



Zoonotic Diseases in Pork Production

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Introduction

Zoonoses are diseases transmissible between animals and humans. Zoonoses can be caused by viruses, bacteria, fungi, and parasites. In each stage of pork production, there are different potential zoonoses that workers should be aware of. Although most exposures do not result in disease, it is important to educate yourself on the risks involved in working with swine.

You may be exposed to zoonotic pathogens, or organisms that cause disease, in different ways. The most common route of exposure is contact with an infected animal, its bodily fluids, or waste products. Other zoonotic pathogens can be spread by inhalation, ingestion, or exposure to blood. Needle sticks and other injuries can also result in exposure to zoonotic pathogens. There are many zoonoses that are associated with swine. The zoonoses in this review should not be considered to be an all-inclusive list.

Objective

To review common swine zoonoses and infection control guidelines.

Zoonotic pathogens of swine

Ascariasis: this roundworm infection is due to ingestion of parasite eggs, and may be related to contaminated food. Overall, there is a low risk of infection in the U.S. Infection is generally asymptomatic. Clinical signs may include abdominal pain and coughing. Proper hygiene and food handling practices greatly reduce the risk of infection.

Brucellosis: a form of this bacterium can be transmitted from swine to humans. Risk of infection in the U.S. is low, but disease may be serious. Workers are usually exposed by contact with reproductive fluids or tissues. Initially an influenza-like illness may occur, but serious complications may follow. Symptoms may continue to wax and wane over time. Antibiotic treatment is required.

Campylobacteriosis: this bacterial agent is excreted in the feces or reproductive fluids of infected animals and may be ingested. Campylobacter is an important cause of foodborne illness, although pork products are not the major source of infection in the U.S. It usually causes gastrointestinal illness. Hygienic work and food preparation practices are important in reducing exposure.

Cysticercosis: this parasite can be ingested via undercooked pork. It is rare in non-immigrant citizens in the U.S., but disease may be serious. It may cause gastrointestinal signs, or less commonly, neurological disease. Proper cooking virtually

eliminates risk of infection.

Erysipeloid: this bacterial agent (*Erysipelothrix rhusiopathiae*) is spread by contact and most commonly infects skin wounds. It causes swelling and lesions on the hands (note: this disease is different from human Erysipelas, caused by a *Streptococcus* species). Infection is relatively rare. Hygienic work practices are recommended to reduce the risk of infection.

Hepatitis E: this virus is usually spread by ingesting food or water contaminated with infected feces. A swine specific type of this virus exists in the U.S., although it does not cause illness in pigs. This virus has rarely caused liver infections in humans worldwide. Infection with the human specific strain of Hepatitis E during pregnancy has been linked to liver disease, maternal death, and fetal death. It is not known if the swine specific strain of Hepatitis E would have the same effect in pregnant women. Hygienic work practices and food preparation techniques reduce the risk of infection.

Leptospirosis: this bacterial agent is usually spread by contact with infected urine or waste. Leptospirosis is rare in the U.S. It causes general flu-like signs in people, but can cause miscarriage and fetal death in pregnant women. Hygienic work practices are recommended to reduce the risk of infection.

Listeriosis: this bacterial agent is usually spread by contact with infected waste, contaminated food, or soil. Although relatively rare in the U.S., serious disease can occur. This pathogen may cause influenza like symptoms, or gastrointestinal upset. Exposure to non-swine associated *Listeria* species is associated with abortion in pregnant women. Hygienic work and food preparation practices are recommended to reduce the risk of infection.

Ringworm: these fungi are spread by contact and can occasionally cause itching, hair loss, and scaly skin in people. People are much more likely to contract ringworm from animals other than pigs. Avoid contact with suspect lesions, and use hygienic work practices to reduce exposure and risk of clinical disease.

Salmonellosis: this bacterial agent is spread by ingestion of fecal matter via contaminated food or objects, including your hands. *Salmonella* is an important cause of foodborne illness in the U.S. It can cause diarrhea, fever, or abdominal cramping. Hygienic food preparation practices, and proper cooking, are recommended.

Scabies: these pig-specific mites can survive on humans, but cannot reproduce; they may cause temporary itching and redness. Mange can be a significant problem in some swine herds, but the risk to humans is minimal. Avoid contact with infected pigs to prevent accidental exposure.

Streptococcus suis: this bacterial agent is spread by contact and often enters through wounds. Although disease is relatively rare, it may be quite serious and includes blood and brain infections. Good hygiene, and covering wounds/abrasions, is recommended to reduce exposure. Prompt treatment with antibiotics is critical in cases of neurological disease.

Swine influenza: these viruses most likely spread to people by contact with respiratory secretions of sick pigs. Many cases of swine influenza in humans are probably undiagnosed because of their clinical similarity to human influenza infection. Good hygiene is recommended to reduce exposure.

Tetanus: this bacterium can be found in swine feces or soils infected with feces from pigs (as well as other animals). Although disease is rare, infectious are serious. The bacterium usually enters the body through a wound. Tetanus may result in stiffness and muscle spasms that cause death. A vaccine is available.

Toxoplasmosis: infective forms of this parasite can be ingested when people consume undercooked meat products. This infection is not uncommon, but most infections are asymptomatic. Clinical signs range from mild to severe, particularly in pregnant women or others with weak immune systems. Infections can be treated with antibiotics, although they are often self-limiting.

Trichinellosis: this parasite can also be ingested via undercooked pork. Infection is very rare in the U.S. Clinical signs may be gastrointestinal or neurological. Proper cooking and/or freezing virtually eliminate risk of infection.

Practices to prevent the transmission of zoonoses

To reduce pathogen exposure, use basic hygiene and sanitation practices, which include:

- Prompt treating or disposal of infected animals
- Adequate disposal of infected tissues

- Proper cleaning of contaminated sites
- Proper use of personal protective equipment
- Use eye protection and gloves when necessary

Infection control planning

Pork producers should consider implementing an infectious disease control plan for their operation. Specifying the required personal protective equipment (PPE) and health requirements for workers will reduce pathogen exposure. The following example is adapted with permission from Materials Produced by the National Association of Public Health Veterinarians (NASPHV) & Veterinary Infection Control Committee (VICC).

Sample Infection Control Plan for Pork Production Operations

This model plan should be adapted to your pork production operation and you should consult with qualified health/safety professionals to meet additional local, state and federal regulations.

Please refer the corresponding sections in document titled “Compendium of Veterinary Standard Precautions” for complete information and guidance (available at www.nasphv.org).

Name of Production Operation: _____

Date of Plan Adoption: _____

Date of Next Review: _____

Worker Health/Safety Officer: _____

This plan will be followed as part of our production operation’s routine safety and health practices. The plan will be reviewed at least annually and as part of new employee training.

Personal Protective Actions and Equipment

Hand Hygiene: Wash hands before and after working in the barn and with animals. Wash hands before you eat, drink or smoke; after using the toilet; after cleaning animal housing or animal care areas; and whenever hands are visibly soiled. Alcohol-based gels may be used if hands are not visibly soiled, but handwashing with soap and warm running water is preferred. Keep fingernails short. Keep handwashing supplies stocked at all times. Staff responsible _____.

Correct handwashing procedure:

- Wet hands with warm, clean, running water
- Place soap in palms
- Rub hands together to make a lather
- Scrub hands vigorously for 20 seconds
- Dry hands with a clean, disposable paper towel

Use of Gloves and Sleeves: Wear gloves when caring for sick animals or when assisting a veterinarian with any type of procedure and when cleaning pens and contaminated environmental surfaces and equipment. Change gloves between examination of individual animals or animal groups. Gloves should be removed promptly and disposed of after use. Disposable gloves should not be washed and reused. Hands should be washed immediately after glove removal.

Note: Gloves are generally not necessary when examining or handling normal, healthy animals as long as normal handwashing occurs before eating, drinking or smoking; after using the toilet; after cleaning animal housing or animal care areas; and whenever hands are visibly soiled

Facial Protection: Wear facial protection whenever exposure to splashes or sprays is likely to occur. Use splash-proof goggles and an N-95 particulate respirator (mask) when cleaning with high-pressure sprayers. Refer to the respiratory protection section of this website for additional requirements needed when wearing a respirator.

Respiratory Protection: Wear a disposable N-95 respirator or other particulate respirator in any other circumstance where there is concern about airborne disease transmission from a sick or dead animal. Refer to the respiratory protection section of this website for additional requirements needed when wearing a respirator.

Protective Outerwear: Wear a protective outer garment such as coveralls when attending animals and when conducting cleaning chores. Shoes or boots should have thick soles and closed toes, and be water resistant and easily cleanable. Impermeable outerwear should be worn whenever substantial splashes or large quantities of body fluids may be encountered. Keep clean outer garments available at all times. Staff responsible _____.

Bite and Other Animal-Related Injury Prevention: Take precautions to prevent bites and other injuries. Use physical restraints and other protective equipment as needed. Plan an escape route when handling large animals. Do not rely on untrained staff for animal restraint. Notify _____ if there concern for personal safety. When bites, scratches, or lacerations occur while working with animals, wash the site with soap and water immediately.

Report all bites and other injuries to _____ (Safety/Health Officer) who will also maintain the incident report log. Consult a physician whenever the skin is broken as a result of direct contact with an animal. An evaluation of the need for medical attention, tetanus immunization, antibiotics, and other prophylaxis will be made by a physician.

Needlestick Injury Prevention: Dispose of all sharps in designated puncture-proof sharps containers. Dispose of the used syringe with attached needle in the sharps container when injecting live vaccines or aspirating body fluids. For most other veterinary procedures, use the needle removal device on the sharps container and dispose of the syringe in the regular trash. Sharps containers should be located in convenient areas of the facility. Do not transfer sharps from one container to another.

Obstetrics: Wear gloves and/or shoulder-length sleeves.

Diagnostic Specimen Handling: Wear gloves. Discard gloves and wash hands before touching clean items (e.g., telephone).

Veterinary Medical Waste: Insert here your local and state ordinances regulating. Disposal of animal waste, pathology waste, animal carcasses, bedding, sharps and biologics should be included.

Other Environmental Controls: There are designated areas for eating, drinking, and similar activities. These activities should never be done in animal care areas or in the laboratory area.

Employee Health

The following personnel are responsible for developing and maintaining the practice's infection control policies, keeping records, and managing workplace exposure and injury incidents.

Staff Responsible: _____

Employee Immunization Policies and Record Keeping:

Record Keeping: Current emergency contact information will be maintained for each employee. Records will be maintained on immunizations and exposure and injury incidents. Report and record changes in health status (e.g. pregnancy) that may affect work duties.

Tetanus Vaccination: Tetanus immunizations for all workers in the production facility should be up to date. Report and

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record puncture wounds and other possible exposures to tetanus. Consult a health care provider regarding the need for a tetanus booster.

Seasonal Influenza Vaccination: Unless contraindicated, animal workers are encouraged to receive the current seasonal influenza vaccine. Check with CDC for updated recommendations at www.cdc.gov.

Staff Training and Education: Infection control training and education will be documented in the employee health record.

Documenting and Reporting Exposure Incidents: Report incidents that result in injury or potential exposure to an infectious agent to _____. The following information will be collected for each exposure incident: date, time, location, person(s) injured or exposed, other persons present, description of the incident, the status of any animals involved (e.g., vaccination history, clinical condition, diagnostic information), and plans for follow-up. If consultation with a health care provider is necessary, be sure to inform them of the exposure to the animal(s).

Pregnant and Immunocompromised Personnel: Pregnant and immunocompromised employees are at increased risk from zoonotic diseases. Inform _____ if you are concerned about your work responsibilities, so that accommodations may be made. Consultation between a qualified veterinarian and a health care provider may be needed.

The following information is recommended to be attached to the Infection Control Plan:

- Your herd veterinarian
- State Department of Agriculture or Board of Animal Health contact information and regulations
- Local animal waste disposal and biohazard regulations

Summary

There are a number of swine pathogens that are zoonotic. Working in the pork industry can result in occupational exposure to many of these pathogens. However, implementation of an infection control plan can enhance the producer's ability to recognize and prevent zoonotic diseases.

FAQs:

Q: What are the most important things I can do to reduce my risk of a zoonotic infection from working with pigs?

A: There are numerous steps to be taken. These include: proper personal protective equipment, careful hand washing, and other steps to avoid contact with infectious agents. Refer to the sample plan on infection control for more detailed information.

Q: Are there any groups at higher levels of risk than others?

A: Some zoonotic agents will make ANY person sick if exposure occurs. However, some groups do have an additional level of risk and must be protected from exposures. This includes women who are pregnant, persons who are immunocompromised, or others with specific health conditions. Employees working in situations where zoonotic disease agents are present should check with their doctor to see what additional special precautions are needed.

LINKS

An excellent collection of fact sheets on specific animal diseases including those which have zoonotic potential can be found at: <http://www.cfsph.iastate.edu/DiseaseInfo/factsheets.htm>

Information on animal-transmitted diseases from the Centers for Disease Control and Prevention (CDC) <http://www.cdc.gov/Ncidod/dpd/animals.htm>

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