | (4.3) | 24.5 | (6.1) | 19.7 | (4.7) | 12.7 | (5.3) | 17.0 | (3.6) |
| Revalor | 55.7 | (6.5) | 62.2 | (6.8) | 66.7 | (5.6) | 44.3 | (8.4) | 57.9 | (4.8) |
| Synovex | 26.1 | (5.9) | 18.1 | (4.6) | 16.2 | (4.3) | 34.4 | (8.1) | 23.3 | (4.2) |
| Other | 7.3 | (3.4) | 6.4 | (2.9) | 3.2 | (1.7) | 12.8 | (5.5) | 7.0 | (2.4) |

### 2. Heifers

F.2.a. From the time of placement until marketing, percentage of feedlots that gave heifers any implants for growth promotion, by cattle weight at placement, feedlot capacity, and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Cattle weight | Pct. | Std error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Less than 700 lb when placed | 74.0 | (5.3) | 94.1 | (2.9) | 82.4 | (4.5) | 77.9 | (6.8) | 80.8 | (3.8) |
| 700 lb or more when placed | 85.2 | (4.5) | 97.4 | (1.8) | 87.3 | (4.1) | 93.3 | (3.9) | 89.5 | (3.0) |

F.2.b. From the time of placement until marketing, percentage of heifers given any implants for growth promotion, by cattle weight at placement, feedlot capacity, and region:

**Percent Heifers**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Cattle weight | Pct. | Std error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Less than 700 lb when placed | 89.5 | (4.6) | 94.8 | (3.3) | 99.0 | (0.6) | 52.1 | (15.0) | 94.3 | (3.0) |
| 700 lb or more when placed | 92.4 | (5.3) | 94.9 | (3.6) | 95.4 | (3.9) | 91.1 | (3.7) | 94.7 | (3.3) |

Almost all heifers less than 700 lb when placed (95.8 percent) received two implants, while about half of heifers 700 lb or more when placed received one or two implants (48.8 and 51.2 percent, respectively). A low percentage of the lighter heifers (2.7 percent) received three or more implants; none of the heavier heifers received more than two implants.

F.2.c. For implanted heifers, percentage of heifers by number of implants given, feedlot capacity, and region:

**Percent Heifers**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Number of implants** | **Pct.** | **Std error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Heifers less than 700 lb when placed | | | | | | | | | | |
| 1 | 10.0 | (4.4) | 0.4 | (0.3) | 0.8 | (0.4) | 12.6 | (6.5) | 1.4 | (0.6) |
| 2 | 87.0 | (4.9) | 96.9 | (1.2) | 96.6 | (1.2) | 82.4 | (7.5) | 95.8 | (1.3) |
| 3 or more | 3.0 | (2.1) | 2.7 | (1.1) | 2.6 | (1.0) | 5.0 | (4.0) | 2.7 | (1.0) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |
| Heifers 700 lb or more when placed | | | | | | | | | | |
| 1 | 55.7 | (12.2) | 48.0 | (5.4) | 42.7 | (4.1) | 80.2 | (10.1) | 48.8 | (4.9) |
| 2 | 44.3 | (12.2) | 52.0 | (5.4) | 57.3 | (4.1) | 19.8 | (10.1) | 51.2 | (4.9) |
| 3 or more | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) | 0.0 | (—) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

Revalor was the product chosen by the highest percentage of feedlots for heifers that received a single implant and as the terminal implant for heifers receiving two implants (48.3 and 47.6 percent, respectively) [table F.2.e].

F.2.d. For feedlots that implanted any heifers **just once**, percentage of feedlots by products used, feedlot capacity, and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Product** | **Pct.** | **Std error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Component | 25.4 | (7.0) | 31.0 | (6.2) | 30.7 | (6.0) | 21.7 | (8.7) | 27.5 | (5.0) |
| Revalor | 54.0 | (8.2) | 38.3 | (7.1) | 46.7 | (7.0) | 51.2 | (10.7) | 48.3 | (5.9) |
| Synovex | 20.1 | (6.6) | 26.1 | (7.0) | 20.0 | (5.8) | 26.3 | (9.1) | 22.3 | (4.9) |
| Other | 15.4 | (5.7) | 7.6 | (3.8) | 7.4 | (3.5) | 21.7 | (8.8) | 12.6 | (3.9) |

F.2.e. For feedlots that implanted any heifers **two or more times,** percentage of feedlots by product used as the terminal implant, by feedlot capacity, and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | All feedlots | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | | |
| Product | Pct. | Std error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Component | 16.8 | (5.3) | 29.4 | (6.2) | 28.1 | (5.2) | 9.1 | (5.8) | 22.2 | (4.0) |
| Revalor | 51.4 | (7.8) | 42.5 | (7.5) | 48.6 | (6.5) | 45.6 | (10.3) | 47.6 | (5.5) |
| Synovex | 23.1 | (6.5) | 27.0 | (6.7) | 20.0 | (5.3) | 35.2 | (9.6) | 24.8 | (4.7) |
| Other | 13.9 | (5.5) | 8.1 | (3.6) | 8.1 | (3.4) | 19.0 | (8.1) | 11.5 | (3.5) |

## G. General Information

### 1. Pest control

Feedlots have a range of products available to control internal and external parasites. Nearly all feedlots (99.8 percent) used some product to control parasites on at least some cattle. Avermectins were the most common type of product used (89.6 percent of feedlots) for some animals.

G.1.a. Percentage of feedlots by parasiticides (dewormers and/or insecticides) used as a treatment or preventive for internal or external parasites, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Pesticide** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Avermectins (e.g., Ivomec®, Eprinex®, Dectomax®, Cydectin®) | 86.7 | (3.8) | 96.3 | (1.3) | 88.6 | (3.6) | 91.1 | (3.9) | 89.6 | (2.7) |
| Avermectin/ Clorsulon combination (Ivomec® Plus) | 5.0 | (2.3) | 15.9 | (4.9) | 10.4 | (3.3) | 4.8 | (2.3) | 8.2 | (2.2) |
| Levamisole (e.g., Totalon®, Tramisol®, Prohibit™) | 1.5 | (1.4) | 0.0 | (—) | 0.0 | (—) | 2.7 | (2.5) | 1.1 | (1.0) |
| Permethrins (e.g., Permectrin™, CyLence™, Ectiban®) | 12.5 | (3.6) | 24.4 | (6.7) | 23.2 | (5.0) | 5.1 | (2.8) | 16.0 | (3.3) |
| Organophosphates (Co-Ral®, Spotton, Tiguvon, Warbex) | 0.0 | (—) | 2.2 | (2.0) | 1.1 | (1.0) | 0.0 | (—) | 0.6 | (0.6) |
| Other | 0.0 | (—) | 2.9 | (2.7) | 0.0 | (—) | 2.2 | (2.0) | 0.9 | (0.8) |
| Any | 100.0 | (—) | 99.4 | (0.1) | 100.0 | (—) | 99.5 | (0.0) | 99.8 | (0.0) |

Overall, 87.1 percent of cattle were treated with an avermectin product to control internal or external parasites. Relatively few animals received other parasiticides. Less than 1 percent of cattle did not receive any treatment for parasites.

G.1.b. Percentage of cattle by parasiticides (dewormers and/or insecticides) used as a treatment or preventive for internal or external parasites, and by feedlot capacity and region:

**Percent Cattle**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pesticide | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| Avermectins (e.g., Ivomec®, Eprinex®, Dectomax®, Cydectin®) | 80.9 | (6.8) | 87.9 | (5.5) | 88.0 | (5.9) | 83.1 | (5.0) | 87.1 | (4.9) |
| Avermectin/ Clorsulon combination (Ivomec® Plus) | 3.2 | (1.9) | 8.5 | (4.0) | 6.7 | (4.3) | 13.1 | (4.1) | 7.8 | (3.6) |
| Levamisole (e.g., Totalon®, Tramisol®, Prohibit™) | 0.9 | (0.9) | 0.0 | (—) | 0.0 | (—) | 0.6 | (0.6) | 0.1 | (0.1) |
| Permethrins (e.g., Permectrin™, CyLence™, Ectiban®) | 9.5 | (4.0) | 10.9 | (3.7) | 10.4 | (3.8) | 12.2 | (6.2) | 10.8 | (3.3) |
| Organophosphates (Co-Ral®, Spotton, Tiguvon, Warbex) | 0.0 | (—) | 0.3 | (0.3) | 0.4 | (0.3) | 0.0 | (—) | 0.3 | (0.3) |
| Other | 0.0 | (—) | 0.6 | (0.6) | 0.0 | (—) | 3.0 | (2.9) | 0.5 | (0.5) |
| Any | 99.8 | (0.2) | 99.6 | (0.0) | 100.0 | (0.0) | 97.9 | (0.6) | 99.6 | (0.0) |

Fly control is a concern for feedlots for many reasons, including the flies' impact on cattle and the annoyance they bring to neighboring facilities. There is no universally effective program for fly control; feedlots typically use a combination of approaches aimed at the flies or their habitat. Removing manure helps control fly habitats. Most feedlots (96.4 percent) removed manure as part of their fly control program. Over half of feedlots used either environmental sprays (54.0 percent) or granular fly bait (57.5 percent) to control fly populations. The use of biologic controls such as predatory insects and the use of granular fly baits were more common in feedlots with a capacity of 8,000 or more head than in feedlots with 1,000 to 7,999 head.

G.1.c. Percentage of feedlots by method used to control flies on the feedlot, and by feedlot capacity and region:

**Percent Feedlots**

| | **Feedlot capacity** (number head) | | | | **Region** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1,000–7,999** | | **8,000 or more** | | **Central** | | **Other** | | **All feedlots** | |
| **Method** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** | **Pct.** | **Std. error** |
| Manure removal | 95.6 | (2.3) | 98.4 | (1.4) | 94.1 | (2.8) | 100.0 | (—) | 96.4 | (1.7) |
| Biological control (predatory insects) | 20.6 | (4.5) | 54.1 | (7.3) | 33.4 | (5.0) | 26.1 | (6.1) | 30.5 | (3.8) |
| Ear tags containing insecticides | 6.2 | (2.9) | 3.2 | (1.9) | 3.4 | (1.9) | 8.2 | (4.4) | 5.3 | (2.1) |
| Environmental sprays | 53.0 | (5.4) | 56.4 | (6.3) | 61.1 | (5.1) | 43.2 | (7.2) | 54.0 | (4.3) |
| Pour-ons, dusting powder, or animal sprays (e.g., Co-Ral®) | 27.8 | (4.8) | 18.0 | (5.8) | 34.3 | (5.3) | 10.6 | (4.4) | 24.9 | (3.8) |
| Feed additives that kill larva (e.g., phenothiazine, runnel) | 4.6 | (2.4) | 0.0 | (—) | 5.4 | (2.8) | 0.0 | (—) | 3.3 | (1.7) |
| Sticky tape or other fly traps | 17.7 | (4.1) | 28.8 | (6.6) | 28.7 | (5.1) | 9.3 | (4.1) | 21.0 | (3.5) |
| Granular fly bait (e.g., Goldern Mairin®) | 45.8 | (5.3) | 85.3 | (4.4) | 72.9 | (4.9) | 34.0 | (6.8) | 57.5 | (4.1) |
| Other | 0.0 | (—) | 1.4 | (1.3) | 0.7 | (0.6) | 0.0 | (—) | 0.4 | (0.4) |

### 2. Computer record keeping

All feedlots with a capacity of 8,000 or more head (100.0 percent) and 7 of 10 feedlots with a capacity of 1,000 to 7,999 head (70.4 percent) used computerized record-keeping systems. More than 9 of 10 feedlots considered computer record-keeping systems to be very or somewhat important for tracking economic records (100.0 percent), tracking production (98.8 percent), and comparing feedlot information over time (96.4 percent).

G.1.a. Percentage of feedlots that used computer record-keeping systems to store production and/or animal health-related information, by feedlot capacity and by region:

**Percent Feedlots**

| Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| 70.4 | (5.1) | 100.0 | (—) | 85.1 | (4.1) | 70.0 | (6.9) | 79.1 | (3.7) |

G.2.b. For feedlots that used computer record-keeping systems, percentage of feedlots by importance of computer record-keeping systems for the following purposes:

**Percent Feedlots**

| | Level of Importance | | | | | | |
|---|---|---|---|---|---|---|---|
| | Very | | Somewhat | | Not | | |
| Purpose | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Total |
| Comparing feedlot with other feedlots | 51.9 | (4.9) | 31.4 | (4.4) | 16.7 | (3.5) | 100.0 |
| Comparing current information with historical information for this feedlot | 72.0 | (4.4) | 24.4 | (4.2) | 3.6 | (1.8) | 100.0 |
| Tracking withdrawal times | 65.1 | (4.4) | 22.1 | (4.0) | 12.8 | (3.1) | 100.0 |
| Tracking production | 93.0 | (2.6) | 5.8 | (2.4) | 1.3 | (1.2) | 100.0 |
| Tracking economic records | 90.9 | (2.9) | 9.1 | (2.9) | 0.0 | (—) | 100.0 |

### 3. Monitoring food safety pathogens

A low percentage of all feedlots monitored for either *E. coli* O157 (8.0 percent) or *Salmonella* (6.9 percent).

G.3. Percentage of feedlots by food safety pathogens monitored, feedlot capacity, and region:

**Percent Feedlots**

| | Feedlot capacity (number head) | | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000–7,999 | | 8,000 or more | | Central | | Other | | All feedlots | |
| Food safety pathogen | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error | Pct. | Std. error |
| *E. coli* O157 | 5.9 | (2.6) | 13.2 | (4.5) | 9.3 | (3.1) | 6.1 | (3.3) | 8.0 | (2.3) |
| *Salmonella* | 5.3 | (2.4) | 10.7 | (3.9) | 8.1 | (2.9) | 5.1 | (2.8) | 6.9 | (2.1) |

# Section II: Methodology

## A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting stakeholders about their informational needs and priorities during a needs assessment phase. Stakeholders for NAHMS studies include industry members, allied industry representatives, other government agencies, animal health officials, and many others. The objective of the needs assessment for the NAHMS Feedlot 2011 study was to collect information about the most important animal health and production management productivity issues of beef feedlots. A driving force for the needs assessment was the desire of NAHMS to receive as much input as possible from a variety of producers, as well as from industry experts and representatives, veterinarians, extension specialists, universities, and beef organizations. Information was collected via interviews with key industry figures and through a needs assessment survey.

The needs assessment survey was designed to collect the most critical information gaps regarding animal health, and health and production management from producers, veterinarians, extension personnel, university researchers, and allied industry groups. The survey, created in SurveyMonkey, was available online from September 20, 2010, through February 14, 2011. The survey was promoted via electronic newsletters, magazines, and Web sites. Organizations/magazines promoting the study included "Beef Business Bulletin," "Beef Magazine," "Bovine Veterinarian," "Cattle Network," "Drovers," "Farm Industry News," "Farm Press," "Feedlot Magazine," "Feedstuffs," "Iowa Farmer Today," "Progressive Farmer," "The National Cattleman," and "Weekly Livestock Reporter." Email messages identifying the online site and asking for input were also sent to State extension personnel as well as State and Federal animal health officials. There were 134 responses to the SurveyMonkey needs assessment survey. Stakeholders represented in the respondents included Federal government personnel, university and extension personnel, service providers for the beef industry (e.g., veterinarians, nutritionists), and beef producers or producer organizations.

Objectives for the Feedlot 2011 study, using input from interviews, literature searches, and the online survey, were drafted and circulated to stakeholder groups. Following this review, five final study objectives were identified:

1. Describe changes in management practices and animal health in feedlots.
2. Describe the management practices in feedlots that impact product quality.
3. Identify factors associated with shedding of potential foodborne pathogens or commensal organisms by feedlot cattle.
4. Describe antimicrobial usage in feedlots.
5. Describe biosecurity practices and capabilities in feedlots.

## B. Sampling and Estimation

### 1. State selection

The preliminary selection of States to be included in the NAHMS Feedlot 2011 study was done using the National Agricultural Statistics Service (NASS) “Cattle on Feed” reports. A goal for NAHMS national studies is to include States that account for at least 70 percent of the animals and producer population in the United States. The initial review identified 12 major States with feedlots with a capacity of 1,000 or more head, and 13 States with feedlots with a capacity of fewer than 1,000 head. The States with large-capacity feedlots were: Arizona, California, Colorado, Idaho, Iowa, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Washington. States with small-capacity feedlots were: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin.

### 2. Operation selection

For Phase I of the study, 995 operations with a capacity of 1,000 head or more were selected in the 12 States from a sampling frame provided by NASS. Within each State, a stratified random sample was selected, in which strata were defined by feedlot capacity (number of head). Phase I of the study was administered by NASS via the General Feedlot Management Questionnaire. Producers who completed Phase I were eligible to continue on to Phase II (VS collection). Of the 403 operations that completed Phase I, 192 consented to be contacted for further participation in Phase II of the study.

### 3. Population inferences

Inferences cover the population of feedlots with at least 1,000-head capacity in the 12 participating States. As of January 1, 2011, these States accounted for 96.2 percent of cattle on feed in the United States. According to the latest State-level published number of feedlots (NASS Census of Agriculture 2007), the 12 States accounted for 86.1 percent of feedlots in the United States. (See Appendix II for respective data on individual States.) All respondent data were statistically weighted to reflect the population from which they were selected. The inverse of the probability of selection for each operation was the initial selection weight. This selection weight was adjusted for nonresponse within each State and size group to allow for inferences back to the original population from which the sample was selected. Phase II data were re-weighted to allow for inference back to the original population.

## C. Data Collection

### 1. Data collectors and data collection period for Phase II

From October 10 through December 16, 2011, VS enumerators administered the feedlot health and management questionnaire. The interview took an average of 1.25 hr.

## D. Data Analysis

### 1. Validation

After completing the feedlot health and management questionnaire, data collectors sent them to their respective State NAHMS Coordinators, who reviewed the questionnaire responses for accuracy. Data entry and validation were completed by CEAH staff using SAS.

### 2. Estimation

All estimates were generated using SUDAAN® software (Research Triangle Institute) to account for the stratified survey design. Data were weighted to reflect the population from which the initial Phase I sample was selected.

## E. Sample Evaluation

The purpose of this section is to provide various performance measurement parameters. Historically, the term “response rate” was used as a catch-all parameter, but there are many ways to define and calculate response rates. Therefore, the following table presents an evaluation based upon a number of measurement parameters, which are defined with an “x” in categories that contribute to the measurement.

### 1. Phase I: General Feedlot Management Report

A total of 995 operations were selected for Phase I of the survey. Of these operations, 871 (87.5 percent) were contacted. There were 517 operations that provided usable inventory information (52.0 percent of the total selected and 59.4 percent of those contacted). In addition, there were 403 operations (40.5 percent of total selected) that provided "complete" information for the questionnaire. Of operations that provided complete information, 192 (47.6 percent) consented to be contacted for consideration/ discussion about further participation in Phase II (VS collection) of the study.

| | | | Measurement Parameter | | |
|---|---|---|---|---|---|
| **Response category** | **Number operations** | **Percent operations** | **Contacts** | **Usable[1]** | **Complete[2]** |
| Survey complete and VMO consent | 192 | 19.3 | x | x | x |
| Survey complete, refused VMO consent | 211 | 21.2 | x | x | x |
| No cattle on feed on July 1, 2011 | 107 | 10.8 | x | x | |
| Out of business | 7 | 0.7 | x | x | |
| Out of scope | 33 | 3.3 | | | |
| Refusal of GFMQ | 354 | 35.6 | x | | |
| Office hold (NASS elected not to contact) | 44 | 4.4 | | | |
| Inaccessible | 47 | 4.7 | | | |
| Total | 995 | 100.0 | 871 | 517 | 403 |
| Percent of total operations | | | 87.5 | 52.0 | 40.5 |
| Percent of total operations weighted[3] | | | 87.1 | 51.2 | 37.5 |

[1]Usable operation–respondent provided answers to inventory questions for the operation (either zero or positive number on hand).
[2]Survey complete operation–respondent provided answers to all or nearly all questions.
[3]Weighted responsethe rate was calculated using the initial selection weights.

### 2. Phase II: VS Visit

There were 192 operations that consented during Phase I to be contacted by a VS enumerator for Phase II. Of these 125 (65.1 percent) agreed to continue in Phase II of the study and completed the feedlot health and management questionnaire; 56 (29.2 percent) refused to participate. Approximately 5 percent of the 192 operations were not contacted, and 0.5 percent were ineligible because they had no cattle on feed at the time they were contacted by the VS enumerator during Phase II.

| | | | Measurement Parameter | | |
|---|---|---|---|---|---|
| **Response category** | **Number operations** | **Percent operations** | **Contacts** | **Usable[1]** | **Complete[2]** |
| Survey complete | 125 | 65.1 | x | x | x |
| Survey refused | 56 | 29.2 | x | | |
| Not contacted | 10 | 5.2 | | | |
| Ineligible[3] | 1 | 0.5 | x | x | |
| Total | 192 | 100.0 | 182 | 126 | 125 |
| Percent of total operations | | | 94.8 | 65.6 | 65.1 |
| Percent of total operations weighted[4] | | | 93.9 | 66.1 | 65.4 |

[1]Usable operation–respondent provided answers to inventory questions for the operation (either zero or positive number on hand).
[2]Survey complete operation–respondent provided answers to all or nearly all questions.
[3]Ineligible–no cattle on feed at time of interview, which occurred from October 10 through December 16, 2011.
[4]Weighted response–the rate was calculated using the turnover weights.

# Appendix I: Sample Profile

## A. Responding Operations

### 1. Number of responding operations, by herd size

| | Phase I: General Feedlot Management Report | Phase II: VS Initial Visit |
|---|---|---|
| **Herd size** (total inventory) | **Number of responding operations** | |
| 1,000–7,999 | 237 | 73 |
| 8,000 or more | 166 | 52 |
| Total | 403 | 125 |

### 2. Number of responding operations, by region

| | Phase I: General Beef Management Report | Phase II: VS Initial Visit |
|---|---|---|
| **Region** | **Number of responding operations** | |
| Central | 266 | 78 |
| Other | 137 | 47 |
| Total | 403 | 125 |

*Regions were combined for VS portion of study

# Appendix II: Feedlots and Inventory, 1,000 or More Head Capacity for Selected States

| | | | **Inventory** (1,000 head) | | | |
|---|---|---|---|---|---|---|
| **Region** | **State** | **Number of lots 2007[1]** | **Jan. 1, 2010** | **July 1, 2010** | **Jan. 1, 2011[2]** | **July 1, 2011[3]** |
| Central | CO | 132 | 1,010 | 920 | 1,080 | 1,000 |
| | KS | 200 | 2,250 | 2,010 | 2,280 | 2,030 |
| | NE | 770 | 2,360 | 2,000 | 2,430 | 2,020 |
| | OK | 23 | 365 | 350 | 375 | 350 |
| | TX | 128 | 2,680 | 2,590 | 2,840 | 2,700 |
| | Total | 1,253 | 8,665 | 7,870 | 9,005 | 8,100 |
| | | | | | | |
| Other | AZ | 6 | 287 | 255 | 258 | 287 |
| | CA | 21 | 440 | 430 | 470 | 470 |
| | ID | 39 | 215 | 200 | 240 | 215 |
| | IA | 345 | 570 | 570 | 640 | 590 |
| | NM | 8 | (D) | (D) | (D) | (D) |
| | SD | 176 | 235 | 215 | 260 | 210 |
| | WA | 12 | 166 | 168 | 209 | 200 |
| | Total | 607 | 1,913 | 1,838 | 2,077 | 1,972 |
| Total 12 States | | 1,860 | 10,578 | 9,708 | 11,082 | 10,072 |
| Other States | | 300 | 405[4] | 363[5] | 432[4] | 379[5] |
| Total U.S. (50 States) | | 2,160 | 10,983 | 10,071 | 11,514 | 10,451 |

(D)=Withheld to avoid disclosing data for individual operations.

[1]Latest State-level published lots available.

[2]February 18, 2011, NASS Cattle on Feed.

[3]July 22, 2011, NASS Cattle on Feed.

[4]New Mexico inventory unpublished beginning July 2009. Other Region total used New Mexico published inventory for January 2009 of 164,000 head.

[5]New Mexico inventory unpublished beginning July 2009. Other Region total used New Mexico published inventory for June 2009 of 105,000 head.

# Appendix III: U.S. Feedlots and Inventory by Size

| | Number of feedlots | | | | |
|---|---|---|---|---|---|
| **Feedlot capacity** | **2007[1]** | **2008[2]** | **2009[3]** | **2010[4]** | **2011[4]** |
| Fewer than 1,000 | 85,000 | 80,000 | 80,000 | 75,000 | 75,000 |
| 1,000 or more | 2,160 | 2,170 | 2,170 | 2,140 | 2,120 |
| 1,000–7,999 | 1,713 | 1,730 | 1,725 | 1,685 | 1,675 |
| 8,000 or more | 447 | 440 | 445 | 455 | 445 |
| All feedlots in United States | 87,160 | 82,170 | 82,170 | 77,140 | 77,120 |
| | **January 1 inventory** (x1,000 head) | | | | |
| | **2008[1]** | **2009[2]** | **2010[3]** | **2011[4]** | **2012[4]** |
| Fewer than 1,000 | 2,734.7 | 2,621.7 | 2,659.2 | 2,499 | 2,260 |
| 1,000 or more | 12,092 | 11,234 | 10,983 | 11,513 | 11,861 |
| 1,000–7,999 | 2,413 | 1,850 | 2,243 | 2,283 | 2,256 |
| 8,000 or more | 9,679 | 9,384 | 8,740 | 9,230 | 9,605 |
| All feedlots in United States | 14,826.7 | 13,855.7 | 13,642.2 | 14,012 | 14,121 |
| | **Marketings** (x1,000 head) | | | | |
| | **2007** | **2008** | **2009** | **2010** | **2011** |
| Fewer than 1,000 | 4,285 | 4,045 | 3,914 | 4,032 | 3,170 |
| 1,000 or more | 22,461 | 22,404 | 21,692 | 22,078 | 22,577 |
| 1,000–7,999 | 4,149 | 4,139 | 3,932 | 3,938 | 3,957 |
| 8,000 or more | 18,312 | 18,265 | 17,760 | 18,140 | 18,620 |
| All feedlots | 26,746 | 26,449 | 25,606 | 26,110 | 25,747 |

[1]February 20, 2009, NASS “Cattle on Feed.”
[2]February 19, 2010, NASS “Cattle on Feed.”
[3]February 18, 2011, NASS “Cattle on Feed.”
[4]February 24, 2012, NASS “Cattle on Feed.”

# Appendix IV: Study Objectives and Related Outputs

1. Describe changes in management practices and animal health in feedlots:

    Part I: Management Practices on U.S. Feedlots with a Capacity of 1,000 or More Head, March 2013

    Part II: Management Practices on U.S. Feedlots with a Capacity of Fewer than 1,000 Head, March 2013

    - Part III: Health and Management Practice Trends for U.S. Feedlots, 1994–2011, July 2013
    - Part IV: Health and Health Management on U.S. Feedlots with Capacity of 1,000 or More Head, September 2013
    - Importance of Pre-arrival Management Practices to Operators of U.S. Feedlots, info sheet, July 2012
    - Emergency Preparedness and Management on U.S. Feedlots, info sheet, September 2012
    - U.S. Feedlot Processing Practices for Arriving Cattle, info sheet, October 2012
    - Implant Usage, info sheet, October 2012
    - Types and Costs of Respiratory Disease Treatment in U.S. Feedlots, info sheet, April 2013
    - Vaccine Usage in U.S. Feedlots, info sheet, April 2013

2. Describe the management practices in feedlots that impact product quality:
    - Part I: Management Practices on U.S. Feedlots with a Capacity of 1,000 or More Head, March 2013
    - Quality Assurance on U.S. Feedlots, 2011, info sheet, July 2012

3. Identify factors associated with shedding of potential foodborne pathogens or commensal organisms by feedlot cattle:
    - Management Strategies Used to Control Food Safety Pathogens in Feedlot Cattle, info sheet, expected spring 2013
    - *Salmonella* Prevalence and Resistance, info sheet, expected summer 2013
    - Campylobacter Prevalence and Resistance, info sheet, expected summer 2013

4. Describe antimicrobial usage in feedlots:
    - Part I: Management Practices on U.S. Feedlots with a Capacity of 1,000 or More Head, March 2013
    - Part II: Management Practices on U.S. Feedlots with a Capacity of Fewer than 1,000 Head, March 2013
    - Part III: Health and Management Practice Trends for U.S. Feedlots, 1994–2011, July 2013
    - Part IV: Health and Health Management on U.S. Feedlots with Capacity of 1,000 or More Head, September 2013

5. Describe biosecurity practices and capabilities in feedlots:
    - Part I: Management Practices on U.S. Feedlots with a Capacity of 1,000 or More Head, March 2013
    - Biosecurity on U.S. Feedlots, info sheet, July 2012

# Feedlot Part IV

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