MSU Pork Quarterly

Information for an Industry on the Move

May 2019 Vol. 24 No.2

In This Issue...

aai
ANIMAL AGRICULTURE INITIATIVE

This newsletter is edited by:
Dr. Madonna Benjamin, MSU Extension Swine Veterinarian, 517-614-8875, gemus@cvm.msu.edu
& Emily Schmitt MPPA, Program Director

Selecting a Deworming Schedule

Beth Ferry & Dave Thompson, MSU Extension Swine Educators

As youth exhibitors in Michigan prepare to obtain animals and begin mapping out a pig care strategy, they should be mindful of the need, and consider their options for controlling parasites.

We are mid-spring in Michigan and hundreds of youth in the state are planning to show pigs later this summer at over 70 county fairs. These young people are in the process of purchasing animals and will soon, if not already, be working hard to prepare their swine projects for the fair. For themselves, their families, advisors and friends... and for our industry, it is important that they present the best project possible. This means, above all else, that their pigs should receive proper nutrition, housing, socialization and health care, which includes controlling parasite infections.

Parasites that typically infect Michigan pigs, at some stage of their development, include both internal and external species. Internal species (endoparasites) that reside mostly in the gastrointestinal tract include coccidia (protozoa), with Isospora suis being the most dangerous to pigs, and roundworms (especially Ascaris and whipworms). External parasites (ectoparasites) cling to and irritate the skin of pigs, and include ear mites and lice.

Worm, mite and lice infections very rarely lead to death in pigs, but they can severely reduce average daily gain and overall health. Impacts of parasite infection in fair pigs might also include diarrhea, red/scabby skin (especially around the head and ears) and even in the appearance of large, white worms in the feces. In addition, even a relatively low worm burden infection by roundworms can cause persistent coughing from larval stages of the worm that migrate into the lungs, and liver damage (white spots), sometimes leading to condemnation of the liver at slaughter. Whipworm infection frequently damages the colon sufficiently to cause extreme diarrhea and bloody stools.

In Michigan, most pigs destined for county fairs will be purchased from farmers at 6-8 weeks age, weighing 30-40 pounds. Pigs should have received at least one dose of deworming product and be free of significant

infection by ear mites or lice at time of sale. But untreated pigs, especially those maintained on pasture or in barns with unslatted floors, can become infected with worms and external parasites between the time of purchase and fair season, which typically begins 3-4 months later.

How to avoid parasite problems between time of purchase and through the fair season? Ideally, pigs should be kept on a deworming schedule throughout the growing season, and be given deworming medications once every 30 days, rotating products when possible. This will allow the pig to remain free of most parasites and have an optimal growth rate. If this practice has not been followed, it is even more important to make sure that the pigs are dewormed before they go to the fair. For some youth exhibitors, it may be their first experience with livestock agriculture. As stewards of agriculture, it is the job of the youth exhibitor to have healthy, clean animals on display.

When treating your animal, there are a number of products available to use and most of these can be found at your local feed store or agriculture supply store. These medications are typically less costly when purchased in multiple-dose packages; sharing product with other 4-H or FFA club members is often a useful buying strategy. Deworming medication can be given via injection, orally (in the feed or water) or topically (1), although topical wormers are not very effective on swine, because they do not have enough hair follicles for absorption of the medication. More treatments for mites and lice are available for topical delivery (2, 3), but only members of the mectin class are effective when administered as an injection, and these bring the added benefit (i.e., versus the topical products) of a long duration of efficacy. It is important to evaluate each of these products to make sure you are using the best treatments for your pigs. Below is a summary of some anti-parasitic products commonly found in feed supply stores and agriculture supply stores.

Safe-Guard® (Fenbendazole)

• Is an orally fed product, which comes as a pellet when labeled for swine.

• Controls lung worms, stomach worms, nodular worms, round worms, and kidney worms.

• Safe-Guard pellets are meant to be top-dressed or mixed into swine feed and fed for a period of 3-12 days, depending on the rate at which it is mixed.

• There is no withdrawal time for Safe-Guard and it can be fed up to slaughter.

• Please note: Safe-Guard does not address external parasite issues (mange or lice).

Ivomec® (Ivermectin)

• Can be found as an injectable, oral (premix) or topical product at most stores.

• Controls gastrointestinal (large roundworm, red stomach worm, nodular worm, thread worm) worms, lung worms, lice and mange mites in swine.

• Ivermectin injectable should be injected subcutaneous under the skin, in the neck of the animal.

• Withdrawal time is 18 days pre-slaughter for injected product or 7 days for the oral product.

Noromectin® (Ivermectin)

• This product is the same as ivermectin, the label name is different.

• All of the above information for ivermectin applies.

• Withdrawal time is 7 days for the product when given in feed.

• Keep in mind that getting the right dose can be difficult with oral products if more than one pig is housed per pen.

Dectomax® (Doramectin)

• Is an injectable product labeled for swine.

• Controls round worms, lung worm, kidney worm, lice and mange mites.

• Dectomax should be injected intramuscularly, in the neck of the animals.

• Withdrawal time is 24 days pre-slaughter.

Wazine® (Piperazine)

• This product is given orally and mixed with the animals drinking water.

• Controls ONLY round and nodular worms.

• Withdrawal time is 21 days pre-slaughter.

Even though each of the listed deworming products will address the key roundworm species that infect pigs, **Safe-Guard** is typically the gold-standard for control of round worms; rotating this product with a product from

the mectin family (Ivomec or Dextomax) will provide the broadest spectrum of coverage, as those products also provide long-lasting control of mites and lice. Treatment with a product from the mectin family should be administered about a month prior to the final exhibition or marketing so that withdrawal times are followed. Exhibitors can then follow up a week or so before fair with the Safe-Guard product, which does not require a withdrawal time.

For youth exhibitors who are unable to de-worm each month, it might be useful to consider the following minimal dose schedule, designed to make sure their pigs are ready at time of fair:

- Give your pig Safe-Guard 3 weeks after you purchase it from a farmer.
- Give Ivomec or Dectomax 1 month prior to the fair.
- Repeat with Safe-Guard 2 weeks prior to fair.

As with any potential health care issues, you should observe your pig(s) daily for any signs that suggest a parasite infection (coughing, runny diarrhea, evidence of worms in stools). If this is observed, a more routine schedule of deworming should take place.

Other steps exhibitors should consider for reducing incidence and severity of parasitic diseases in their animals include:

- Purchase animals only from a reputable farmer. Obtain a health certificate that describes each treatment your animal received prior to purchase. Make sure that it has received at least one dose of an antiparasitic agent.
- Clean and disinfect your barn or rotate pastures prior to pig placement in order to reduce (almost impossible to eliminate) exposure to coccidia and roundworm eggs. Ascaris and coccidia eggs are highly resistant to most disinfectants, and can persist for up to 10 years in pasture and heavily soiled areas in barns. However, removing as much feces and debris as possible can help reduce exposure to roundworm (and coccidia) eggs. (4) Because worm eggs can live in soil or soiled areas of the barn for years, it is important to have a deworming plan in place. Just because you have never observed worms in your animals, does not mean that you cannot get them, prevention is the best practice.
- When you deworm your animal, all pigs on site should be treated at the same time. Failure to do that increases the chances for reinfection.
- When bringing your pig home (both at purchase and following the fair), if you are able, separate your animals from different farms, eliminating nose to nose contact if you can for at least 2 (and ideally 4) weeks. If you do not have enough space to separate your animals, make sure that you are carefully watching your pigs for any signs of sickness or parasitic infection. This is done to ensure that your animals remain healthy and have time to adapt to its new environment before being comingled with other animals.
- Follow sound biosecurity practices (4) to control rodents and other wild-life that typically carry infective larvae of roundworms, mites and lice into barns and pastures. Clean up feed spills and store feed in containers that rodents cannot access, change footwear and clothing prior to accessing your animals and after visiting another farm with pigs and use cleaning and disinfection protocols to help keep your farm disease free.

In summary, there are a number of different deworming products that youth exhibitors can utilize to help keep their animals as healthy as possible and parasite free. It's important to choose a product that controls several different parasites, especially those that are common in Michigan. Although it's good practice for all swine owners, if you house your animals outside, include a product that also addresses lice and mange infections. If possible, keep your animals on a deworming schedule and rotate your deworming medications so that you have the best efficacy and coverage against all internal and external parasites. If your pig will be slaughtered after the fair, be mindful of any drug withdrawal periods required for products you are using. Remember that even the most effective parasiticide rotation cannot overcome the risks to animal health posed by poor nutrition, animal husbandry or failure to practice solid biosecurity.

References and useful links

1.Common Internal Parasites of Swine, Corwin and Tubbs, https://extension2.missouri.edu/g2430

2.Ectoparasites, The Pig Site, https://thepigsite.com/disease-guide/ectoparasites

3.Arends, J.J., Skogerboe, T.L. and Ritzhaupt, L.K., 1999. Persistent efficacy of doramectin and ivermectin against experimental infestations of Sarcoptes scabiei var. suis in swine. Veterinary Parasitology, 82, 71–79

4.A Champion's Guide to Youth Swine Exhibition, Biosecurity and Your Pig Project, Am. Assoc. Swine Veterinarians and Pork Checkoff, 2013. http://porkcdn.s3.amazonaws.com

Feeding Pigs in Extensive Production: Part 1

Dale W. Rozeboom, Professor/Extension Specialist,
Department of Animal Science, Michigan State University

Extensive pork production is often driven by the objectives of a market niche, what may be easiest to do when beginning to farm, and what generates some profit, rather than what is most efficient and costs the least. Extensive farmers may be willing to accept biologically inefficient production methods and more costly inputs compared to commodity producers, and consequently seek markets willing to compensate them for the unique product they produce. Their farms are not large enough to take advantage of economies of scale.

Like in the mid-20th century, today's extensive pork producers are raising pigs outdoors or in low-cost buildings. Initially, they manage feeds and feeding in those settings. New farmers are excited and may be willing to spend extra money if needed for the principles and beliefs they adhere to. They successfully sell to like-minded consumers. The excitement begins to wear off if customers stop buying because products are too expensive. If this happens, the new farmer must find ways to reduce costs or find customers willing to pay more in order for the farm business to be profitable. They ask how they can decrease cost of production, and they search for the most valuable change they can make to their current feed procurement plan; realizing that feed is the most expensive input.

In this two-part series, several management and procurement approaches are discussed relative to feeding pigs in extensive settings. Feed is available in ready-to-feed bags, ready-to-feed bulk, or one can purchase ingredients and formulate their own. Generally, the cost of feed decreases with increasing responsibility for grinding, formulating, mixing, storage and quality control. Taking on responsibility for devising the nutritional program and making the feed must result in equivalent or improved production and a cost improvement that accounts for the added time and knowledge (more time formulating, buying individual ingredients, more automation for bulk procurement of ingredients, equipment and power to manufacture feed, automation for delivery to bins, and delivery to feeders).

Meet Nutritional Requirements

Desirable growth, animal health and product quality are most readily obtained by providing pigs their daily nutrient requirements, each day. Daily rations should be specific to the stage of growth and (or) reproduction, and they should provide minimum daily requirements suggested by the National Research Council (NRC). Understand that NRC guidelines are aimed at the majority of pigs, more of which are higher lean growth than most heritage breed pigs, and more often raised indoors. Because extensively reared pigs are typically outdoors for part each day, the requirements of NRC, which are minimum requirements, are sufficient because feed intakes are generally greater in extensive/outdoor situations. Further discussion about the basics of nutrition, ration formulation, intake allowances, and the contribution of grazing may be found Swine Nutrition and the National Swine Nutrition Guide, and a review about feeding swine in niche situations by Dr. Allen Harper (2012) .

Buying Complete Feed

Feed that is ready to be fed to pigs is referred to as a 'complete feed', as it contains all required nutrients. The ingredients may be grains, grain by-products, forages, dried animal products, minerals, and vitamins. These complete feeds are made at a feed manufacturing facility; which is sometimes a local grain elevator and sometimes a regional commercial feed mill. Complete feeds may be purchased from the local elevator, farm stores, or from an area feed dealer. Local elevators will provide feed in bulk or bagged. Feed from farm stores or dealers is typically in bags and referred to as 'floor stock'. The potency of vitamins and minerals in a complete feed decreases with time, exposure to heat and moisture, and sunlight if in clear plastic. This is referred to as 'shelf-life', and the sellers and buyers of complete feed share responsibility for the quality of feed presented to the pigs. When you purchase a complete feed, you are buying their expertise in knowing the dietary requirements, nutrient availability in the feedstuffs used in the mix, grinding and mixing, and

quality control. With the purchase of the complete feed, you do not grow or buy the feed ingredients. You do not have to store feed ingredients and be concerned about loss of nutrition, pest infestation, and spoilage.

The complete feed made by small local grain elevators is typically in meal form. Larger commercial feed mills often make feeds in pellet form. Pelleted feed is more expensive. The first advantage of pelleted feed is that pigs cannot sort through their feed, so each bite represents the balanced diet as designed. The second advantage of pelleted feed is that the pigs waste less feed and the feed-to-gain ratio is more desirable. With a well-designed feeder, more frequent small meals, and less feed wastage, the feed-to-gain ratio of pigs receiving feed in meal form can be equal to those received in pelleted feed. Taking measures to minimize feed waste, regardless of feed form, may have far greater economic payback than changing your procurement approach from buying complete feed to some degree of at-home mixing. If you see feed on the ground around a feeder you know you are wasting over 10 percent.

Shop for Best Feed Price

One day in December of 2018, three elevators and one local farmer (with 6000 sows and an on-farm mill) were asked the cost of one ton of a 15 percent crude protein finishing ration. The answers received were $251, $320, $256, and $141 per ton. Take time to call or visit elevators in your vicinity to shop for a less expensive price. Investigate if it is possible to negotiate feed price based on a larger quantity and a commitment to buy for an extended period of time. When buying from a mill or elevator that you have not used before, ask other customers how their pigs have performed on the ration you are considering.

Do your best to evaluate nutritional equivalency when shopping by comparing feed tags. All commercially available feeds must be labeled, and that label must include a guaranteed analysis stating the nutrient concentrations guaranteed by the manufacturer . Concentrations of all trace minerals (copper, zinc, iron, selenium, manganese, and iodine) and vitamins (A, D3, E, K, B12, riboflavin, pantothenic acid, niacin, choline, biotin, folic acid, and pyridoxine) may not be presented on the feed tag, but they are important and rations must be balanced for them. The feed tag must also include the common name of each ingredient. Some states permit use of 'collective terms' for ingredients of similar type (common origin and similar function). This allows the manufacturer to substitute one ingredient for another as market prices fluctuate. In contrast, some feed manufacturers use a locked formula where feed products are made using the same ingredients time after time. Feed milled according to a locked formula may fluctuate more in price with ingredient availability. Additional information needs to be included on the label if a medication has been added to the feed.

Bulk or Bagged

Feed bins, wood, metal or plastic, allow for the storage of 'tons' of feed. The price benefit of buying complete feed in bulk may be significant. The cost advantage may pay for a used or new bin in a few years if the number of pigs you feed annually is large enough. The price difference between bulk and bagged complete feed will be specific to the feed mill and the distance from the mill to your home. The price advantage with purchasing bulk feed is obtained with quantities of one ton or more. Many local elevators cannot make smaller quantities easily and accurately. Most mixers are not made to uniformly mix 500 pound batches, and the charge to make a batch of less than one ton has either the same "mix" cost as one ton, or may even be greater. Building your own bins from wood may be cheapest. Wood, however, is very difficult to sanitize if that becomes necessary following exposure to a pathogen, mold, mycotoxin or other anti-nutritional factor.

For an example, let's say that the price of bagging is $15 per ton, and the price of a new galvanized steel bin is $1250, the purchase of about 84 tons of feed in bulk instead of bags would pay for the bin. The cost of the bin may be spread over several years, making the prospect of payback achievable with even fewer pigs. Thus, the factor in making a decision to purchase a bulk feed bin, is having enough pigs to consume at least a ton of a specific diet. North Carolina State University in their Swine Nutrition Guide states that a sow and her 18.5 pigs will consume 7.3 tons of feed annually in a distribution (column heading "percent of total") as shown in Table 1. The right-hand column shows the estimated number of animals (pigs or sows) that need to be in a cohort to consume one ton of feed. So it takes at least 254 nursery pigs to consume one ton of their first diet and it takes at least 5 nursing sows to consume a

Table 1. Feed usage by stage of production.			
Diet	Typical weight, lbs.	% of total	Number of animals to consume one ton of feed
Starter 1	12-15	1	254
Starter 2	15-25	2	127
Starter 3	25-50	3	85
Grower 1	50-125	13	20
Grower 2	125-200	20	13
Finisher	200-mkt	45	6
Gestation	350-500	10	3
Lactation	350-500	6	5

ton of lactation feed. Likewise, only 20 feeder pigs will justify the purchase of bulk feed for rearing to harvest weights.

If one ton of feed is too much for the number of pigs you plan to feed, then various consequences need to be considered. With too few pigs being fed in a given growth period on the small farm, then you may feed them a diet longer, which is over-fortified for them. Or you may feed an under-fortified diet early, as it is cheaper. Underfed pigs grow more slowly and deposit less lean mass, particularly when 2 to 4 months of age. This results in less product, and the butcher or customer saying that the hogs are "too fat and there is not enough ham." Overfeeding is a waste of money and a greater environmental responsibility as excess nutrients are excreted. If one ton of feed is too much, consider whether it may be possible to split orders with other farms in close proximity. Many small farms will need to purchase starter feed in bags but may be able to take advantage of bulk pricing for feed for market hogs or sows.

Part 2 of this series will be included in the next issue of the MSU Pork Quarterly.

Notes:

[1] The descriptive term used here is 'extensive' and represents the niche, small farm, back-yard, local, heritage, out-back, and (or) part-time producers who want to do it themselves, on their own property. Typically, the numbers of growing and reproducing pigs are 3-100.

[2] NRC. 2012. Nutrient Requirements of Swine. 11th rev. ed. Natl. Acad. Press, Washington, DC.

[3] Swine Nutrition, Second Edition, Ed's Austin J. Lewis and L. Lee Southern, CRC Press 2000. Print ISBN: 978-0-8493-0696-9. eBook ISBN: 978-1-4200-4184-2.

[4] National Swine Nutrition Guide. 2010. U.S. Pork Center of Excellence. 1202 NSRIC, Iowa State Univ., Ames IA 50011.

[5] Harper, A. F. 2012. Feed and feeding options for small-scale and niche market pork production. Proc. Small-Scale and Niche Market Pork Production Conf. Tidewater Agricultural Research and Extension Center (TAREC), Suffolk, VA, October 26 – 27, 2012.

[6] Nutrients which must be guaranteed are determined by each state's government agricultural agency.

[7] Swine Nutrition Guide. Feed processing. North Carolina State University, Available at: http://www.cals.ncsu.edu/an_sci/extension/swine/nutrition/nutritionguide/default.htm

Veterinary Feed Directive – Year One in Review

Beth Ferry, Michigan State University Extension Educator
Phil Durst, Michigan State University Extension Senior Educator
Dave Thompson, Michigan State University Extension Educator

In 2016 and 2017, the U.S. Food and Drug Administration (FDA) implemented new restrictions on how antibiotics can be used in food animal production. The updated Veterinary Feed Directive (VFD), which was explained in Guidance Document 209(1) and 213(2), took effect January 1, 2017 and it changed how farmers could use antimicrobials that were deemed medically important to human medicine (used in both human and animal medicine). The changes made focused on a one-health approach, a key aspect of which is that antimicrobial drug use contributes to the emergence of drug resistant organisms and that these important drugs must be used judiciously in both animal and human medicine to slow the development of resistance (1).

The biggest change for farmers was that, when utilizing certain feed-grade medications, farmers would need to follow a process that required them to first seek a directive (VFD) written by a veterinarian with whom the farmer had a valid Veterinary-Client-Patient Relationship (VCPR), in order to source antibiotics that would be delivered to the animals through the feed. This process provides a framework for all veterinarians who are involved in issuing these antimicrobials for use, and provides documentation requirements for the farmers using the antimicrobial, veterinarian issuing the VFD and feed mill processing the order. The purposes of the policy changes by FDA were to promote the judicious use of antibiotics, protect public health and help to limit the development of antimicrobial resistance (1).

It is important to note that the United States is not the first county to incorporate stricter regulations regarding use of antibiotics in livestock feed. In the 1990's the European Union made the decision to phase out the use of antibiotics as growth promoters. This policy is similar to one of the changes in regulations that U.S. farmers incorporated over the last year. Denmark went further than other E.U. countries, implementing a full voluntary ban in 1998, which was fully integrated in 2000. The overarching goal of the Danish regulations was to work towards a decrease in antimicrobial resistance by reducing the use of antibiotics in human and animal health. Evaluation and summary data found through the DANMAP (Danish Integrated Antimicrobial Resistance Monitoring Research Program) have shown an overall reduction; use of antimicrobials for animals declined for the fourth consecutive year and has since 2013 been reduced by more than 16 metric tons. From 2016 to 2017, antimicrobial consumption decreased by approximately 3% (5), suggesting that the mandated reduction is approaching a new steady state. Similarly, use of antibiotics in human medicine has also declined steadily since the mandate. Reductions achieved during the past 10 years were observed for all age groups (excluding the eldest > 80 years) and for both genders, as recorded in the DANMAP (5).

It is important to note that use of antibiotics in humans and food animals is comparatively low in Denmark, a county that produces approximately the same amount of pork as the State of Iowa, when compared to other countries in the EU, the U.S and the rest of the world. However, in spite of low use rates for antibiotics, results obtained from broad, well-powered susceptibility surveys clearly indicate that the number of resistant organisms in farm animals and humans continues to increase (DANMAP (5)). For example, resistance profiles were taken from Salmonella isolates from Danish pigs with some of the isolates showing resistance to tetracycline, ampicillin and sulfonamides, antimicrobials that have not been used. The steady increase since 2010 was echoed in samples taken from the human isolates (5). This information summarized from Denmark leads to a number of questions regarding implementation of antibiotic use guidelines in the United States and what the unintended effects of this may be on production agriculture at a farm level.

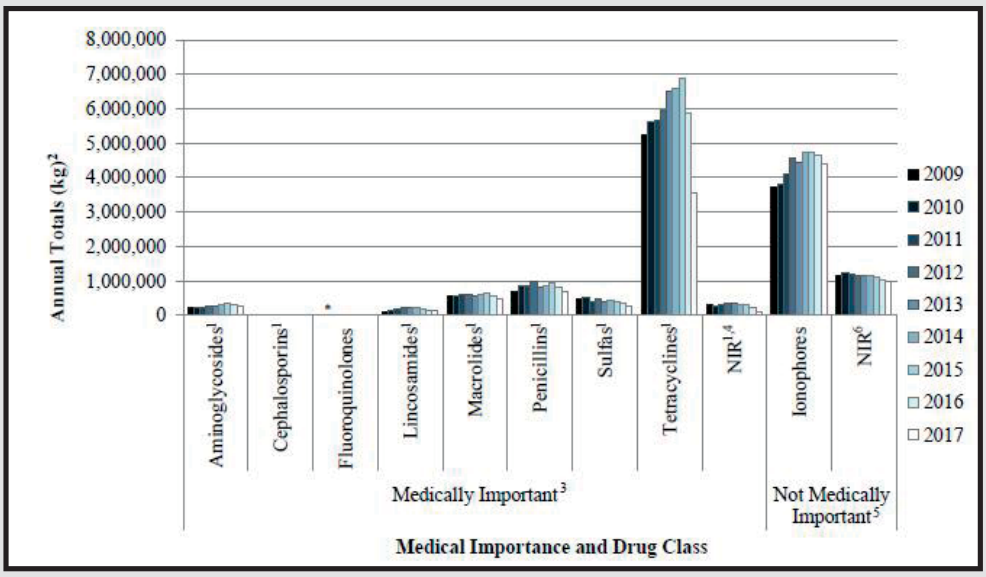
It was hypothesized that the VFD regulations had impacts at the farm level on production practices and management of health. To gain a better understanding of the direct impacts to farmers raising animals for food production, Michigan State University Extension led a nationwide survey to help determine what effect these new rules had across food animal species and across farms on a national level. Farmer input was solicited in survey questions that covered five areas: antibiotic use, animal morbidity and mortality, management, the relationship between farmers and their veterinarian, and economics.

Survey responses were collected from farmers in 48 states and represented beef, dairy, sheep, goats, swine, poultry and other minor species. While data analysis is still ongoing, several consistent themes have emerged after the initial review of the data and responses. One theme is that some unintended economic impacts have occurred on farms because of the new VFD regulations, that is supported by producer comments such as, "The biggest change has been how much I have to pay the vet for treatment of my herd. It has increased the cost for production and for people who actually limited antibiotic usage before the regulation, the treatment has not changed, just the cost."

Other untended consequences of VFD compliance reported in the survey relate to animal health. When looking at animal morbidity and mortality some producers indicate that they see more animal sickness, have limitations on the availability of product to treat animals and are frustrated with the timeframe in which it takes them to source these products with VFD regulations, "While the VFD doesn't majorly affect my practices on a regular basis, it does limit the variety of options available to treat ailments and especially help supporting newborns, which can be frustrating." Farmers also indicted that sourcing VFD friendly businesses to support their operations can be challenging, stating "My veterinarian refuses to write a VFD. I have no other veterinarians in my area" and "It has been difficult finding feed suppliers in my area who are willing to carry VFD products. I have had to go without or pay much higher prices because of added shipping costs and additional veterinary costs."

While there are some challenges to the ways that farmers have had to implement the VFD regulations, there are also positive impacts that these changes have created. For example, it appears that the critical goal of reducing farm use of medically important antibiotics is being achieved, thanks to the commitment of farmers to comply with VFD guidelines. Findings recently reported by the FDA (3) indicate that sales and distribution of medically important antibiotics approved for use in livestock (all species combined) declined by 33% between the years 2016 and 2017, and by 43% since 2015. Summarized data on antimicrobial sales from 2009-2017 can be seen in Figure 1 (3). Although the ultimate on-farm use of these products cannot be adequately determined from sales data alone, it is assumed that with reduced sales, a reduction in the use in food animal production has occurred.

(Figure 1) Antimicrobial drugs approved for use in food-producing animals actively marketed 2009-2017(3). Note the trend for declining use of medically important classes, especially the tetracyclines, since peak use in 2014-2015.



These results, reported by manufacturers/distributors of the products, are consistent with data from the Michigan State University Extension survey results. Overall, the survey results indicate that communication with farm veterinarians and the use of vaccines have increased. This is supported by comments from farmers, including "VFD actually has helped us to find more preventive opportunities." This finding is highly encouraging, because strengthening the link between farmers and their veterinarians should further help American farmers achieve their objective of protecting medically important antibiotics for future use in humans and animals (4).

Further work, including data analysis from the survey and determining areas that may benefit from follow-up will be completed during the next coming months. Using the information gathered, Michigan State University Extension will be able to further support the One Health antimicrobial stewardship approach, by sharing with both farms and non-farm communities the positive practices put in place in agriculture to protect both human and animal health.

References

1. U.S. Department of Health and Human Services Food and Drug Administration Center for Veterinary Medicine April 13, 2012. #209 Guidance for Industry, The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals. Available at: https://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM216936.pdf. Accessed 7 January 2019.

2. U.S. Department of Health and Human Services Food and Drug Administration Center for Veterinary Medicine April 13, 2012. #213 Guidance for Industry New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of FoodProducing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209. Available at: https://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM299624.pdf. Accessed 7 January 2019.

3. FDA U.S. Food and Drug Administration, Center for Veterinary Medicine, Summary Report 2017 on Antimicrobials Sold of Distributed for Use in Food-Producing Animals. December 2018. Available at: https://www.fda.gov/downloads/ForIndustry/UserFees/AnimalDrugUserFeeActADUFA/UCM628538.pdf.

4. U.S. Pork Industry Ends 2018 with Major Antibiotic Progress. PORK, Dec 21, 2018. Available at: https://www.porkbusiness.com/article/us-pork-industry-ends-2018-major-antibiotic-progress

5. DANMAP 2017 - Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark. ISSN 1600-2032

MICHIGAN STATE UNIVERSITY | Extension

All comments and suggestions should be directed to the:

MSU Pork Team

Dale Rozeboom: Extension Specialist
(517) 355-8398, *rozeboom@msu.edu*

Madonna Benjamin: Extension Swine Vet
(517) 614-8875, *gemus@cvm.msu.edu*

Melissa Millerick-May: MSU, Division of Occupational and Environmental Medicine
(517) 432-0707, *melissa.may@hc.msu.edu*

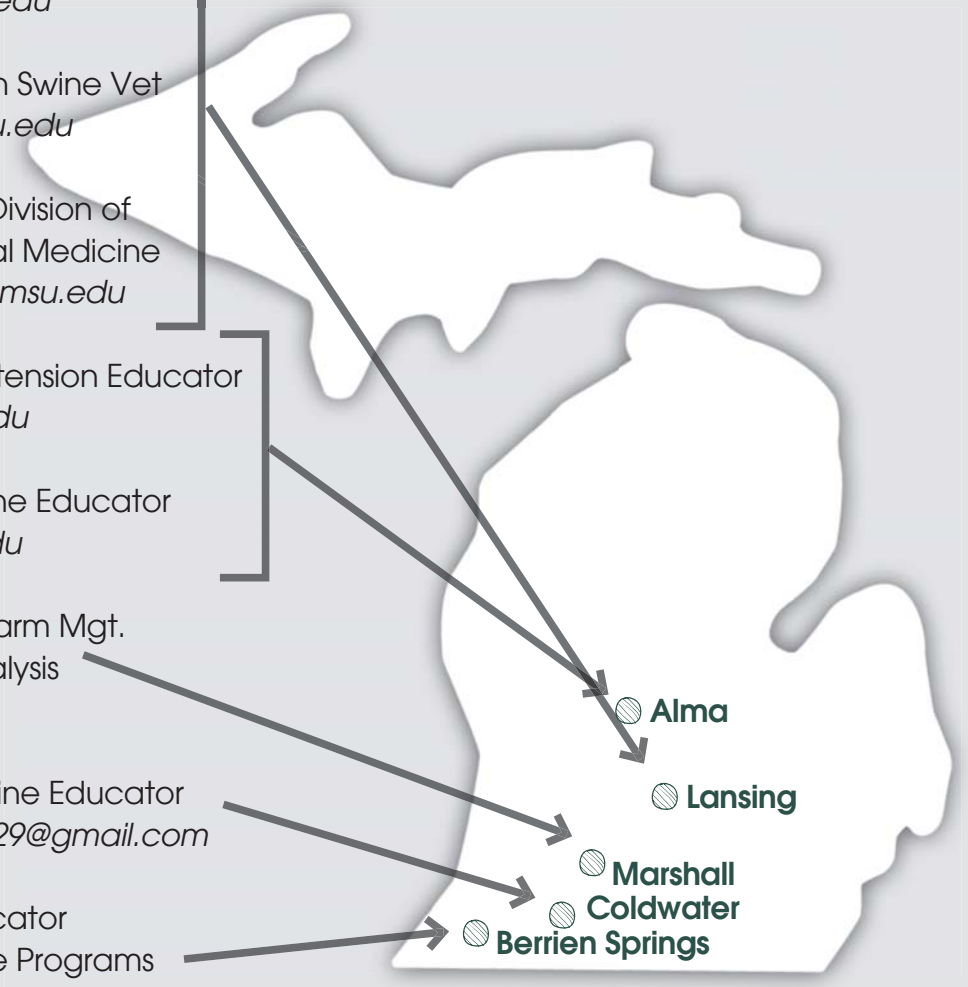
Erica Rogers: Environmental Extension Educator
(989) 875-5296, roger392@msu.edu

Casey Zangaro: Extension Swine Educator
(989) 875-5292, zangaro@msu.edu

Roger Betz: Southwest District Farm Mgt.
Finance, Cash Flow, Business Analysis
(269) 781-0784, *betz@msu.edu*

Dave Thompson: Extension Swine Educator
(269) 832-8403, davethompson729@gmail.com

Beth Ferry: Southwest Pork Educator
Management, Quality Assurance Programs
(269) 876-2745, *franzeli@msu.edu*



Sign Up for the Latest News for Agriculture

Want to stay updated on various MSU Extension topics? Sign up for news digests online! Visit bit.ly/MSUENews, and follow the prompts to get customized email digests. Digests are electronic newsletters of recent articles published on the MSU Extension website. You can unsubscribe or change your areas of interest anytime. The digests contain information on categories including agriculture, business, community, family, food and health, lawn and garden, 4-H and youth, and natural resources. Each category has multiple subcategories, so subscribers can narrow down their choices to fit their specific interests.