

# Diseases of Feral Swine



In the United States (U.S.), feral swine (*Sus scrofa*) are defined as Eurasian wild boar, wild-living pigs descended from domestic swine, and hybrids of the two. The negative impacts of this non-native species on agriculture, human health, and wildlife health are significant. This is a quick reference guide to some of the pathogens that can be found in swine.

## Bacterial Diseases

### Brucellosis

#### What is it?

Brucellosis is a disease in feral swine caused by *Brucella suis*. In the U.S., biovars 1 and 3 have been identified in feral swine.

#### How is it transmitted?

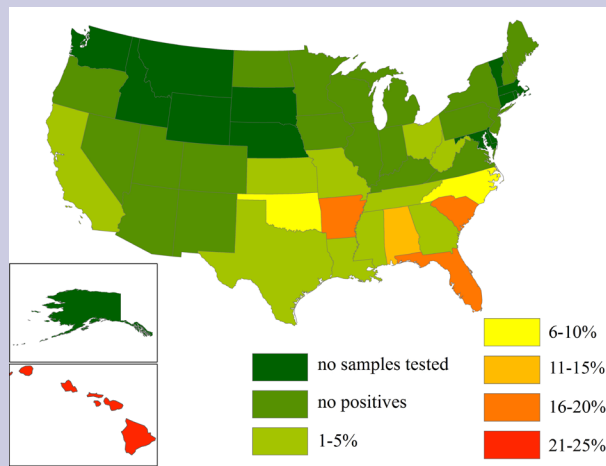
In swine, *B. suis* transmission occurs primarily through sexual contact, but can also occur through mucosal membranes, damaged skin, or through ingestion of infected tissues.

#### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, infection can cause abortion, lameness, hind limb paralysis, inflamed testicles or mammary glands, and abscesses in various tissues or extremities. However, the domestic swine industry is considered brucellosis free. Asymptomatic infection with *B. suis* has been reported in cattle.

#### Can it be transmitted to humans?

Yes. Humans become infected when blood, body fluids, or tissues from an infected animal come in contact with the eyes, nose, mouth, and cuts in the skin. Brucellosis in humans may cause fever, excessive perspiration, headache, muscle and joint pain, or fatigue.



Apparent antibody prevalence of *Brucella* spp. in feral swine



### Leptospirosis

#### What is it?

Leptospirosis in feral swine is caused by members of the spirochete bacteria *Leptospira interrogans*, most commonly serovars *bratislava* and *pomona*.

#### How is it transmitted?

Infectious leptospires are transmitted through direct contact with contaminated urine and reproductive tract fluids, or through indirect contact with contaminated lakes, creeks, and mud.

#### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, infection can cause abortion, fever, and a possible rash; however, infected feral swine may not show signs and still shed infective leptospires. Clinical signs of leptospirosis are similar in cattle and other livestock species.

#### Can it be transmitted to humans?

Yes. Humans may become infected through direct contact with contaminated urine or indirectly through contaminated water that comes in contact with the skin, eyes, or mucosal membranes. Leptospirosis in humans can cause fever, headache, muscle aches, vomiting, jaundice, and diarrhea.

# Bacterial Diseases

## Pathogenic *E. coli*

### What is it?

*Escherichia coli* is a ubiquitous bacterium found in the intestines of humans and animals. Some strains are pathogenic and can cause food poisoning in humans.

### How is it transmitted?

Transmission of *E. coli* occurs through ingestion of fecal-contaminated material.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine and other livestock species, no symptoms may be visible, or the bacteria can cause fever, diarrhea, and weakness.

### Can it be transmitted to humans?

Yes. Humans can become infected by ingesting food contaminated with small amounts of fecal material. Infection with pathogenic *E. coli* can cause fever, abdominal cramps, diarrhea, or in some cases, death.



## Salmonellosis

### What is it?

Salmonellosis is a disease caused by infection with *Salmonella* bacteria. It is one of the most common foodborne diseases.

### How is it transmitted?

Transmission occurs through ingestion of *Salmonella* bacteria.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine and other livestock species, no symptoms may be visible, or the bacteria can cause fever, diarrhea, and weakness.

### Can it be transmitted to humans?

Yes. Humans can become infected by eating contaminated food that has not been completely cooked, or has become contaminated after preparation. Salmonellosis in humans can cause headache, fever, abdominal cramps, or diarrhea.

## Tuberculosis

### What is it?

Tuberculosis in feral swine is caused by *Mycobacterium bovis*. Molokai, Hawaii is the only place in the U.S. the disease has been reported in feral swine.

### How is it transmitted?

*Mycobacterium bovis* is transmitted through inhalation of bacteria exhaled in the air by infected animals, or through ingestion of contaminated tissues or feed.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, cattle, and other livestock species, infection can cause weight loss, chronic cough, and enlargement of lymph nodes.

### Can it be transmitted to humans?

Yes. Humans become infected by eating or drinking contaminated or unpasteurized dairy products, through direct contact with a wound, or inhaling the bacteria in air exhaled by animals infected with *M. bovis*. Tuberculosis in humans may cause fever, chronic cough, chest pain, weakness, weight loss, or chills.



## Tularemia

### What is it?

Tularemia, also called rabbit fever or deer fly fever, is a disease caused by *Francisella tularensis*.

### How is it transmitted?

The bacteria are transmitted through the bites of fleas, ticks, and other arthropods that have fed on infected wildlife, inhalation of contaminated particles, skin contact with infected animals, or ingestion of contaminated water.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine and other susceptible livestock species such as cattle and sheep, infection can cause fever, weakness, and enlarged lymph nodes when associated with a vector bite.

### Can it be transmitted to humans?

Yes. Tularemia spreads to humans through insect bites or direct exposure to an infected animal. Depending on the exposure route, tularemia in humans can cause skin ulcers at the site of a vector bite, inflammation of the eyes, sore throat, tonsillitis, cough, chest pain, and difficulty breathing.



# Viral Diseases



## African Swine Fever

### What is it?

African swine fever (ASF) is a disease of swine caused by African swine fever virus. African swine fever is a foreign animal disease, and has never been reported in the U.S.

### How is it transmitted?

African swine fever virus is primarily transmitted via direct contact with infected animals, by ticks, or via ingestion of contaminated garbage.

### Can it be transmitted to domestic swine and other livestock?

Yes. Infection can cause fever, abortion, bleeding, skin discoloration, and death. African swine fever virus is not known to cause disease in animals other than swine.

### Can it be transmitted to humans?

No.

## Classical Swine Fever

### What is it?

Classical swine fever (CSF) is a disease caused by classical swine fever virus. The disease is a foreign animal disease that was eradicated from the U.S. in 1978. High and low virulence forms exist.

### How is it transmitted?

The virus is primarily transmitted via direct contact with infected animals, or the ingestion of contaminated pork or garbage.

### Can it be transmitted to domestic swine and other livestock?

Yes. Infection with high virulence CSF virus can cause fever, abortion, bleeding, skin discoloration, and death (similar to ASF). Low virulence CSF virus may be difficult to detect as the symptoms, including fever and poor reproductive performance, may mimic other common diseases of swine.

### Can it be transmitted to humans?

No.

## Foot and Mouth Disease

### What is it?

Foot and mouth disease (FMD) is caused by foot and mouth disease virus. The disease is a foreign animal disease, and last occurred in the U.S. in 1929.

### How is it transmitted?

In swine, FMD virus is primarily transmitted via aerosolized virus, or by contact with infected individuals, tissues, or contaminated materials.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, cattle, sheep, goats, and other artiodactyl species, infection can cause fever, vesicles and ulcers on the tongue and mucosa, feet, and teats (similar to vesicular stomatitis virus). Salivation and weight loss may also occur.

### Can it be transmitted to humans?

No.



Arrows indicate lesions of FMD on the foot and mouth of an infected pig

## Hepatitis E

### What is it?

Hepatitis E is a disease caused by hepatitis E virus (HEV). Hepatitis E virus genotypes 3 and 4 can infect swine.

### How is it transmitted?

HEV is transmitted primarily through contaminated water, but the ingestion of contaminated meat can also result in infection.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, infection can cause inflammation of the liver (hepatitis). Cattle, sheep, and goats can also have hepatitis following infection with HEV.

### Can it be transmitted to humans?

Yes. Humans can become infected with any of the known genotypes (1, 2, 3, or 4), typically through ingestion of contaminated water or consumption of undercooked meat. Infection can cause fever, vomiting, abdominal pain, dark urine, and jaundice.

# Viral Diseases

## Influenza A

### What is it?

The most common subtypes of Influenza A viruses found in swine are H1N1 and H3N2.

### How is it transmitted?

Influenza A viruses are most commonly transmitted by inhalation of the virus, but transmission can also occur through contact with excretions from infected individuals.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, no symptoms may be visible, or infection may cause lethargy, coughing, sneezing, and fever. Horses, poultry, and waterfowl are also susceptible to infection with certain types of influenza A viruses, and clinical signs include lethargy, lack of appetite, weakness, and death.

### Can it be transmitted to humans?

Yes. Shared influenza A viruses have been reported between humans and swine. Humans can become infected by inhaling the virus or by touching surfaces contaminated with the virus and then touching the mouth or nose. In adults, influenza A viruses cause fever, chills, weakness, lethargy, coughing, and sneezing. The virus may cause diarrhea and vomiting in children in addition to the symptoms in adults.



## Porcine Circovirus

### What is it?

Infection with porcine circovirus type 2 (PCV2) is widespread in pigs and occasionally develops into porcine circovirus type 2-associated disease (PCVAD). In many cases, PCV2 requires a coinfection with another pathogen to progress to PCVAD.

### How is it transmitted?

Transmission of PCV2 may occur via direct contact (oral, nasal, fecal, and urinary routes) with infected animals. Transmission may also occur via contact with contaminated materials and through biting insect vectors. Infected pigs can carry the virus for months.

### Can it be transmitted to domestic swine and other livestock?

Yes. In young swine, clinical signs of infection with PCV2 may include emaciation, failure to grow, a rough hair coat, diarrhea, difficulty breathing, or death.

### Can it be transmitted to humans?

No.

## Porcine Epidemic Diarrhea

### What is it?

Porcine epidemic diarrhea (PED) is caused by a coronavirus.

### How is it transmitted?

In swine, PED virus is transmitted primarily through feces.

### Can it be transmitted to domestic swine and other livestock?

Yes. PED virus causes diarrhea that rapidly

transmits to all ages of pigs, but causes very high mortality rates (up to 100%) in piglets. Porcine epidemic diarrhea virus is not known to infect other livestock species.

### Can it be transmitted to humans?

No.



## Porcine Reproductive and Respiratory Syndrome

### What is it?

Porcine reproductive and respiratory syndrome (PRRS) is a disease of swine that can cause reproductive failure in pigs of breeding age, and respiratory failure in piglets and postweaning pigs.

### How is it transmitted?

The virus is transmitted through direct contact with nasal secretions, urine, semen, mammary secretions, or feces of an infected animal.

### Can it be transmitted to domestic swine and other livestock?

Yes. Symptoms may not be visible, or may include anorexia, fever, lethargy, depression, abortion, and lack of appetite. The virus is not known to infect other livestock species.

### Can it be transmitted to humans?

No.



# Viral Diseases

## Pseudorabies

### What is it?

Pseudorabies (PRV), also called Aujeszky's disease, is a disease caused by suid herpesvirus 1. Feral swine are considered the reservoir for PRV in the U.S., and the virus is widespread in feral swine populations.

### How is it transmitted?

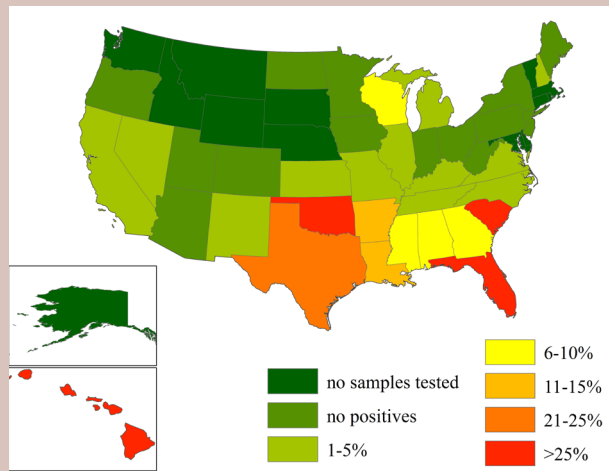
In swine, PRV is primarily transmitted through sexual contact, nose-to-nose contact, or ingestion of infected tissues; however, transmission can occur via aerosolized virus, or contaminated equipment and clothing. Infected feral swine are long term carriers.

### Can it be transmitted to domestic swine and other livestock?

Yes. In young swine, infection can cause death, respiratory distress, and paddling. Infected adult swine may not display clinical signs, or they may abort fetuses. In livestock (cattle and sheep) and companion animals (dogs and cats), infection is almost always fatal. The domestic swine industry is considered pseudorabies free.

### Can it be transmitted to humans?

No.



Apparent antibody prevalence of PRV by state



## Vesicular Stomatitis

### What is it?

Vesicular stomatitis virus (VSV), serotypes New Jersey and Indiana. However, the New Jersey serotype is the only one that has been identified in swine.

### How is it transmitted?

In swine, VSV is transmitted primarily via direct contact with lesions and sores of infected animals, and from biting insects (sand flies, black flies).

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine, there may be no clinical signs, or infection may cause fever, vesicles, and ulcers on the tongue and mucosa, feet, and teats. Excessive salivation and weight loss may also occur. Susceptible livestock species such as cattle and sheep may show similar clinical signs. Vesicular stomatitis is clinically indistinguishable from foot and mouth disease.

### Can it be transmitted to humans?

Yes. Humans can become infected when the virus passes through broken skin or mucosal membranes, or through insect bites. Infection can cause fever, headache, and muscle aches. Lesions are uncommon, but may occur.

# Parasitic Diseases

## Toxoplasmosis

### What is it?

Toxoplasmosis is a disease caused by *Toxoplasma gondii*, one of the world's most common parasites.

### How is it transmitted?

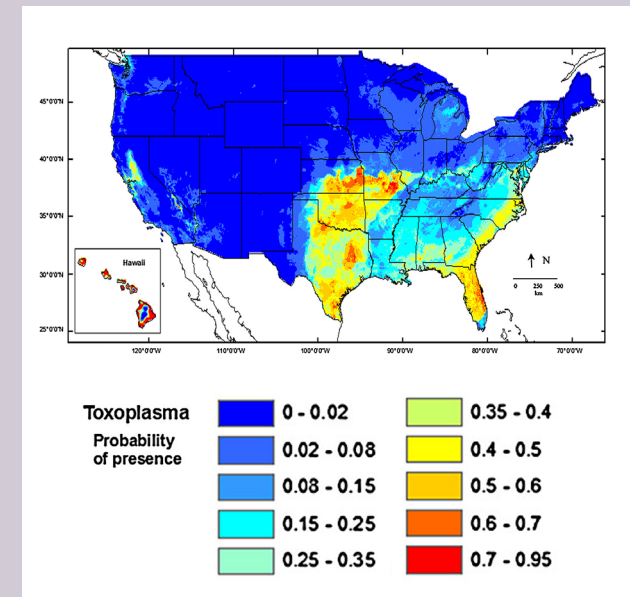
*Toxoplasma gondii* is primarily transmitted through the ingestion of encysted larvae in tissues or forage contaminated with cat feces. Cats are the natural hosts of *T. gondii*.

### Can it be transmitted to domestic swine and other livestock?

Yes. In swine and other livestock, there are usually no clinical signs, but it can cause mortality especially in young animals.

### Can it be transmitted to humans?

Yes. Humans can become infected via the ingestion of infective oocysts. Infection with *T. gondii* is a significant health risk to pregnant women and their fetuses, and to immunocompromised people.



Predicted probability of occurrence for *T. gondii* infection in feral swine in the USA

# Parasitic Diseases

## Trichinellosis

### What is it?

Trichinellosis is a disease caused by the nematode (roundworm) *Trichinella spiralis*. Trichinellosis also is known as trichinosis.

### How is it transmitted?

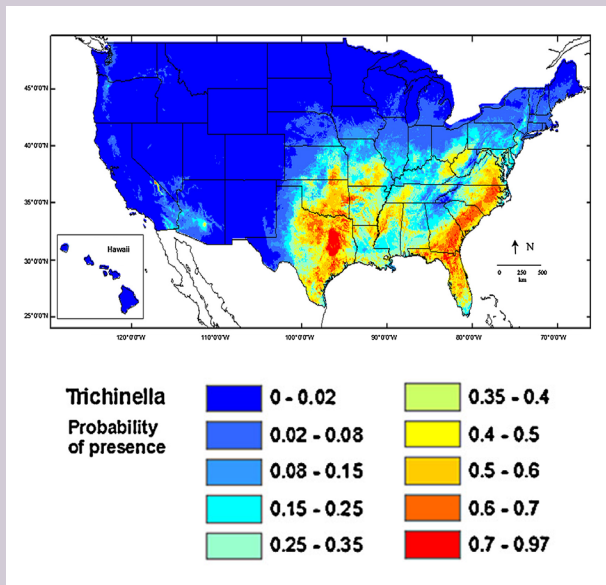
In swine, *T. spiralis* is transmitted through the ingestion of tissues containing encysted larvae.

### Can it be transmitted to domestic swine and other livestock?

Yes. Domestic swine (higher risk for pasture-raised pigs) may become infected by ingesting the parasite in infected tissues or feces.

### Can it be transmitted to humans?

Yes. Humans can become infected from eating infected, undercooked meat. *Trichinella spiralis* in humans can cause fever, abdominal pain, diarrhea, and vomiting.



Predicted probability of occurrence for *Trichinella* spp. infection in feral swine in the USA

## Summary

The diseases described in this brochure are of significance to agriculture and human health. Several of these diseases are also of significance to wildlife. Parasites described in this brochure can cause disease in humans, and may be encountered while handling feral swine. Exposure to many of these diseases has been documented in feral swine; however, there are some listed here for which no exposure has been reported in feral swine. No direct link between feral swine and humans has been made regarding many of the diseases in this brochure; however, shared susceptibility of humans and feral swine to these disease agents warrants listing them here as potential issues of human health.

All photos courtesy of USDA APHIS Wildlife Services



Brucellosis and pseudorabies maps created with data collected by the USDA-APHIS-WS National Wildlife Disease Program through 2015. Toxoplasmosis and trichinellosis maps from: Vet Parasitol 205: 653-665 (2014).

Disease	Agent Type	Affects Livestock	Affects Humans	In the U.S.
Brucellosis	Bacteria	Yes	Yes	Yes
Leptospirosis	Bacteria	Yes	Yes	Yes
E. coli	Bacteria	Yes	Yes	Yes
Salmonellosis	Bacteria	Yes	Yes	Yes
Tuberculosis	Bacteria	Yes	Yes	Yes (Hawaii)
Tularemia	Bacteria	Yes	Yes	Yes
African Swine Fever	Virus	Yes	No	No
Classical Swine Fever	Virus	Yes	No	No
Foot & Mouth Disease	Virus	Yes	No	No
Hepatitis E	Virus	Yes	Yes	Yes
Influenza A	Virus	Yes	Yes	Yes
Porcine Circovirus	Virus	Yes	No	Yes
Porcine Epidemic Diarrhea	Virus	Yes	No	Yes
Porcine Reproductive & Respiratory Syndrome	Virus	Yes	No	Yes
Pseudorabies	Virus	Yes	No	Yes
Vesicular Stomatitis	Virus	Yes	Yes	Yes
Toxoplasmosis	Parasite	Yes	Yes	Yes
Trichinellosis	Parasite	Yes	Yes	Yes



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