2024 ANTIBIOTIC STEWARDSHIP REPORT

Hormel Foods

Welcome to our fourth annual Antibiotic Stewardship Report. We are proud to share information about our approach and our efforts, including metrics for portions of our supply chain.

This document is a supplement to our Global Impact Report, now in its 18th year of publication. Both reflect the spirit of *Our Food Journey*™, a credo that articulates our commitment to transparency and to making a positive, lasting difference in the world.

Our antibiotic stewardship is documented on our company's website and in various publications. We are committed to taking a holistic approach to animal care — one that carefully considers the health and comfort of the animals in our supply chain.

We are devoted to raising animals without antibiotics, and we are advocates of alternative approaches to animal health and well-being, which may help to minimize the need for antibiotics.

Finally, we are steadfast in our resolve to deepen our partnerships with leading experts in animal and human health and to using science and technology that is designed to make an impact in this important area.

Introduction

We understand the importance of using antibiotics responsibly in an effort to protect human and animal health. We also know antibiotic overuse and resistance are considered problematic, complex and multifaceted global issues. However, our goal is to make a positive impact via a holistic approach to antimicrobial stewardship that is aided by key partnerships. In fact, we are committed to a balanced approach to stewardship so that collectively the problem of antibiotic resistance might be mitigated. When all of the components of an antibiotic stewardship program function effectively, the end goal is that the health of the animals is optimized while the occurrence and impact of disease are minimized.

OUR HOLISTIC APPROACH

Our antibiotic stewardship program is built on four pillars: management, preventive medicine, veterinary oversight and continuous improvement.

Management

Management is a foundational element of our program. The core purpose of any management structure is to ensure production and housing systems meet the basic needs of the animals and minimize the risk of diseases. Providing an appropriate environment, including proper housing and temperature, as well as ample access to feed and water, may help animals develop healthy immune systems, which could in turn increase resiliency to infection and disease.

There are several systemic changes our partners have committed to making to improve the health of hogs and turkeys in our supply chain. For example, we've raised the age at which pigs are weaned, which could lead to more robust piglets. We have also implemented batch farrowing at some sow farms. In addition, we have minimized the number of market hog sites we use for pig sourcing, with the goals of better segregation of animals based on health status and addressing the specific welfare needs of at-risk populations. These practices may help to prevent diseases from spreading to the broader animal population and therefore, could aid in the reduction of the need for antibiotic treatment.

Over the last few years, Jennie-O Turkey Store has been partnering with a technology company to develop a modified hatching system that would change how turkeys are managed during their first few days of life. This advanced system elevates the level of care for newly hatched poults. Among other potential positive outcomes, this technology is designed to support early development of the poults' immune systems.

Our turkey and hog suppliers are committed to using technology that is designed to ensure environmental conditions are comfortable and consistent. These computerized barn-monitoring systems measure and adjust environmental conditions such as temperature, humidity and ventilation rates for animals' comfort.

In addition, many monitoring systems are designed to capture feed- and water-consumption patterns. This information is important, as a reduction in these patterns could indicate that the monitored animals aren't feeling well. Responding to these changes in eating and drinking patterns with supportive care (such as additional heat, vitamins or probiotics) could potentially help these animals to avoid antibiotic treatment altogether.

Preventive Medicine

The next pillar of the Hormel Foods antibiotic stewardship program is preventive medicine. Specialized licensed internal and external veterinarians manage disease-prevention programs at Hormel Foods. The veterinarians monitor and revise these programs on an ongoing basis. A typical disease-prevention program outlines potential routes of disease introduction, as well as potential action items that may help to mitigate those risks. The program will also provide potential strategies to support the overall health and welfare of the animals.

There are two aspects of disease prevention that we believe should be a part of every comprehensive disease-prevention program. First, procedures and policies need to be in place to mitigate the various ways by which diseases are introduced to a farm or barn, collectively known as a biosecurity program. Biosecurity programs cover a wide variety of mitigation strategies. Biosecurity mitigation efforts could include: requiring individuals to shower in and/or shower out of a barn if the breeding stock is different from the previous barn they were in or the next barn they will enter; wearing site-specific clothing, such as footwear and gloves, at all commercial hog and turkey farms; and performing thorough sanitation practices for all transportation vehicles.

The second aspect of preventive medicine includes the direct support of animal health. The cornerstone of this aspect is a vaccine program that targets common pathogens — the viruses and/or bacteria that cause disease — to which hogs or turkeys could be exposed. For example, we recently introduced a vaccine for streptococcus suis at our company-owned sow farm.

Additionally, partners in our hog and turkey supply chains committed to focusing on their water quality, which could then help support young pigs and turkeys that can be challenged by gastrointestinal upset in the early stages of their development. To ensure clean, high-quality water, farmers often filter or treat it before it is delivered to animals. Feed composed of good-quality, nutritious ingredients has been found to be critical to animal health and development.[1] Caretakers are devoted to screening feed ingredients to assess the quality of its nutrients and to look for contaminants, such as toxins resulting from moldy ingredients.

Veterinary Oversight

Veterinary oversight is often fundamental to ensuring judicious antibiotic use. Our veterinarians — internal and external — have a deep understanding of disease progression in pigs and turkeys, the development of antimicrobial resistance (AMR) and animal welfare. These licensed professionals give us the expertise to navigate the potential interrelatedness of antibiotic use, animal welfare and public health when making treatment decisions.

Carrie Cremers, a licensed veterinarian, and manager of technical service and animal welfare for Jennie-O, works to uphold our commitment to high standards for animal welfare. She has been with the company since 2019 as an internal adviser and staff veterinarian, holding various leadership roles. A boarded member of the American College of Poultry Veterinarians, she earned a Doctor of Veterinary Medicine degree from Minnesota State University and a master's degree in avian health and medicine from the University of Georgia.

Along with Cremers, we employ a team of veterinarians at our Jennie-O subsidiary and have partnered with a leading veterinary clinic to help define long-term health strategies for our company-owned sow farm. Each farm in our supplier network is required to have or utilize veterinary care.

This network of veterinarians is committed to understanding ways to minimize antibiotics, such as by innovating in areas of animal husbandry and preventive medicine.

In addition, veterinarians monitor and evaluate the health and welfare of our animals, as well as our antibiotic use, on an ongoing basis. For example, when Jennie-O staff veterinarians determine antibiotics are necessary to minimize the complications of an illness, their first goal is to ensure antibiotic efficacy against the bacteria causing the disease. Before an antibiotic is prescribed, the team at Jennie-O performs testing to help select an antibiotic that will be the most effective against the bacteria. This procedure is called an antibiotic sensitivity test, and it helps to ensure that only proven antibiotics are prescribed.

Continuous Improvement

Continuous improvement is the fourth pillar in our antibiotic stewardship program. This empowers us to constantly assess — and if necessary — alter and potentially improve our course based on new information, scientific developments, etc.

For example, we previously set out to reduce our antimicrobial use by 10% year over year. However, after reassessment, we have since amended our goal. Over time, we began to understand that a myopic approach focused solely on the measurement of antibiotic use has the potential to create unacceptable tradeoffs between animal health and welfare, as does the expectation for consistent reduction in antibiotic use over time. If an animal is sick, it should be treated, provided a veterinarian deems it necessary. Farm partners of Hormel Foods do their best to prevent health issues on their farms, but despite these efforts, illnesses can occur, and when they occur, they must be addressed.

Rather than being concerned only with the reduction of antibiotic use, our program takes a more comprehensive approach to animal wellness. For example, Jennie-O has been involved in ongoing research pertaining to antibiotic alternatives. For example, Jennie-O has conducted 24 studies pertaining to antibiotic alternatives or management practices that have shown positive results over the past five years. The alternatives, such as prebiotics, probiotics and essential oils, that demonstrate value may then be integrated into feeding programs or used as supportive therapy in drinking water. Hormel Foods owns one sow farm, which gives us an opportunity to employ these measures, and further explore ways to improve animal health and to eliminate the use of antibiotics where we can.

Ongoing refinement of management and preventive medicine programs, engagement with veterinary experts and a commitment to continuous improvement are critical principles of our comprehensive antibiotic stewardship program. In our experience, when components of an antibiotic stewardship program function effectively, it is easier to meet our goal of optimal animal health and minimized disease occurrence.

Our white paper published in December 2021 has more information.

FOCUS AREAS

Our core principles of management, preventive medicine, veterinary oversight and continuous improvement underlie and give rise to various initiatives, programs and approaches. For example:

Partnering With Stakeholders

We believe strategic partnerships give us the opportunity to have a larger impact on antibiotic resistance. With this in mind, we formed an antibiotic working group comprised of internal subject-matter experts, leading nongovernmental organizations, independent veterinarians and other stakeholders. This team explores and evaluates research opportunities and participates in industry antibiotic initiatives. In addition, we are engaging with the National Institute of Antimicrobial Resistance Research and Education to further the dialogue and find solutions around AMR.

In addition to the company's antibiotic working group and involvement with members of the National Institute of Antimicrobial Resistance Research and Education, in calendar year 2018, Hormel Foods, along with other food companies, retailers, livestock producers, and trade and professional associations, announced a comprehensive framework aimed at strengthening the stewardship of antibiotic use in food animals. The framework was part of a two-year dialogue with stakeholders, which was moderated by the Farm Foundation and Pew Charitable Trusts, and designed to help ensure that antibiotics are used judiciously throughout production to protect animal and public health.

The 15 core components of the antibiotic stewardship framework are based on the ideals of the importance of veterinary guidance and partnership, disease prevention strategies and optimal treatment approaches, as well as effective recordkeeping and a culture of continuous improvement and commitment to antibiotic stewardship. The components address education, implementation and evaluation steps for stewardship programs. Finally, the framework's guiding principles are intended to help ensure that stewardship programs have a clear scientific basis, are transparent, minimize the risk of unintended consequences, encourage alternatives to antibiotics and focus on long-term sustainability.

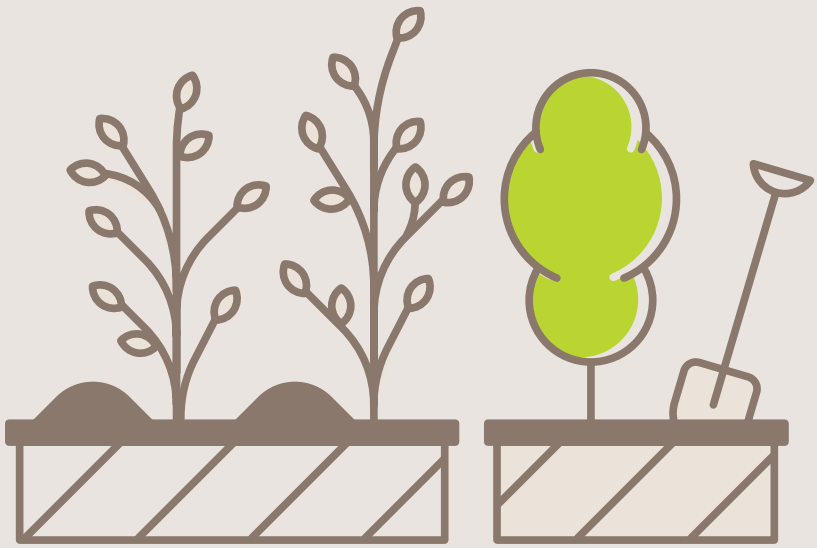
In the past year alone, we've reviewed the World Health Organization's (WHO) "Guidelines on Use of Medically Important Antimicrobials in Food Producing Animals." We are aligned with several key points in the guidelines, however, there are some areas we are studying further to determine the feasibility and potential impacts of implementation. Specifically, we are studying animal welfare guidelines that WHO has defined as "conditional recommendation[s], with very low-quality evidence."

Additionally, we recognize customers and consumers expect more transparency about antibiotic use across all animal-protein sectors. We are engaged with and support the voluntary, industry-led measurement of antibiotic use.

The first comprehensive report on antibiotic use in poultry production was released in August 2019 and has since been updated. This was followed by the peer-reviewed journal article "Estimates of On-Farm Antimicrobial Usage in Broiler Chicken and Turkey Production in the United States, 2013-2017,"[2] which captures actual practices in the broiler and turkey industries. These reports do not provide specific company data; however, the trends reported include data from Jennie-O farming operations. These reports are important steps in establishing meaningful metrics for the entire turkey industry, and we will continue to support efforts to collect and report data on an industrywide basis.

Producing Raised-Without-Antibiotics Products

Hormel Foods has had animals-raised-without-antibiotics product offerings for many years. For example, the company's Applegate subsidiary in Bedminster, New Jersey, has a product portfolio produced entirely from animals raised without antibiotics. Antibiotics are still given as needed to properly care for an animal, and only approved medications and dosage levels are used under the direction of a licensed veterinarian. However, if antibiotics are given to an animal, that animal would not enter the Applegate supply chain. Additionally, we offer several raised-without-antibiotics meat and turkey foodservice items under the *Columbus*® and *Jennie-O*® brand names.



METRICS

Focusing only on one metric, such as milligrams of antibiotics per pound of animal produced, can compromise the integrity of a robust stewardship program. For example, one could impact overall milligrams per pound by substituting a higher-potency antibiotic. Randy Singer, a veterinary epidemiologist, calls attention to this risk by comparing the course of treatment of penicillin and lincomycin for 12,500 turkeys weighing 25 pounds each in the following example:[3]

	Penicillin	Lincomycin
Active antimicrobial per pack	1.0 billion IU/pack	192 g/pack
Gallons of water per pack[a]	666 gallons/pack	3,000 gallons/pack
Number of packs of antimicrobial[b]	27 packs	6 packs
Total IU	27,000,000,000 IU	N/A
Total active drug (g)[c]	- 16,927.2 g	1,152 g
Active antimicrobial per bird	1,354.2 mg/bird	1,152 mg/bird
Active antimicrobial per kg body weight (BW) at time of treatment	119.4 mg/kg BW	8.1 mg/kg BW
Active antimicrobial per kg treated BW per day	17.1 mg/kg BW/day	1.2 mg/kg BW/day
Days of animal therapy (five-day duration of treatment)	87,500	87,500
Therapeutic regimens (number of birds treated)	12,500	12,500

[a] Each antimicrobial is administered according to label instructions (U.S. Food and Drug Administration, 2020a).

[b] Number of packs of antimicrobial needed is rounded up, as the entire pack must be mixed into the stock solution.

[c] Conversion used for penicillin G procaine is 1,595,066 IU/g.

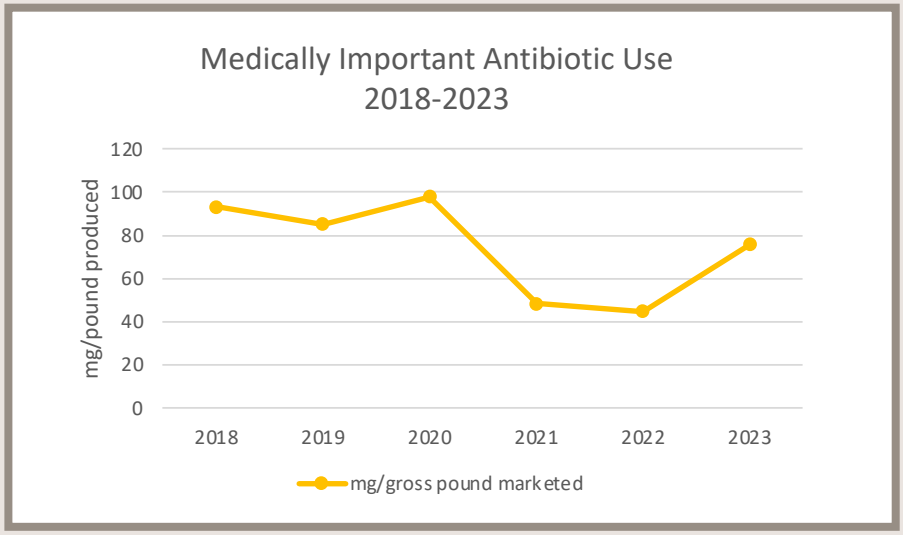
Even though the number of treated birds and the duration of treatment are the same in the example above, the total grams of administered penicillin are 14.7 times higher than the grams of lincomycin administered, due to the lower potency of penicillin. What this scenario demonstrates is that a single metric, such as antibiotic milligrams per pound of animal produced, is greatly impacted by the chosen antibiotic. It's important to have a broader commitment to overall stewardship, not just measurement, to have an impact on antimicrobial resistance.

Turkey Data

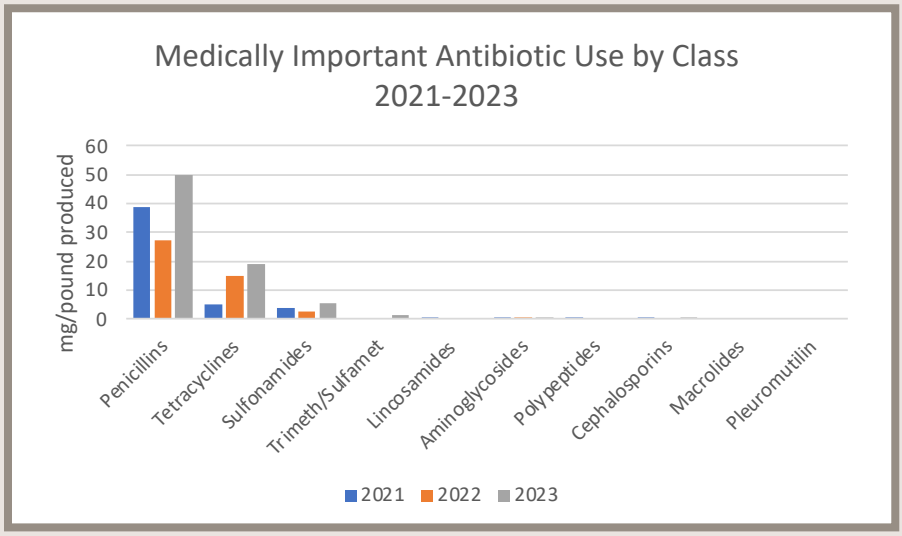
We collected data pertaining to antibiotic administration, including details about antibiotic class, from the Jennie-O network of company and contract farms (see Graphs 1 and 2). This group of farms represents more than 75%

of the Jennie-O turkey supply. The Jennie-O farming system also produces approximately 150 million pounds of animals-raised-without-antibiotics turkey. Any turkey flocks that received antibiotics are disqualified from the raised-without-antibiotics program and are included in the data below.

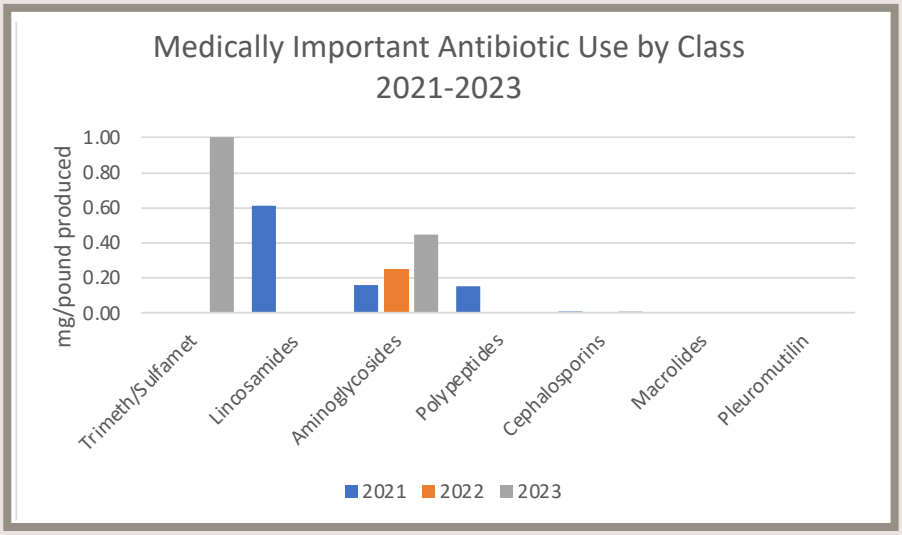
Graph 1: The following graph shows the use of FDA medically important antibiotics in our Jennie-O farm system from 2018 to 2023.



Graph 2: The following graph shows the use of FDA medically important antibiotics by class in our Jennie-O farm system and by our contract growers in 2021, 2022 and 2023.



Graph 2a*: The following graph focuses on the seven rarely used FDA medically important antibiotics listed at the end of the graph above by class in our Jennie-O farm system and by our contract growers in 2021, 2022 and 2023.



***Adjusted Y axis.**

Discussion

The Jennie-O network of farms reached the company goal of reducing antibiotic usage by 10% for fiscal year 2021 and 2022. However, fiscal year 2023 was not on target. This was likely due to the health-and-welfare challenges and concerns in the turkey production system in 2023 that required antibiotic treatment. For example, salmonella was discovered in hatcheries and required the use of the ceftiofur antibiotic Naxcel to treat sick poults and to safeguard public safety.

Another challenge in 2023 was poults' struggles with enteritis and E. coli infections that needed to be treated with antibiotics. When poults have a difficult start in life, their immune systems can be compromised into adulthood. Proper management is one key to keeping a poult healthy. However, at times, a once-compromised poult may need help later in life.

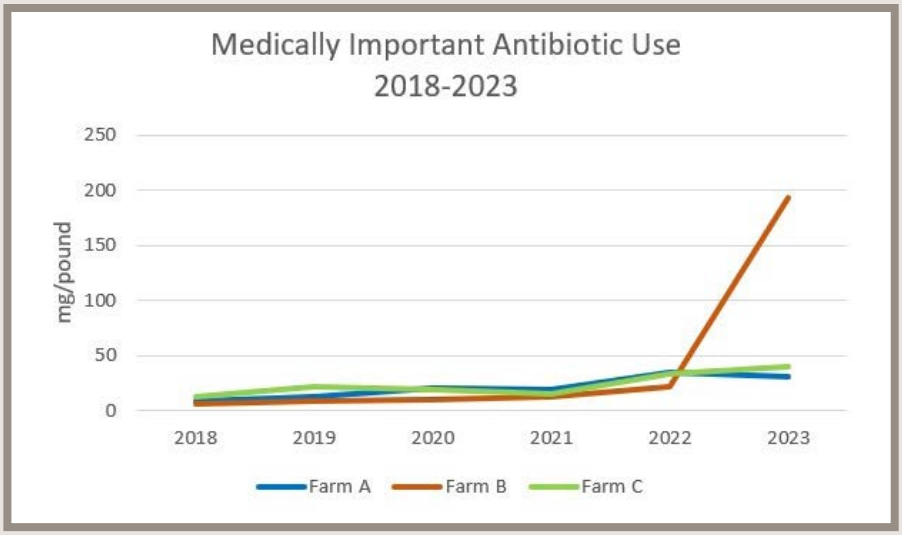
Finally, use of neomycin, an aminoglycoside antibiotic, increased due to a rise in bacterial enteritis (i.e., intestinal inflammation), and oxytetracycline was prescribed for colibacillosis in young poults. Penicillin was also used to treat a disease called dermatitis. This bacterial disease affects older birds that are close to market age, which increases the usage of the antibiotic. As discussed previously, while we strive to manage the health of our poults and birds through management, antibiotics are sometimes needed.

Pig Data

When Hormel Foods first made the commitment to report on antibiotics administered to the animals in our supply chain, there was very little guidance on how to best capture antibiotic use throughout the life cycle of a pig. Unlike Jennie-O and our turkey supply chain, which is highly integrated, our pork supply chain relies on a large collection of producers with varying levels of integration.

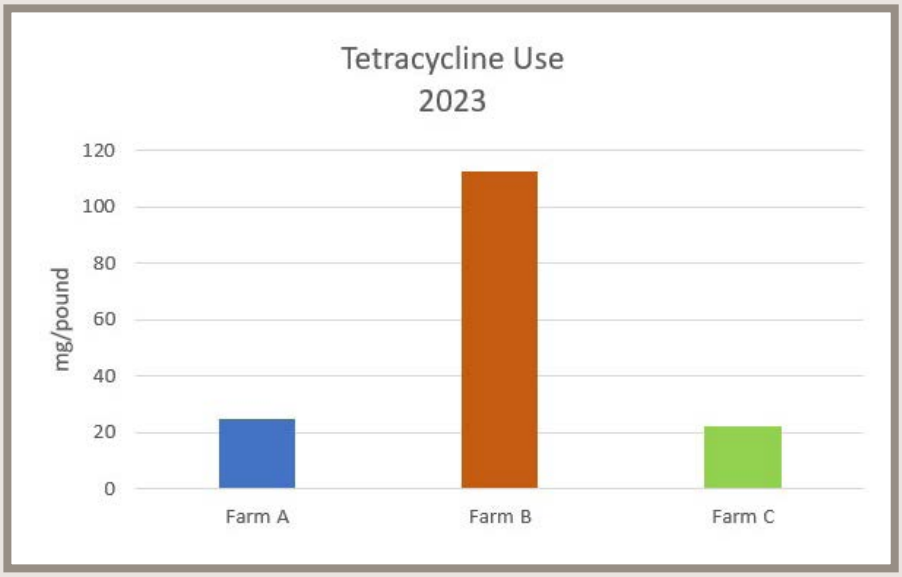
As Hormel Foods has one company-owned sow farm, we launched a pilot project in 2019, where we work with farm partners from four representative systems to collect data on the administration of antibiotics. Three of the systems support the Hormel Foods enterprise (see Graphs 3 through 7). In total, the data in the following graphs represents approximately 660,000 market hogs. Data from our single company-owned sow farm is presented separately (see Table 1 and Graph 8).

Graph 3: FDA medically important antibiotics used per pound produced for three Hormel Foods hog supplier systems from 2018 to 2023.

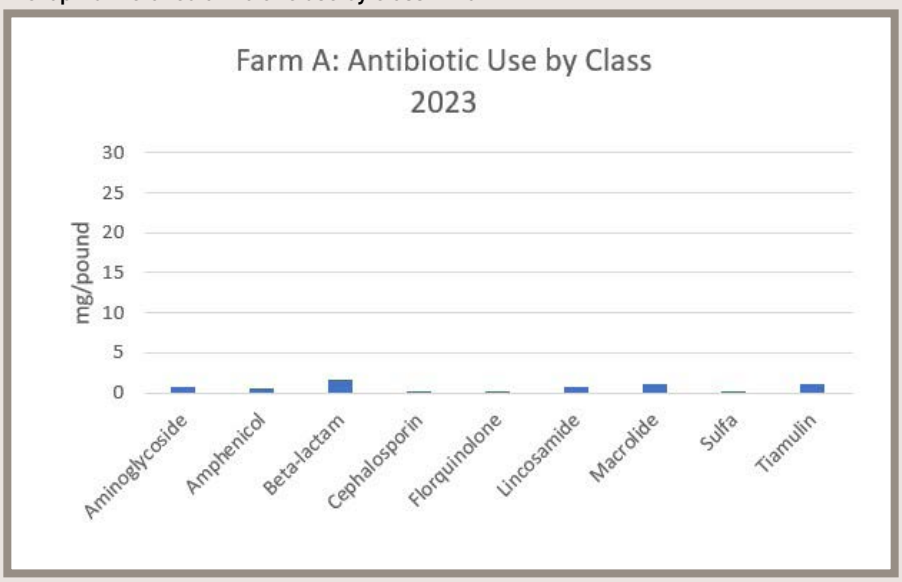


Note: The live weight calculated was based on a 75% carcass yield. Pigs were co-horted based on when they started on feed, so the milligram-per-pound figure for a given month is reflective of what those market hogs received.

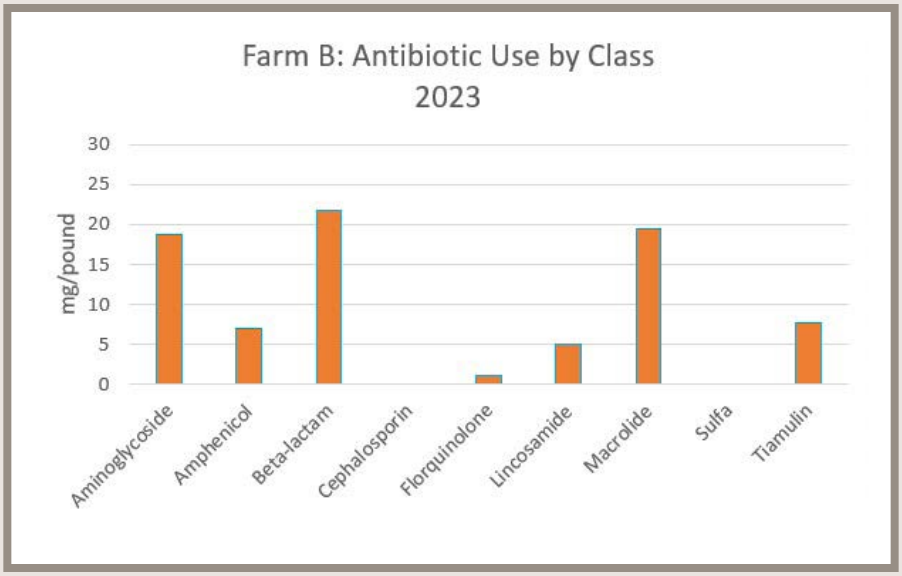
Graph 4: Tetracycline use across three farm systems.



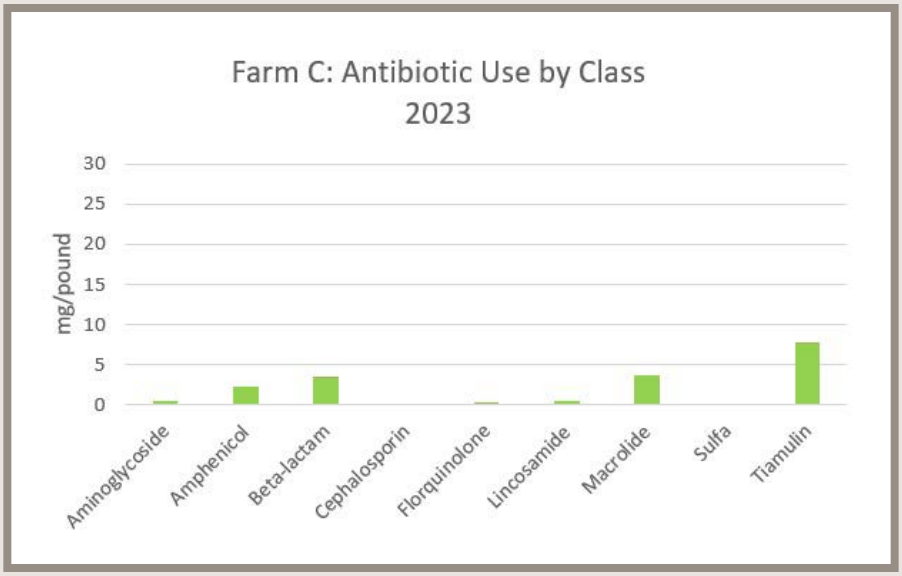
Graph 5: Detailed antibiotic use by class — Farm A.



Graph 6: Detailed antibiotic use by class — Farm B.



Graph 7: Detailed antibiotic use by class — Farm C.



The Challenge of PRRS on Overall Herd Health

The data in Graphs 3 through 7 came from herds that have had various levels of herd-health challenges and or improvements over the last year. It includes farms that have been influenced by porcine reproductive and respiratory syndrome (PRRS). A viral disease common among U.S. sow herds, PRRS can compromise the reproductive and respiratory systems of sows, and the respiratory systems of piglets. Pigs infected with PRRS are more easily impacted by secondary bacterial challenges such as pneumonia, strep, influenza and mycoplasma. To make this report as representative as possible, we've included data on pigs impacted by PRRS. Excluding them would likely have decreased the quantities of antibiotics administered, but that would not have been an accurate picture of the supply chain.

To improve herd health, the sow herd on Farm A was marketed early. The last offspring from the former herd was marketed in 2023. Highly important antibiotic use was significantly down year over year likely due to improved herd health and stability. Use of macrolides was slightly up due to their use in the early life stages of offspring from the previous herd, which was challenged by mycoplasma. It is believed that the use of antibiotics early in the life cycle greatly reduced the need for additional antibiotics as the pigs became ready for market. The ability to keep this herd stabile and healthy appears to have corresponded with a reduction in the use of antimicrobials. Farm A agreed to make significant financial and operational changes to improve the health status of the herd and to reduce the use of antimicrobials.

The sows on Farm B maintained their high health status, including remaining PRRS negative. However, while sow health was stable, offspring were typically raised in regions of the country considered to be hog dense, which led to a higher incidence of respiratory challenges caused by PRRS and influenza in the offspring. Because of these challenges on Farm B, a subsequent increase in antibiotic use was needed to treat the offspring when they were older and during mid- to late finishing. These pigs were treated at heavier weights, and thus, a higher dose of antibiotics was called for. The need to effectively treat older pigs significantly increased total usage on Farm B, especially the antibiotic class of tetracyclines.

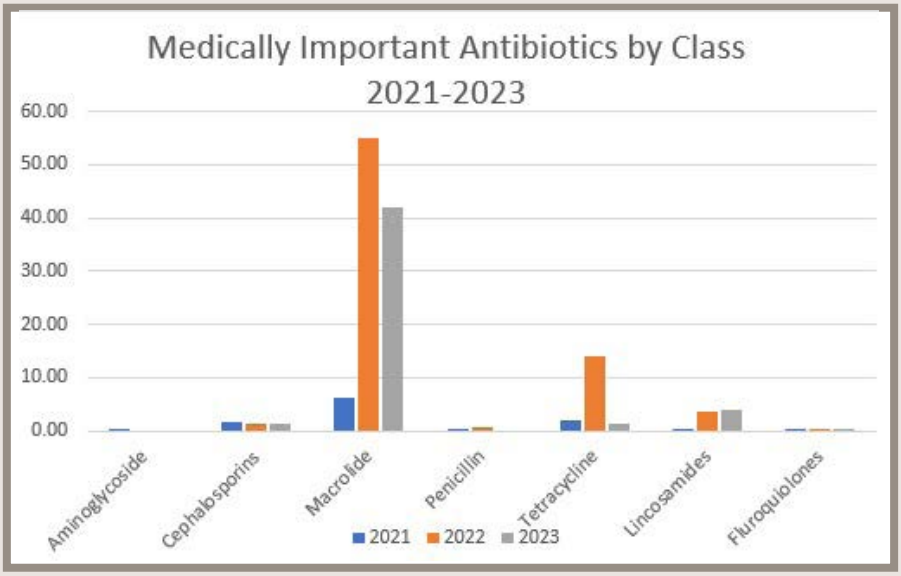
Sourcing of gilts was a challenge for Farm C in 2021 and 2022. However, the sourcing of gilts stabilized in 2023. At the same time, the number of offspring affected by PRRS increased in the first half of 2023, along with

antibiotic usage. A higher dose of tetracycline was needed in Q1 and Q2 to treat some offspring of the health-challenged gilts. Mixing sources of animals can make the management of health outcomes very challenging, and this may be the cause of the slight upward trend of antibiotic use. Despite all these challenges, the producer and the veterinary team are continuing to manage the strategy to stabilize this herd and exploring options for continued improvements in herd health.

Table 1: The following table shows the use of FDA medically important antibiotics at our company-owned sow farm from 2018 to 2023.

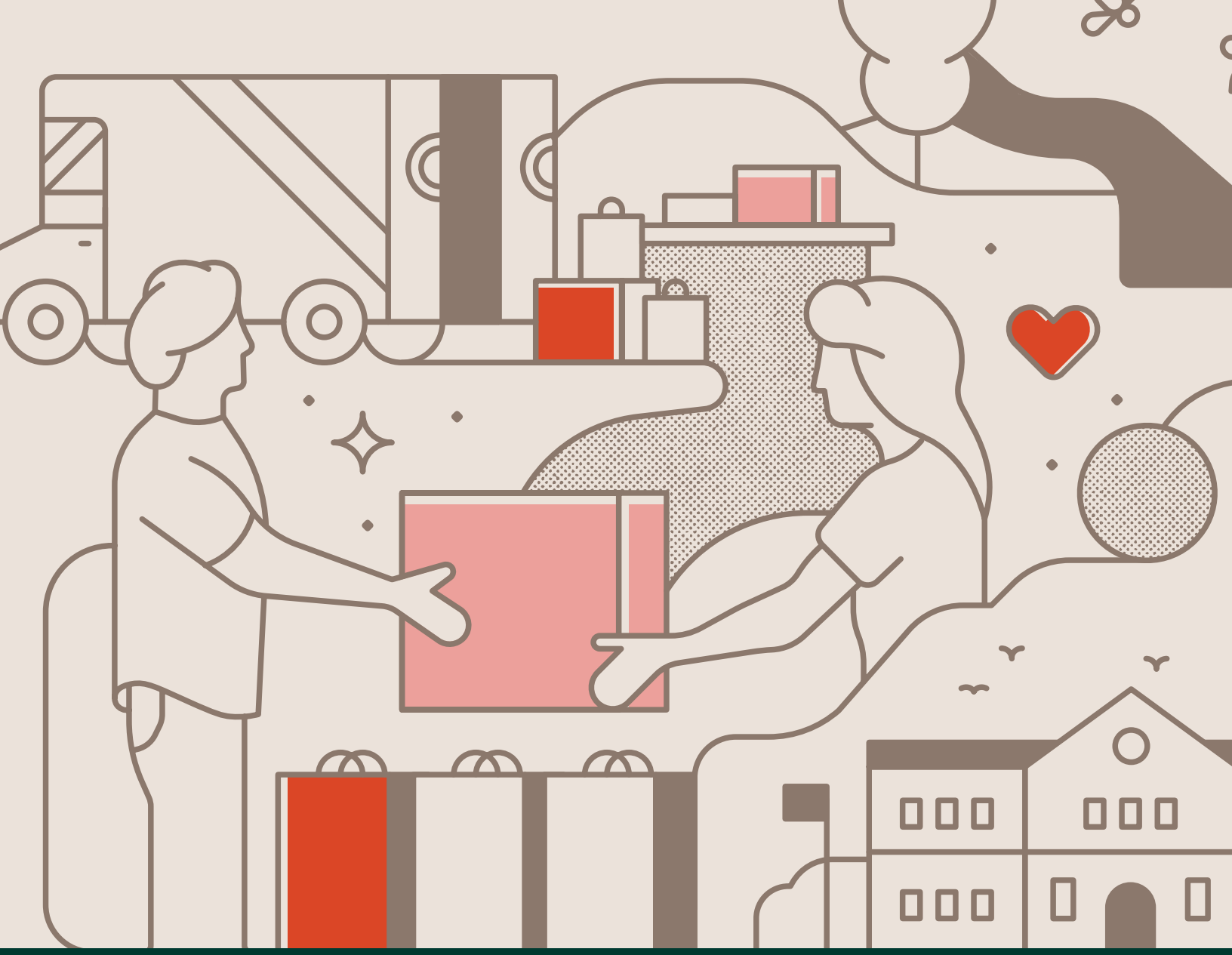
	2018	2019	2020	2021	2022	2023
Sows mg/pound (injectable)	3.76	2.96	2.89	1.00	4.98	6.48
Sows mg/pound (feed)	20.52	66.70	88.82	6.71	66.90	39.40
Piglet mg/pound (injectable)	0.73	0.53	0.61	3.65	2.95	2.81

Graph 8: FDA medically important antibiotic use by class at our company-owned sow farm from 2021 to 2023.

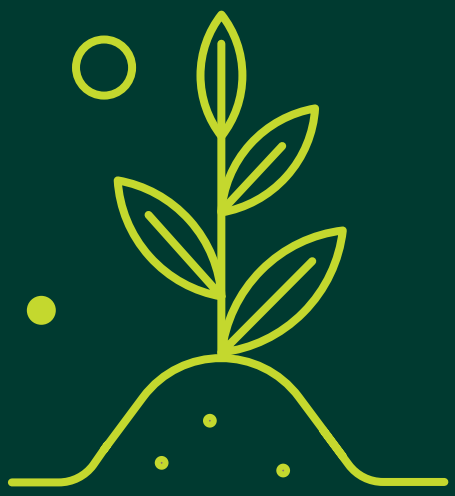


In 2023 the company's sow farm discontinued giving Pulmotil to lactating sows and chlortetracycline to nursery pigs through feed, reducing total macrolide and tetracycline use for the farm. This reduction in feed antibiotics slightly increased the amount of injectables used in the sow herd for needed individual treatments. By discontinuing these feed medications in the various stages of production and focusing instead on individual animal treatments, there was a net reduction of total antimicrobial usage. The impact of these decisions to discontinue some of the antibiotics in feed can be seen in the data provided in Table 1 and Graph 8.

The company's sow farm continues to have a PRRS-positive managed herd. However, the decision to bring in gilts from an external source rather than relying on internal multiplication has reduced the impact of PRRS on sows and piglets. Overall, piglet health was improved in 2023 over 2022, allowing for a small reduction in total injectable antibiotic usage in this phase of the life cycle. We will continue to focus on mitigating the impact of PRRS on animal health, and we will employ individual animal treatments and care to manage and reduce antimicrobial usage overall.



CONCLUSION



Hormel Foods is committed to transparency in its antibiotic stewardship. We work diligently to avoid the need for antibiotics, but when it becomes necessary to use them to protect animal and human health, our goal is to do so judiciously and by following the advice of licensed veterinarians.

Management and preventive medicine programs, engagement with veterinary experts and a commitment to continuous improvement are the foundation of our antimicrobial stewardship program. While antimicrobial use is one metric reflected in this report, its measurement should not be the only criterion by which a comprehensive stewardship program is measured. This document reports antibiotic use from the various facets of our supply chain, and it demonstrates the commitment of our company to improving antibiotic stewardship through a multifaceted approach.

Please email globalimpact@hormel.com if you have any questions or feedback about this report. For more information about our corporate responsibility initiatives, including our environmental stewardship and charitable giving efforts, please refer to our latest Global Impact Report.

[1] Ahmet Baris. Impact of Feed Quality on Livestock Productivity. Journal of Livestock Policy, 10.47604/jlp.v2i1.2112, 2, 2, (1-10), (2023).

[2] As defined in the "Critically Important Antimicrobials for Human Medicine: 6th Revision" by the World Health Organization. Routine use means antibiotic use for disease prevention purposes. For example, treating all animals in a flock or herd at a certain time as a regular practice (such as at weaning or before shipping) is by definition routine use even if administered by injection to individual animals of that flock or herd, In addition, antibiotics delivered through animal feed, water, injectable or any other delivery mechanism, to a group of animals that has not been diagnosed with a transmissible bacterial infection is considered "routine use."

[3] Randall S. Singer, Leah J. Porter, Nora F. D. Schrag, Peter R. Davies, Michael D. Apley, Kathe Bjork. Estimates of on-farm antimicrobial usage in turkey production in the United States, 2013–2017. Zoonoses and Public Health, 10.1111/zph.12763, 67, S1, (35-50), (2020).