Swine Management Practices to Reduce the Need for Antibiotics

Antibiotics are important for maintaining the health and well-being of animals and people. Major concern about the development of resistance to antibiotics has brought increased examination of antibiotic use. With future introduction of new antibiotics for use in animals projected to be limited, producers should make an effort to ensure that antibiotics available today remain effective. The most practical way to reduce antibiotic usage in swine is to improve animal health status by emphasizing the management strategies outlined in this publication.

Four things you can do to reduce the need for antibiotic treatment:

- Prevent the introduction of pathogens.
- Enhance immunity to control exposure or expression of disease.
- Reduce stresses that allow disease expression.
- Practice daily surveillance and promptly treat sick pigs.

What can I do to prevent the introduction of disease to pigs?

Improve Biosecurity

The goal of any biosecurity program is to prevent the introduction of pathogens and minimize the impact of endemic pathogens. At the farm level, this means implementing practical procedures to keep infection from entering and to control spread of infection within the farm. The following information addresses the main routes for pathogen introduction — new pigs, people, vehicles, and feed.

Pigs

Direct contact with other pigs presents the most serious risk for the acquisition and spread of disease. When acquiring replacement gilts and boars you should:

- Know the disease status of both recipient and source herds.
- Select animals from a single source with a documented genetic improvement program and sound biosecurity practices.
- Isolate replacement animals for at least 40 days and test for pathogens before allowing entry into the herd.
- Acclimate and vaccinate incoming replacement animals against current herd diseases.

You can minimize live animal introductions by using artificial insemination (A.I.) to bring new genes into the herd, but A.I. will not eliminate biosecurity risks. Boar semen can contain a number of potential pathogens. Thus, boar stud biosecurity is a critical point to prevent pathogen introduction. Disease exposure also can occur via semen delivery vehicles and personnel. Standard biosecurity procedures and clean-dirty barriers should be emphasized. For nursery and finishing pigs, practicing all-in, all-out and multiple site production gives you the opportunity to empty and clean the facility before another group of pigs enters and greatly reduces the chance of disease transmission.

People

Restrict farm access to authorized individuals. If your facility has a shower, require employees and visitors to use it before entering the barn. Ideally, the locker room should be arranged so clothing worn to the farm can be left on one side before showering and passing to the "clean" side where farm clothes are provided. If your facility does not have a shower, provide a change of clothing and shoes and follow "Danish" entry procedures (Figure 1) to reduce the risk of disease. A key component of both the shower and Danish entry systems is defining the line between "dirty" and "clean" areas to prevent crossover. The transition line can be a swing-over bench instead of a shower stall.

Danish entry procedures

1. Always enter the barn through the Danish entry. Stop when you reach the barrier.
2. Remove outer clothing and outside shoes and leave them on the dirty side of the barrier (usually a swing-over bench).
3. Wash hands thoroughly with soap and water or disinfect them with hand sanitizer.
4. Step over the barrier to the clean side in your sock feet.
5. Put on barn coveralls and boots kept on the clean side of the entry.

Keep visitors to a minimum and ensure they have not been in contact with pigs for 24 to 72 hours before arrival. Maintain a sign-in book and ask visitors to record when and where they were last around pigs, company name, purpose of visit, printed name, and signature. Provide ongoing training and standard operating procedures for employees and visitors to keep diseases from entering or leaving the herd.

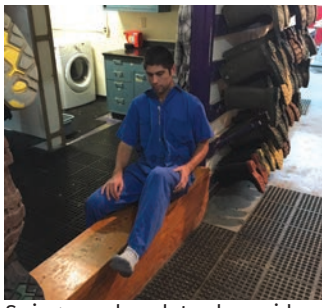
Vehicles

Outside vehicles and drivers can increase disease risk depending on how recently the vehicle has been exposed to other pigs or livestock farms and whether the pigs on your farm come into direct contact with the vehicle. Follow recommended procedures.

1. Keep the vehicles of visitors, consultants, and workers outside the farm perimeter.
2. Only allow vehicles and machinery controlled by the swine farm within the perimeter.
3. Require inspection of commercial pig-hauling vehicles. Do not use contaminated trucks or trailers.
4. Clean, disinfect, and heat-dry vehicles used to transport live pigs.
5. Farm vehicles used to haul pigs should be properly cleaned and disinfected before they reenter the farm.
6. Treat pig transportation and feed delivery vehicle drivers as visitors. Do not allow them into housing areas.

Entry to the hog barn using Danish entry procedures

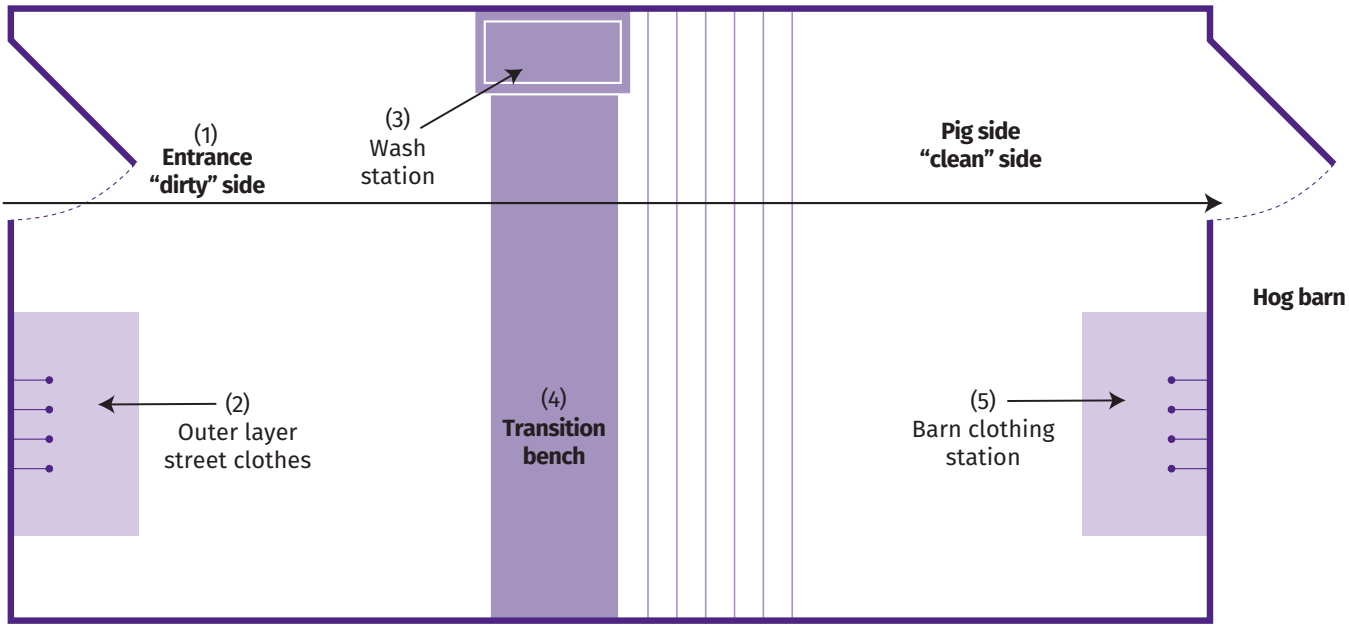
Remove shoes on dirty side.



Swing over bench to clean side.

Put on boots before entering barn.

Figure 1



Feed Delivery

Because feed delivery trucks may be on several farms each day, they present a serious risk for transmission of disease. Frequently, feed mills schedule feed delivery according to a biosecurity pyramid, categorizing sites according to health status and hierarchy within the system. Boar studs, sow farms, and multipliers, which are typically on the top of the biosecurity pyramid, receive priority for feed delivery, followed by nurseries, and then finisher units.

During feed delivery, trucks should be able to unload the feed from outside the perimeter fence. Avoid feed delivery routes that cross areas with potential for higher pathogen contaminations such as fan exhaust areas, deadstock disposal, or manure. Upon arrival, require the driver to put on shoe covers before exiting the cab and to remove them before reentering the cab to leave. This prevents contamination in both directions, from the cab to the site and from the site to the cab. The driver should be able to open and close feed bin lids from the ground outside the perimeter fence. Feed delivery paperwork should be left in a designated area, often a mailbox by the farm office.

Sanitation and Disinfection

Cleaning is the first step in sanitation. High pressure hot water and detergent cleaning will remove most of the microbial load. Research shows soaking and cleaning is more effective when initiated immediately after pigs have been removed. Dried fecal matter increases cleaning time and reduces efficacy. Disinfectant should be applied after cleaning to further reduce the pathogen level.

Many different brands, formulations, and types of disinfectants are available (e.g. phenols, acids, alkalis, chlorine-releasing compounds, cationic surfactants, and ammonium compounds). Each has a different antimicrobial spectrum and should be applied based on the recommended dosage rate. Some disinfectants are better at inactivating viruses, while others are better at targeting bacterial pathogens. Each disinfectant type has different properties that will enhance or inhibit activity over a range of environmental conditions such as temperature and pH. One thing disinfectants have in common is that efficacy is reduced in the presence of organic matter, which is why it is important to clean before you disinfect.

Research has shown that disinfectants should be applied as soon as rooms have been cleaned before drying to increase contact time. Drying is the last step of the sanitation process. Effective drying is a factor of both time and temperature. Ensure equipment, clothing, and footwear is routinely cleaned and disinfected. Cleaning and disinfection procedures should include:

1. Removal of manure and feed, which can contain a high level of contamination and interfere with effective cleaning and disinfection.
2. Thorough cleaning with high-pressure hot water and detergents.
3. Cleaning under surfaces of equipment such as mats and feeders.
4. Rinsing with clear water to remove residual disinfectant.
5. Ensuring wash water is drained from all locations such as feeders and drinkers.
6. Disinfectant application at the correct dosage as soon as cleaning is completed.
7. Adequate drying time before introducing a new group of pigs.

What are the keys to improving immunity to control exposure or expression of disease?

Colostrum Intake

At birth, piglet immune system components are present but functionally underdeveloped. Several weeks of life are necessary before the immune system becomes fully developed. Therefore, immune protection is provided in the colostrum from the mother. Colostrum is the first secretion of the mammary gland and characterized by high immunoglobulin concentrations and other immunity enhancing factors. Colostrum excretion occurs shortly before farrowing and declines rapidly in the first 24 hours. Additionally, the newborn piglet's ability to absorb immune components in colostrum decreases rapidly in the first 24 hours after birth.

To increase colostrum intake, prevent chilled piglets. Cold piglets have a reduced suckling reflex. Individual colostrum intake is highly variable. Split suckling is particularly important for the smallest pigs in the litter. Research suggests that mortality rate increases considerably when colostrum intake is inadequate. Thus, piglet care in the first 24 hours should focus on ensuring all piglets take in adequate colostrum.

Vaccination

Vaccination has been routine practice for prevention of infectious diseases for decades. The immune system is composed of two functional branches: (1) the humoral immune system, which primarily produces antibodies and (2) the cell-mediated immune system, which primarily involves the activation of phagocytes and antigen-specific responses. Vaccination aims to stimulate the humoral immune system by increasing antibody production with minor disruption of the cellular immune system. Commonly used veterinary vaccine technologies are generally classified into live-attenuated and inactivated/killed vaccines. Live-attenuated vaccines have a strong immune response with induction of cell-mediated and humoral immunity but also can have the risk of reverting to full virulence. Inactivated vaccines are safe and can be less expensive to produce but require adjuvants and only induce humoral immune responses. Work with your veterinarian to determine the appropriate vaccination program for your pigs.

Controlled Exposure for Pathogen Elimination

In multi-site pig production, controlled exposure is used to eliminate pathogens in the growing pig population by manipulation of immunity in the sow population. A critical component is that the herd is closed to new animal introductions. The sow population is then exposed to the pathogen in a controlled manner. A period of time without new animal introductions is used to establish immunity and eliminate shedding of specific pathogens. The sows then produce weaned pigs without exposure to the pathogen. Timing and protocols are pathogen specific and should be done under the close supervision of a veterinarian.

Can reducing stress minimize disease outbreaks? If so, what can I do?

Not all stress can be avoided, but it should be minimized because it can directly and indirectly affect the pig's immune response and ability to battle disease. Pigs can adjust to stress over time if it occurs at the right age or stage of production. Detrimental effects on growth, efficiency, and health may be seen when the pig cannot cope with the stress. Here are ways to reduce stress associated with weaning, transportation, and living environment.

Weaning Age

Weaning can be one of the most stressful events a pig experiences. Multiple industry changes (improved farrowing-crate utilization, increased numbers of pigs per sow per year) have decreased weaning age. Lactation length (weaning age) can impact both nursery growth and sow fertility and should be optimized. Research has suggested that pigs from a commercial maternal line weaned at 20 days were 30% heavier than pigs weaned at 15 days. In the same group of pigs, mortality and morbidity were reduced by 38 and 51% in pigs weaned at 20 days compared with pigs weaned at 15 days, respectively. In addition, growth performance was significantly greater during the nursery and grow-finish phases of production in pigs weaned at 20 days compared with pigs weaned at 15 days.

Although most of the benefits of weaning at a later age are observed during the early post-weaning period, the benefit has been reported to persist through the grow-finish phase. Research suggests that weaning at an older age improves growth rate and livability in the initial 42 days post-weaning, with some ongoing growth improvement to slaughter. These improvements are likely functions of both weight and physiological maturity at weaning.

Transportation

Pigs encounter stress during transportation — from handling at loading and unloading, fluctuating temperatures, mixing with unfamiliar pigs, vibrations, noise, and extended period without feed, which may lead to reduced welfare and increased morbidity.

Follow Pork Quality Assurance and Transportation Quality Assurance guidelines to reduce stress during transport:

1. Move pigs in manageable group sizes: no more than 20 pigs for weaned and nursery pigs and five pigs for finishing pigs and sows.
2. Use proper handling equipment (e.g., sorting boards, shaker paddle).
3. Provide ramps and chutes that reduce slipping and falls.
4. Chutes should have the proper slope: 5 feet in length for each 1 foot rise in height.
5. Haul pigs in a clean trailer with weather appropriate bedding.

6. Check for proper venting to maintain airflow consistent with the weather.
7. Follow stocking-density recommendations for transportation: 0.65 square feet per weaned pig, 4.26 square feet per pig at 250 pounds, and 4.79 square feet per pig at 300 pounds.
8. Adjust stocking density and provide cooling in hot weather.
9. Start trip promptly after loading and unload pigs promptly when truck reaches the delivery destination.
10. Make sure to have adequate water available for pigs after they are unloaded.

Environment

Stocking density, temperature, air quality, and humidity affect the pigs' comfort level. Housing pigs at high stocking density at high temperature makes them more susceptible to disease. Chilling and drafts also may increase disease risk. The ventilation system, when designed and managed correctly, helps maintain proper temperature and relative humidity (50 to 60%), which improves the ability to resist disease.

Mixing of Pigs

Commingling of nursery and/or feeder pigs is a common management practice that imposes additional stress on the pig. Commingling should be avoided when possible because pigs from different sources often have different pathogens and levels of immune protection. Mixing pigs from different sources increases disease pressure and reduces performance. This also may apply to pigs coming from sow farms thought to have an equivalent health status. Keep movement of pigs from one pen to another to a minimum and do not move pigs between rooms or buildings. Research shows that pigs from a single source have lower mortality than pigs coming from multiple sources.

Why is surveillance and prompt treatment of sick pigs important for disease control?

Identification of sick pigs followed by prompt treatment reduces pathogen shedding and minimizes disease exposure for other pigs. Prompt treatment improves recovery rates and reduces mortality. Providing hospital pens for pigs that cannot compete in their current pen can help improve recovery rates. Pigs that are not recovering should be euthanized in a timely manner according to farm protocols.

Don't all of these steps just sound like good management?

Yes, good management is the key to minimizing the need for antibiotics. Using good biosecurity and sanitation practices, enhancing immunity, reducing stresses, and promptly treating sick pigs are all steps you can take to reduce the need for antimicrobials.

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