FACT

# Summary and Analysis of the 2017 National Animal Health Monitoring System's Report on Antimicrobial Use Within Cattle Feedlots & Swine Operations

# INTRODUCTION

This summer, the U.S. Department of Agriculture (USDA) released the results of two national surveys of livestock producers conducted by the National Animal Health Monitoring System (NAHMS) in 2017: Antimicrobial Use and Stewardship on U.S. Feedlots, 2017 and Antimicrobial Use and Stewardship on U.S. Swine Operations, 2017. (USDA, 2019) These voluntary surveys asked producers of pigs and beef cattle about their use of antibiotics. They were purposefully timed to gather information on antibiotics use in 2016 before new U.S. Food and Drug Administration (FDA) rules restricting how antibiotics could be used in food-producing animals were put in place in 2017. These reports examine stewardship practices and provide data on antimicrobial administration methods and veterinary oversight. Food Animals Concerns Trust reviewed the data in the reports, filled in some gaps, and created a summary and analysis of the most interesting findings. These data are a useful addition to antibiotic sales data collected and reported by the FDA. While this is the only source of this type of data for the U.S. and thus worthy of our attention, we do have serious concerns with USDA's data collection specifically and with the overall collection and reporting of data on U.S. farm antibiotic use in general.

# LIMITATIONS OF NAHMS STUDIES AS A SOURCE OF DATA ON ANTIMICROBIAL USE

NAHMS studies do not collect data on how much antibiotics are used, instead they ask livestock producers whether an antibiotic was used during the last six months and in some cases what percent of the animals on the farm received it. Since drugs can be given at different doses and durations or to the same animal multiple times, this type of data does not allow the straightforward measurement of the amount of drugs used. NAHMS studies of the poultry industry do not even go this far and do not collect antibiotic use data.

NAHMS studies are voluntary and producers can choose not to participate. This creates multiple challenges with interpreting the data. First, there is the risk that heavy users of antibiotics will simply choose not to participate. Second, there is always the risk that not enough farms will participate to create representative samples. The USDA has identified lack of participation as a problem. Finally, USDA because of concerns about low participation, may choose not to include questions about controversial topics or to withhold report results that producers do not like. Information for each livestock sector is collected only once per five- to seven-year cycle; the questions themselves also can vary from one survey to the next. Both factors make year-to-year comparisons basically impossible, and trends more difficult to establish, while also eroding the data's usefulness in assessing how policy changes have impacted what is done on farms.

In 2011, the U.S. Government Accountability Office summarized the program's shortcomings as follows:

> "....NAHMS is limited by long lag times (approximately six years) between surveys of the same species, changes in methodology and survey populations between studies, reliance on voluntary participation by food animal producers, and collection of qualitative, rather than quantitative information on antibiotic use." (GAO)

The NAHMS surveys conducted in 2017 collected information on the reason for use of specific antibiotics, but the surveys failed to distinguish between use for treatment, control, or disease prevention. This is an important omission since preventive uses, in contrast to disease treatments, are usually administered at lower doses to groups of animals for long durations. These are all factors that can contribute to increased resistance. The authors said they did not ask producers to distinguish between treatment and prevention because they are producers, not veterinarians and cannot diagnose illness. This does not make sense because the producers had to decide the illness and dose to administer. In any case, if livestock producers know enough to diagnose respiratory disease, then they surely know whether or not they are administering antibiotics for treatment or prevention. Previous NAHMS reports have asked producers to distinguish between treatment and prevention.

The beef feedlot study also failed to report important data that was collected. Specifically, the study fails to report reason for use and duration of use for most antibiotics despite this being the purpose of the data collection. USDA reported this information only for the two antibiotics used in the largest number of feedlots, ionophores and chlortetracycline. This information was not provided for the other eight antibiotics reported by USDA as being used in feed. In fact, this information was not provided for the combination of monensin plus tylosin, despite this combination being used in more animals than any other drug. USDA stated that it did not report this data due to unexplained confidentiality concerns. USDA limited reporting of reason for use and duration only to drugs used in at least 15% of all feedlots. It is unclear how reporting on the other antibiotics would create any confidentiality concerns since USDA is prohibited from disclosing what farms participated. For the reason for use, FACT was able to close the gap for the antibiotics used in at least 1% of the cattle on surveyed farms by looking at the approved uses (See Appendix A). We are unable to do the same for the durations.

FACT is concerned that the actual reason for not collecting data on prevention versus treatment and not reporting reason for use and duration of use is because USDA perceives this data to be controversial and is concerned that collecting and reporting it will reduce participation.

## ACKNOWLEDGEMENT

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## HOW DO FEEDLOTS USE ANTIBIOTICS?

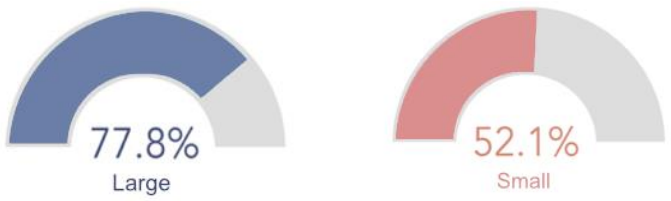
In 2016, 3.6 million kilograms of medically important antibiotics were sold for use in the cattle industry. This was an average of 241 mg of antibiotics used per kg of cattle (NRDC). These medically important antibiotics are considered essential medicines, and their overuse threatens their effectiveness for human health applications.

In May 2019, USDA's National Animal Health Monitoring System (NAHMS) released their Antimicrobial Use and Stewardship on U.S. Feedlots, 2017 report looking at the use of antibiotics on feedlots in 2016. In the United States, most cattle raised for beef are finished on feedlots. Finishing refers to the period of an animal's life before it is slaughtered, and for most beef cattle this means living in a crowded pen on a feedlot eating a high grain diet out of a trough for the last 5-8 months of its life.

Many of these feedlots (large or small) fed medically important antibiotics to their cattle. In fact, **77.8%** of large feedlots used medically important antibiotics in feed, and **52.1%** of small feedlots used them. This seems promising for small feedlots, however in 2015, 83% of feedlot cattle were placed in large feedlots (2016 US Cattle Overview).

When cattle enter feedlots, all animals in a group or pen are often given antimicrobials by injection to prevent respiratory diseases such as shipping fever. This is more common in younger cattle or cattle for which health status is unknown. In 2016, both large and small feedlots administered antibiotics to cattle in groups by injection. In fact, **15.6%** of cattle on the observed feedlots were given an injectable antimicrobial as a group. With **8.9%** of cattle on small feedlots and **17.0%** of cattle on large feedlots receiving injectable antimicrobials as a group. In addition to group injections, most feedlots also injected antibiotics to individual sick cattle.

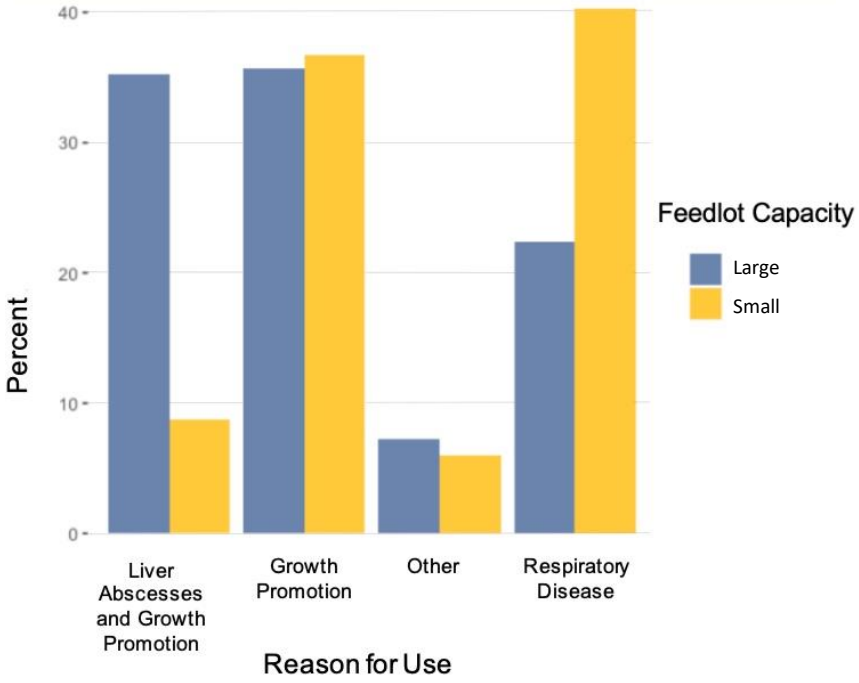
**PERCENTAGE OF FEEDLOTS THAT USED ANY MEDICALLY IMPORTANT ANTIBIOTICS IN FEED**




## WHAT ARE ANTIBIOTICS ON CATTLE FEEDLOTS USED FOR?

As you can see in the graph below, the reason for administering antibiotics differed depending on the size of the feedlot. A greater proportion of cattle on small feedlots (50-999) were given antibiotics in feed to prevent, control, or treat respiratory disease (e.g., bacterial pneumonia) than larger sites (1,000 or more). However, a much greater proportion of large feedlots fed their animals antibiotics for a combination of

**PERCENTAGE OF CATTLE GIVEN ANY ANTIBIOTICS IN FEED**
**REASONS ANTIBIOTICS ARE USED, BY SIZE OF FEEDLOT**



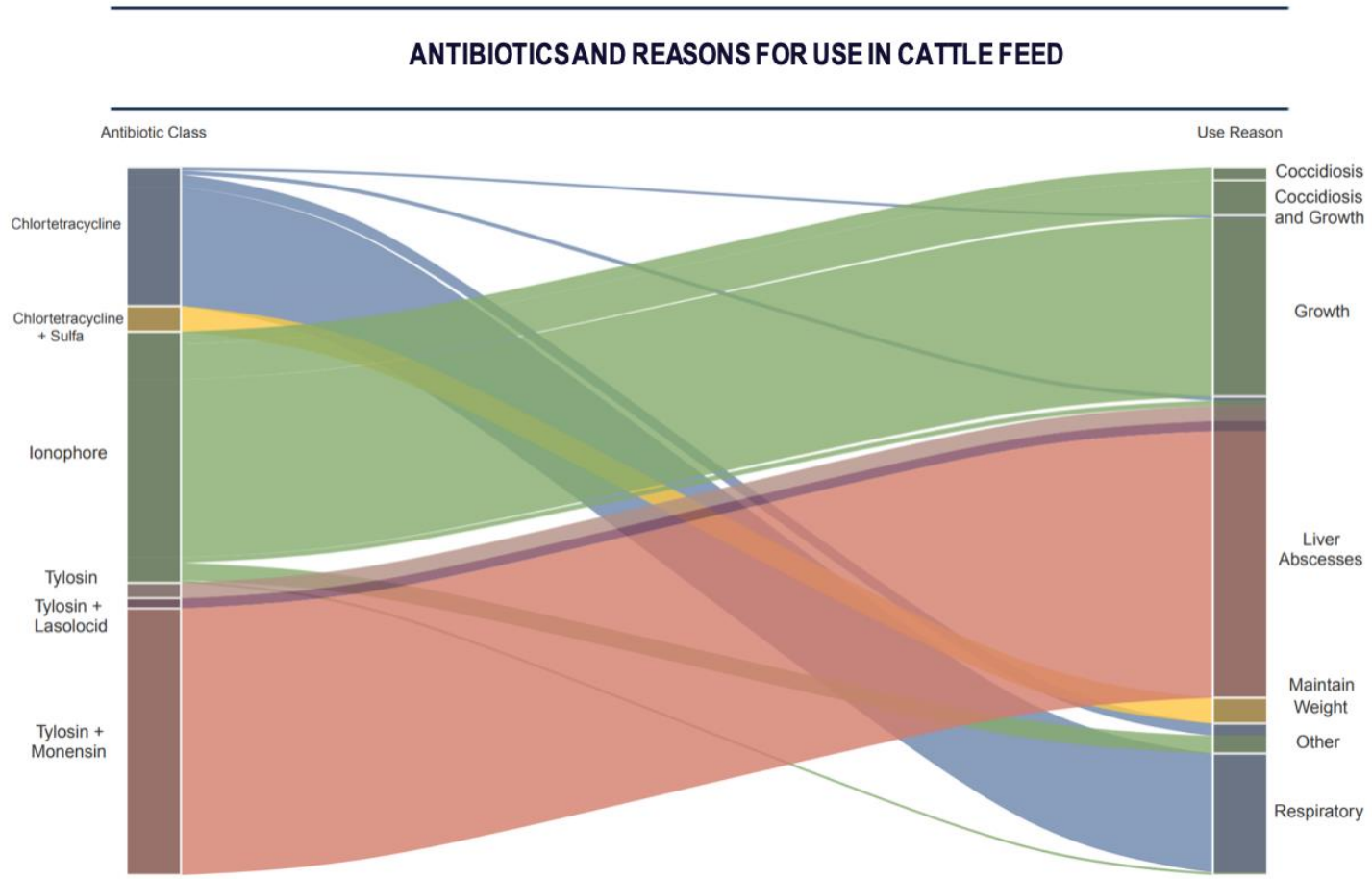
liver abscesses and growth promotion when compared to small feedlots. In general, both small and large feedlots gave a similar percentage of cattle antibiotics for growth promotion and other diseases.

The figure below takes a closer look at the specific antibiotics that were used in cattle feed and what they were used for. (Appendix A) In order to make the graph more readable, we combined all indications that included liver abscess prevention into a single reason for use.

The medically important antibiotic fed to the largest number of cattle on feedlots was tylosin often in combination with monensin. Tylosin is fed to cattle for one purpose - to prevent liver abscesses. Liver abscesses occur when cattle are fed too much grain. Unfortunately, this is very common in a feedlot setting. Both the US Food and Drug Administration and the World Health Organization consider tylosin critically important for human health. In 2016, more cattle received medically important antibiotics, mainly tylosin but also chlortetracycline, to prevent liver abscesses than for any other reason.

The second most commonly fed medically important antibiotic was chlortetracycline, which is used in feedlots primarily for respiratory disease. Interestingly, chlortetracycline use was lower in cattle entering the feedlot over 700 pounds (18.6%) than under 700 pounds (33.9%). This likely indicates lower risk of respiratory disease in these older cattle.

In addition, feedlots also commonly fed cattle ionophores. These ionophore antibiotics, including monensin, are not used in humans and are not considered medically important. Feedlots commonly administered ionophores to cattle in feed to prevent coccidiosis and to promote growth.




*The wider the bar, the more of that antibiotic was used for that indication. See **Appendix A** for more details.

## WHO ADMINISTERS ANTIBIOTICS?

**FEEDLOTS THAT USED THE SERVICES OF A VETERINARIAN / CLINIC**


In general, large feedlots utilized the services of a veterinarian more often than small feedlots, and they were also visited more times throughout the study period. Nearly **80%** of all cattle feedlots used the services of a veterinarian or clinic, and the majority of those feedlots were visited at least twice.

When deciding whether or not to give a pen of animals or an individual animal antibiotics, the owner of the feedlot (non-veterinarian) made the final decision on the majority of sites. In fact, on nearly 80% of feedlots the owner was involved in making the decision to use injectable antibiotics on a group, however a veterinarian was only involved in this process on 33% of sites. Nutritionists, farm managers, and service managers were also involved in this important decision.

## HOW CAN CATTLE FEEDLOTS REDUCE ANTIBIOTIC USE?

One simple solution to drastically reduce the number of liver abscesses in cattle and the subsequent use of antibiotics is to keep the cattle foraging on pasture for longer. Many of the health problems that result from feedlot cattle production can be avoided by allowing beef cattle to graze on well-managed pasture from birth to slaughter. This is otherwise known as 100% grass-fed, such as seen in the lovely cows below, from Brattset Family Farms, a 100% grass-fed cattle operation in Wisconsin.

There are many steps that feedlots can take to reduce antibiotic use in conventional beef production. Here are a few methods feedlot farmers can put into practice:

- Increase the amount of roughage in the cattle's diet
- Avoid mixing groups of cattle on the way to the feedlot
- Purchase cattle from programs that certify health protocols
- Keep cattle on pasture as long as possible before moving them to feedlots
- Vaccinate cattle

# HOW DOES THE PORK INDUSTRY USE ANTIBIOTICS?

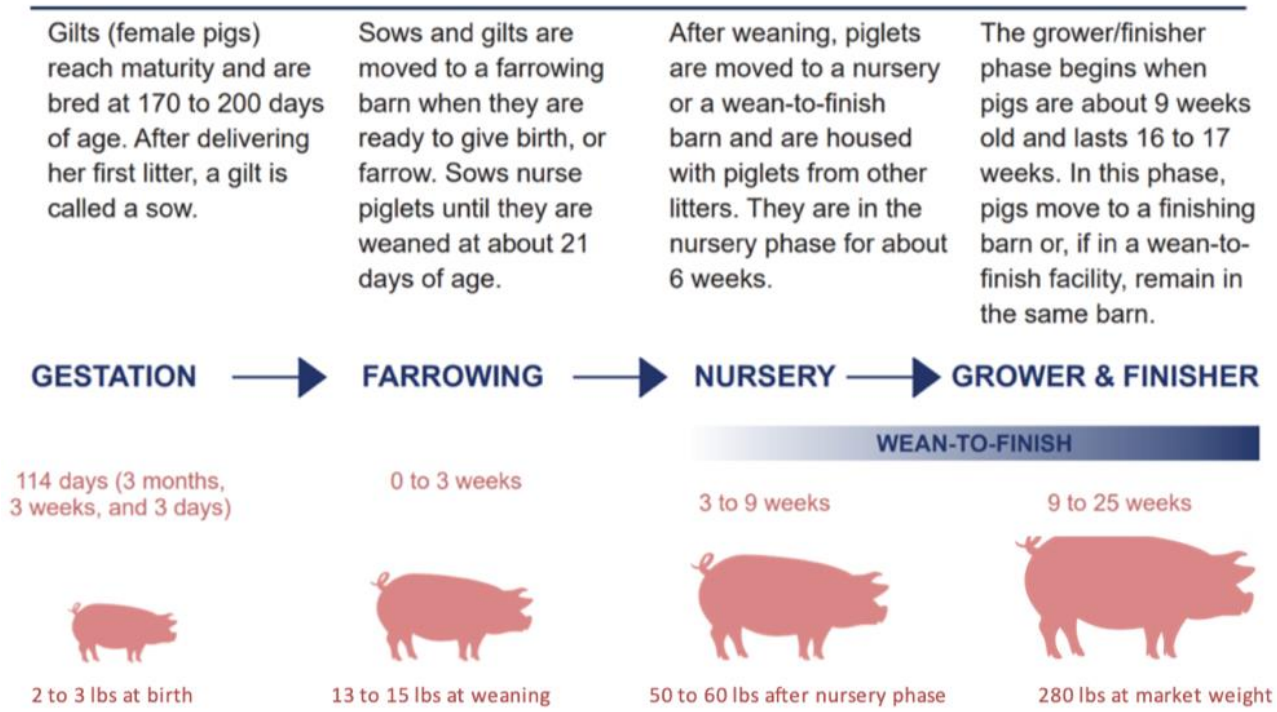
**PERCENTAGE OF SITES THAT GAVE MEDICALLY IMPORTANT ANTIBIOTICS IN FEED OR WATER**


In 2016, over 3.1 million kilograms of medically important antibiotics were sold for use in the pork industry. This was an average of 345 mg of antibiotics used per unit of pork (NRDC). The overuse and misuse of these precious antibiotics in an agricultural setting poses not only a threat to animal health but human health as well.

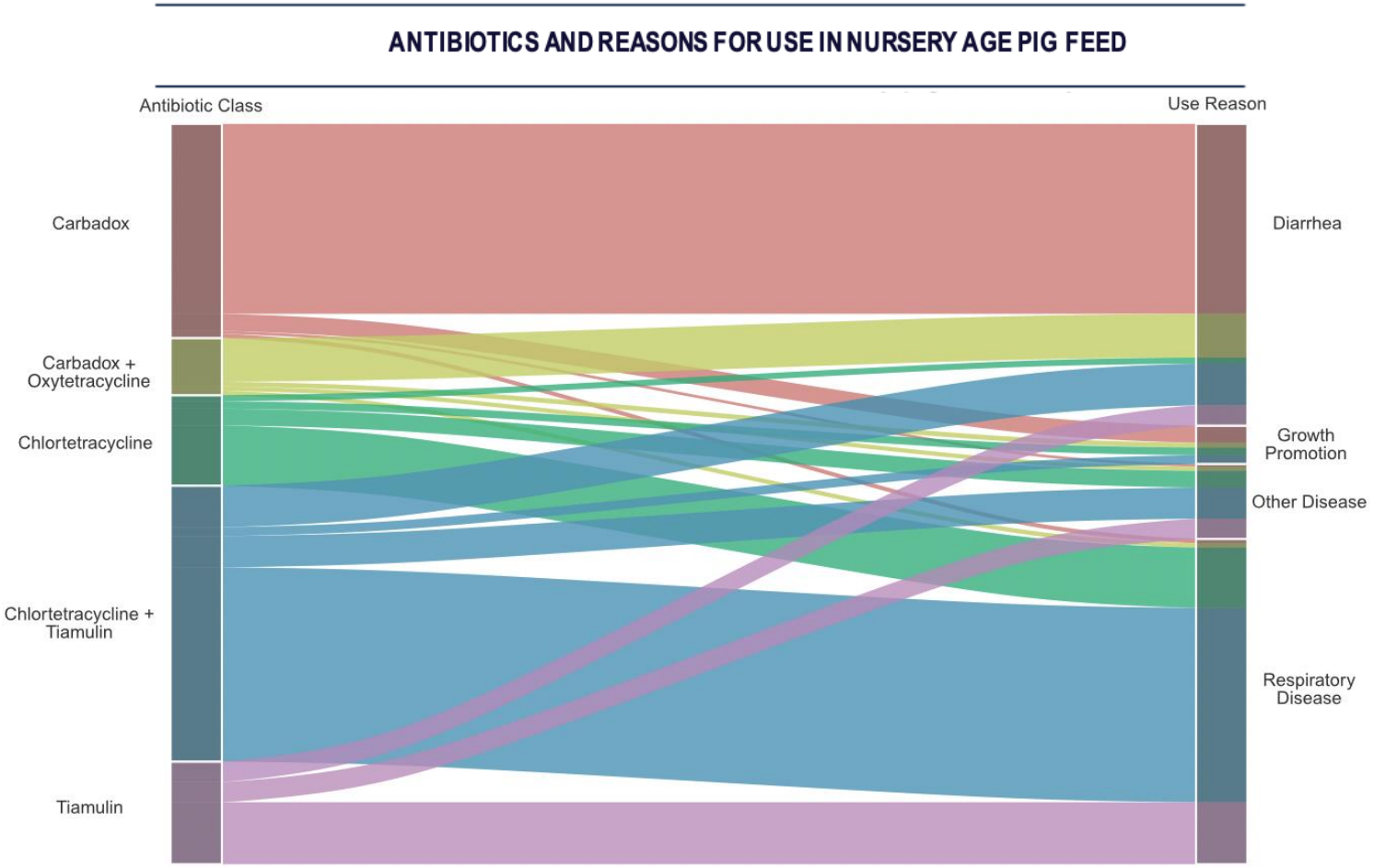
In August 2019, USDA's National Animal Health Monitoring System (NAHMS) released their Antimicrobial Use and Stewardship on U.S. Swine Operations, 2017 report looking at the use of antibiotics in feeder pigs in 2016. This study surveyed farms with an inventory of at least 1,000 "market pigs". Market pigs include both nursery and grower/finisher pigs with ages between 3 and 25 weeks old that have already been weaned.

Of all the surveyed sites, the majority of them administered medically important antibiotics in feed. When antibiotics are given in feed or water, they are most often administered to the whole pen and sometimes the whole herd. Because of this, healthy pigs sometimes receive antibiotics they do not need.

## LIFE CYCLE OF A MARKET PIG




* Graphic adapted from the NAHMS Report on Antimicrobial Use in Swine Operations

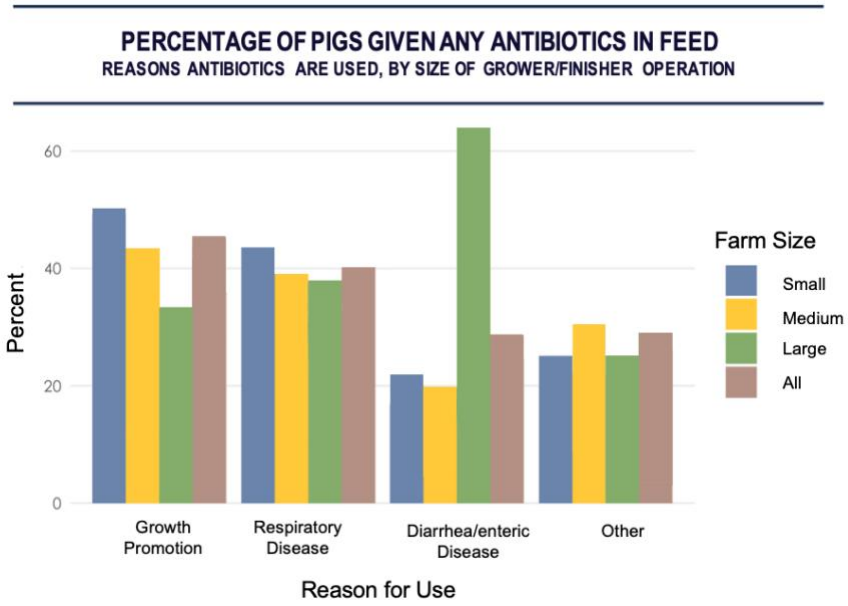


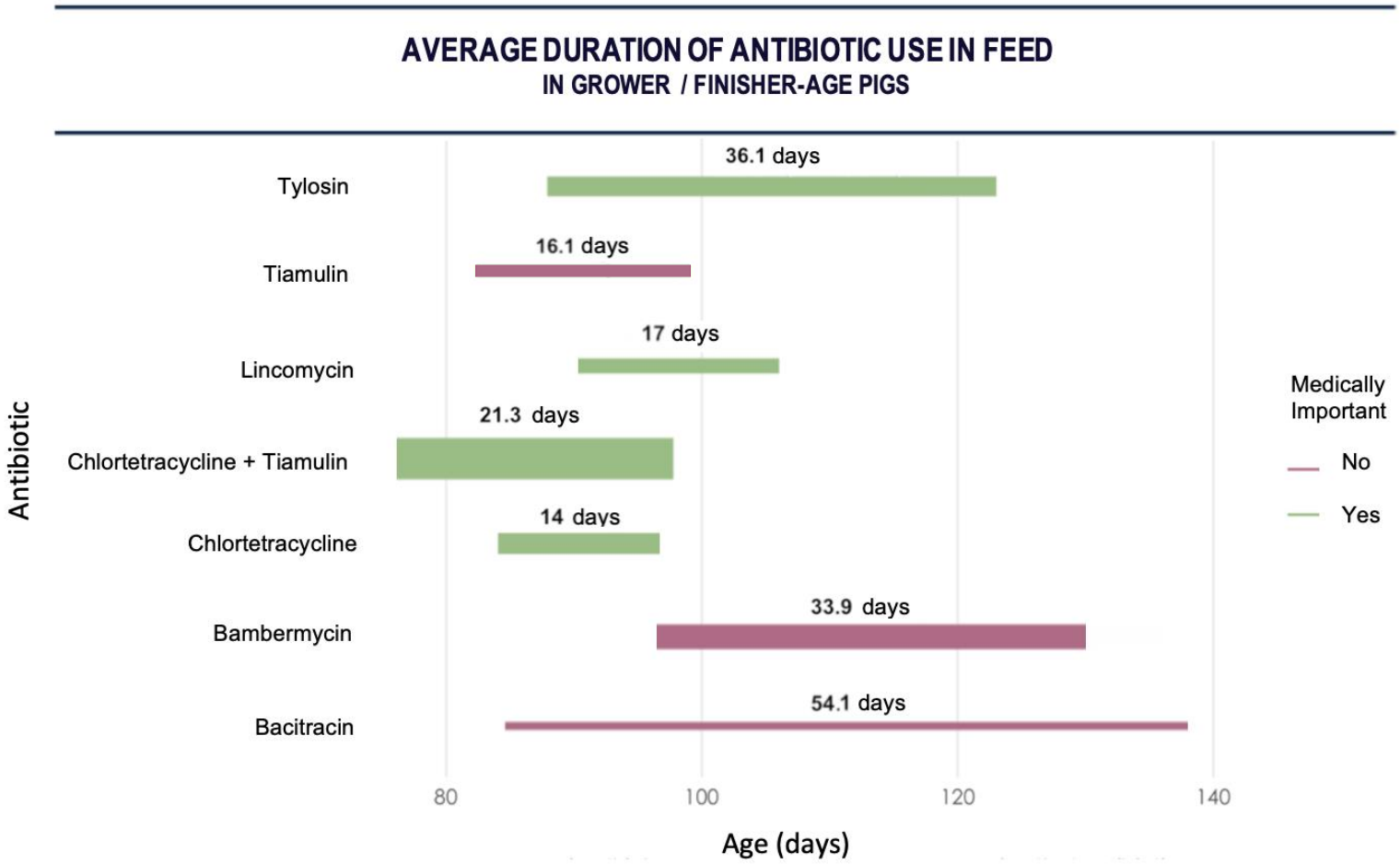

## WHAT ARE ANTIBIOTICS IN SWINE OPERATIONS USED FOR?

The report also notes which antibiotics were used for which conditions. In the chart above the size of the bands is proportional to the percentage of sites. Here, we can see that the most used antibiotic in nursery age pigs was chlortetracycline in combination with tiamulin, and it was primarily used for respiratory diseases. (This was the case in grower/ finisher-age pigs as well.) The second most common antibiotic used in pigs was carbadox which is not medically important so creates little resistance risk, but is a carcinogen, so its use creates the risk that carcinogenic residues end up in pork. (NCBI)(FDA)

In general, the largest proportion of sites used antimicrobials in feed for respiratory disease and diarrhea. (Similar results were reported in water administered antibiotics) Respiratory disease is one of the most economically significant diseases, and bacterial pneumonia can be very problematic in pigs. Overall, **59.9%** of operations gave antimicrobials in feed to nursery age swine for respiratory disease, and nearly **64.7%** used them for diarrhea, both of which require significant management of the environment as well as the herds.

As you can see in the graph below, the reason for administering antibiotics differed depending






* Line thickness indicates what % of pigs receive that antibiotic

on the size of the farm. A greater proportion of large farms (5,000 or more pigs) gave antibiotics for prevention and/or treatment of diarrhea and other enteric disease than smaller sites. However, compared to all of the other farms, a greater proportion of small farms (1,000 to 2,000 pigs) fed their animals antibiotics for growth promotion.

Some of the major factors that contribute to the development of respiratory and enteric diseases are poor environments, high stocking densities, incorrect ventilation, and bringing new pigs into the herd. More responsible herd and environment management can prevent these diseases, and reduce producer's reliance on antibiotics.

Another point of interest has been the duration of antibiotic use. Ideally, an antibiotic will be used only for as long as it is needed. The graphic above shows us at what age certain antibiotics are typically given to pigs, and how long they are used for. Some antibiotics are used for periods of time greater than 7 weeks – however, we can see that most of those are not medically important antibiotics.

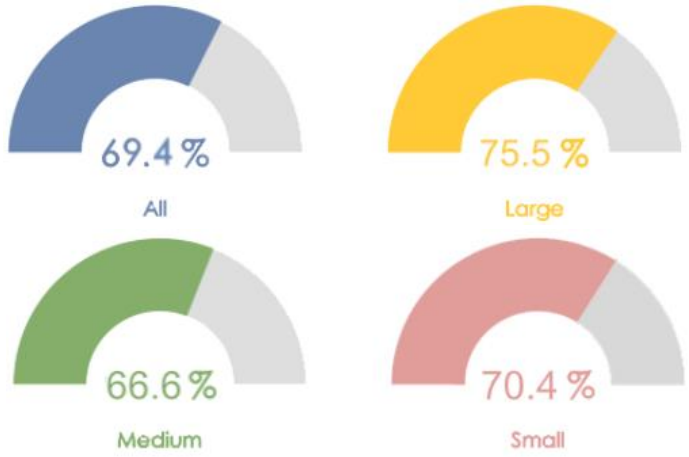
## WHO ADMINISTERS ANTIBIOTICS?

One interesting thing we learned from this data is that the person who decided *when* antibiotics should be used was not always a veterinarian, and also not always the same person who decided *which* antibiotic should be used. Many farms, small and large often consulted farm managers, nutritionists, or service managers when making decisions about antibiotic use rather than a veterinarian.

More than one third of all farms never used a vet, however a large portion of them used medically important antibiotics.

This data was gathered in 2016, so it is important to note that starting in 2017, farms needed a veterinarian's order to use medically important antibiotics in feed or water. However, regardless, consulting a veterinarian is always a good idea when determining a diagnosis and setting proper treatment guidelines. Antibiotic resistance is a serious threat to health, and its proper stewardship is necessary to preserve antibiotics for the future.

**SITES THAT WERE VISITED BY A VETERINARIAN**




## HOW CAN PIG FARMS REDUCE ANTIBIOTIC USE?

One of the best ways to reduce antibiotic use and disease in pigs is to keep the pigs in safe and healthy environments.

Here are some steps conscientious farmers can take:

- Proper maintenance of living spaces, including proper ventilation and timely contaminant removal. Making sure that the pig's living conditions are clean, warm, and dry, with plenty of fresh air goes a long way in maintaining immunity, reducing disease transmission, and reducing stress.

- Immunity. Younger piglets have more weakened immune systems after weaning. Piglets weaned at 20 days are a lot healthier than piglets weaned at 15 days. Healthier piglets don't need as many antibiotics. Vaccinating piglets will also boost immunity and reduce disease.

- Maintaining acceptable herd density. Crowded living spaces mean that not only do diseases spread faster, but it's also harder to keep the spaces clean. Keeping a manageable herd size is good for both farmers and pigs!

# APPENDIX A:
# DATA FOR BEEF CATTLE ANTIMICROBIAL GRAPH

Livestock producers often use a single feed drug or a combination of feed drugs for multiple purposes at the same time. This complicates reporting on reason for use. In order to make the graph more readable, we combined all indications that included liver abscess prevention into a single reason for use. So, liver abscess prevention plus growth promotion or liver abscess prevention plus coccidiosis control were combined with liver abscess control by itself on the right side of the graph.
The USDA reported on reason for use only for the non-combination use of ionophore antibiotics and the non-combination use of chlortetracycline. We included the other antibiotics that USDA reported as being used in at least one percent of the cattle on surveyed farms (NAHMS Beef Report Table C.1.d Page 21). (USDA, 2019) For the drugs included in our graph for which USDA did not report a reason for use (i.e. tylosin plus monensin, tylosin plus lasalocid, and chlortetracycline plus sulfamethazine), we assigned the use to the legally allowed indications included in the 2016 federal regulations the year for which the data were collected. (FDA) Using these feed drugs for other purposes is illegal. Under the federal regulations, tylosin plus monensin can be used either for liver abscess prevention and growth promotion or for liver abscess prevention and coccidiosis control. As noted above we combined these indications in our graph of reason for use. The other drugs for which USDA did not report a reason for use had only one legal indication.

Indications used as well as section number in 21 CFR: (FDA)

- Chlortetracycline plus Sulfamethazine: Aid in the maintenance of weight gain in the presence of respiratory disease. 21 CFR sec. 558.140.
- Tylosin: For reduction of incidence of liver abscesses. 21 CFR sec. 558.625.
- Tylosin plus Monensin: For growth promotion and reduction of incidence of liver abscesses, or for prevention and control of coccidiosis and reduction of liver abscesses. 21 CFR sec. 558.355.
- Tylosin plus Lasalocid: For growth promotion and for reduced incidence of liver abscesses. 21 CFR sec. 558.342.

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