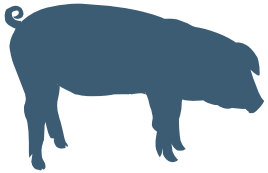

Zoonotic Diseases of Swine

The Center for Food Security & Public Health
Iowa State University® College of Veterinary Medicine

Zoonotic Disease / *Etiologic Agent*	R	Transmission	Clinical Signs in Swine / Prevention for Swine	Clinical Signs in People / Prevention for People
Ascaris suum (Roundworms)		**Ingestion:** eggs in environment, on pigs, in manure, on fomites; contaminated plants, feed, water	**Incubation period:** 1-10 days **Gastrointestinal:** (young pigs) pendulous abdomen **Respiratory:** expiratory dyspnea ("thumps"); chronic paroxysmal cough **Reproductive:** delayed estrus, poor conception rates	**Incubation period:** 7-14 days **Respiratory:** cough, due to larva migration **Gastrointestinal:** diarrhea; vomiting; abdominal pain, intestinal obstruction in children
			Clean and disinfect; remove manure; deworm pigs; wash sows prior to putting in farrowing crate; wean pigs early (2-4 wks); all-in, all-out; rotate and till pastures	Wash hands; wear gloves; wash fruits, vegetables; don't fertilize with pig manure; don't let children play in contaminated soil; don't drink untreated water
Brucellosis *Brucella suis*	A H	**Direct contact:** reproductive tissues/fluids **Ingestion:** contaminated feed, water **Fomites**	**Incubation period:** varies **Reproductive:** abortion, stillbirths; retained placenta; placentitis; orchitis; epididymitis **Musculoskeletal:** arthritis; lameness; spondylitis **Cutaneous:** abscesses	**Incubation period:** 2-4 weeks, up to 6 months **Flu-like:** headache; fever; fatigue; chills; aches **Chronic:** waxing, waning fever; bone, joint infections **Reproductive:** epididymo-orchitis; seminal vesiculitis and prostatitis; abortion or premature birth
			Clean and disinfect; prevent exposure to wild and feral swine; obtain animals from *Brucella*-free sources; screening; isolate/cull infected animals; establish separate area for birthing; remove, destroy aborted fetuses, placentas	Wash hands; wear PPE (gloves, mask, eye protection, coveralls); cover wounds; don't touch your face; handle infected animal tissues with gloves
Campylobacteriosis *Campylobacter jejuni, C. coli*	H	**Ingestion:** feces; reproductive tissues; contaminated soil, water **Direct contact:** infected animals **Fomites**	**Incubation period:** 3-25 days **Asymptomatic** in most **Gastrointestinal:** enteritis, diarrhea	**Incubation period:** 1-10 days **Gastrointestinal:** mild to severe GI distress; fulminant or relapsing colitis; fever; headache; muscle pain; children/vulnerable people most at risk for diarrhea
			Clean and disinfect (including AI equipment); remove manure; prevent overcrowding; vaccinate (animals may still be carriers); isolate aborting animals; remove, destroy aborted fetuses, placentas	Wash hands; wear gloves; control rodents; keep children/vulnerable people away from animals or feces; avoid consuming undercooked meat, raw dairy, untreated water; wash fruits and vegetables; disinfect kitchen surfaces
Colibacillosis *Escherichia coli* STEC-Shiga-toxin producing *E. coli* VTEC-Verotoxin-producing *E.coli* EHEC-Enterohemorrhagic *E. coli*	H	**Ingestion:** contaminated soil, food, water **Direct contact:** feces **Fomites**	**Incubation period:** varies **Gastrointestinal:** (piglets) diarrhea	**Incubation period:** 1-16 days with most signs in 3-4 days **Gastrointestinal:** watery diarrhea; hemorrhagic colitis; nausea; vomiting; abdominal pain; cramping **Systemic:** hemolytic uremic syndrome (HUS); fever
			Clean and disinfect; remove manure; vaccinate pregnant animals to reduce shedding; provide colostrum; minimize stress at weaning/diet changes; prevent crowding; all-in, all-out	Wash hands; wear gloves; keep boots outside the home; launder dirty clothing separately; prevent manure from leaching into groundwater; don't consume raw dairy; cook meat thoroughly, especially ground beef; don't cross-contaminate; isolate infected people

R=Reportable Disease; A=for animals, H=for humans

Zoonotic Diseases of Swine, continued

Zoonotic Disease *Etiologic Agent*	R	Transmission	Clinical Signs in Swine Prevention for Swine	Clinical Signs in People Prevention for People
Cryptosporidiosis *Cryptosporidium* spp	H	**Ingestion:** oocyst-contaminated food, water, soil **Fomites**	**Incubation period:** 3-5 days **Asymptomatic** **Gastrointestinal:** (neonatal calves, lambs, kids, piglets) watery diarrhea; tenesmus; anorexia; weight loss	**Incubation period:** 2-3 days to 2 weeks **Gastrointestinal:** mild to severe profuse, watery diarrhea; abdominal cramps; anorexia; nausea; gas; malaise
			Clean and disinfect (organism is resistant); remove manure; prevent overcrowding; provide colostrum; isolate sick animals; prevent/treat other infections	Wash hands; wear PPE (gloves, coveralls); don't drink untreated water; wash fruits, vegetables; don't cross-contaminate; avoid young, sick animals if vulnerable
Cysticercosis/ Taeniasis *Taenia* spp.	A	**Ingestion:** gravid proglottids in pastures; contaminated food, water or soil	**Incubation period:** months to years **Asymptomatic** **Gastrointestinal:** unthrifty; poor appetite; diarrhea **Neurologic:** neurological signs **Ocular:** eyelid nodules; visual impairment	**Incubation period:** variable; 8 weeks to years **Gastrointestinal:** proglottids in stools; nausea; gas; diarrhea; constipation; abdominal pain; poor appetite **Neurologic:** (neurocysticercosis) seizures; increased intracranial pressure; headaches; blindness
			Clean and disinfect; remove manure; deworm farm dogs and cats; remove and destroy dead stock; do not use river water for animals; keep animals away from human feces	Wash hands; do not defecate in fields, pastures, waterways; treat infected people; don't eat raw or undercooked meat; cook meat to proper internal temperature
Dermatophytosis/ Ringworm *Microsporum* spp., *Trichophyton* spp.		**Direct contact:** infected animals; skin lesions **Fomites**	**Incubation period:** 2-4 weeks **Cutaneous:** alopecia, scaling, crusts, erythema	**Incubation period:** 1-2 weeks **Cutaneous:** pink to red, scaly, slightly elevated skin lesions; follicular papules, pustules, or vesicles at the borders
			Clean and disinfect, specially shared equipment; quarantine and test new animals; isolate and treat affected animals; prevent exposure to rodents; do not overcrowd	Wash hands; wear PPE (gloves, coveralls); clean, disinfect equipment; treat infected animals; treat infected people
Erysipelas *Erysipelothrix rhusiopathiae* Erysipeloid in people		**Direct contact:** animals, fluids **Ingestion:** contaminated soil, feed, water; cannibalism (poultry) **Mechanical vectors:** biting insects	**Incubation period:** 1-7 days **Acute:** fever; prostration; red-purple spots on ears, skin; dyspnea; death **Subacute:** red-purple diamond-shaped skin lesions **Chronic:** joint swelling, lameness, dyspnea; death	**Incubation period:** 1-7 days **Cutaneous**: acute localized cellulitis; painful red/purple firm swelling, usually on hands and fingers; generalized disease possible
			Clean and disinfect; remove manure; control rodents; vaccinate (pigs, turkeys); cull symptomatic pigs; destroy infected carcasses	Wash hands; wear gloves; cover wounds
Giardiasis *Giardia duodenalis or G. intestinalis*	H	**Ingestion:** cysts in contaminated food, water, soil **Direct contact:** infected animals; grooming (self or others)	**Incubation period:** 3-10 days **Asymptomatic,** young more affected **Gastrointestinal:** (cattle, sheep, goats, swine) pasty to fluid, mucoid diarrhea; weight loss or failure to gain	**Incubation period:** 1-45 days; signs usually within 1-2 weeks **Gastrointestinal:** mild-severe, acute-chronic diarrhea **Systemic:** anemia; anorexia; weight loss
			Clean and disinfect; remove manure; change bedding frequently; do not overcrowd; provide colostrum; do not use surface water as your water source	Wash hands; wear gloves; don't drink untreated water (treat or filter fresh water prior to drinking); treat infected animals; prevent contact with feces;

Zoonotic Diseases of Swine, continued

Zoonotic Disease *Etiologic Agent*	R	Transmission	Clinical Signs in Swine Prevention for Swine	Clinical Signs in People Prevention for People
Japanese encephalitis Flavivirus	A H	**Vectors:** *Culex* mosquitoes **Reproductive:** semen; transplacental possible	**Asymptomatic** **Reproductive:** Most common in naïve pigs; birth of stillborn or mummified fetuses; abortions; orchitis; infertility **Neurologic** (piglets): weakness; tremors; convulsions; death shortly after birth	**Incubation period:** 5-15 days **Asymptomatic** - Childhood disease in endemic areas (Asia, Western Pacific) **Flu-like illness:** fever; chills; myalgia; severe headache **Neurologic:** confusion; behavior changes; loss of consciousness; coma; difficulty moving; hemiplegia; quadriplegia; cerebellar disorders; neck pain and stiffness; mild to severe convulsions; transient Parkinson's like signs; severe encephalitis (esp. children under 15 yrs. of age); neurological deficits in half of survivors **Gastrointestinal:** (children) nausea; vomiting; abdominal pain; +/- diarrhea **Reproductive:** miscarriage if infected in first pregnancy
			Clean and disinfect; vector control; vaccines in endemic areas (Asia; Western Pacific); house animals in screened facilities; keep screens in good repair; minimize exposure to wild birds	Vaccination (endemic areas); prevent mosquito bites (insect repellants; protective clothing; permethrin-treated clothing and gear; bed nets); keep window screens in good repair
Leptospirosis *Leptospira* spp. - Sheep can serve as maintenance hosts of Hardjo serovar Weil's disease in humans	H	**Direct contact**: infected urine; contaminated water; aborted tissues **Ingestion:** contaminated feed, water **Inhalation**: aerosolized urine, water	**Incubation period:** 7-12 days **Reproductive:** abortion; decreased fertility; stillbirth; weak offspring **Systemic:** (piglets) fever; icterus; anemia; death; **Neurologic:** (piglets) meningitis	**Incubation period: 7-12 days** **Acute/septicemic phase:** fever, chills, conjunctival suffusion, headache; myalgia; nausea; vomiting **Immune phase:** anicteric (common) or icteric forms; aseptic meningitis; stiff neck; headache; kidney failure; pulmonary hemorrhage; edema; dyspnea; death
			Clean and disinfect, especially breeding/birthing areas; vaccinate; control rodents; prevent contact with reservoirs; provide safe, clean water for drinking; avoid contaminated water sources/ flood waters; quarantine and test new animals; prevent contact between cattle and swine	Wash hands; wear PPE (gloves, mask, eye protection, coveralls); cover wounds; control rodents; avoid wildlife; avoid contaminated water (like floodwaters); drain standing water if possible
Mange/Acariasis *Sarcoptes scabiei* var suis Scabies		**Direct contact:** infested animals **Fomites:** contaminated bedding	**Incubation period:** 10-60 days **Cutaneous:** rough, scaly skin; pruritus; alopecia; crusted skin	**Incubation period:** <24 hours to 4 days **Cutaneous:** severe pruritus on arms, chest, abdomen, thighs
			Clean and disinfect; power spray mite hiding places; quarantine and treat new or affected animals; prevent exposure to rodents and wild birds	Wash hands; wear gloves; treat infested animals; remove wild bird nests from buildings; keep bird housing areas clean

Zoonotic Diseases of Swine, continued

Zoonotic Disease *Etiologic Agent*	R	Transmission	Clinical Signs in Swine Prevention for Swine	Clinical Signs in People Prevention for People
Staphylococcosis *including methicillin-resistant Staphylococcus aureus (MRSA)*		**Direct contact:** skin wounds; feces **Fomites** **Inhalation:** aerosols (dust)	**Incubation period:** variable **Cutaneous:** wound infections, abscesses **Reproductive:** mastitis; metritis	**Incubation period:** variable; 4-10 days **Cutaneous:** skin, soft tissue infection; necrotizing fasciitis; staphylococcal scalded skin syndrome **Gastrointestinal:** acute gastroenteritis (food poisoning); nausea; vomiting; diarrhea; abdominal pain; +/- fever; headache; blood, mucous in vomit, stool
			Clean and disinfect; remove manure; do not overcrowd; isolate infected animals; isolate infected animals	Wash hands; wear PPE (gloves, mask); cover wounds; avoid touching animal wounds, secretions; do not share personal items (towels)
Rabies *Lyssavirus*	**AH**	**Direct contact:** infected animal saliva (bite, droplet on mucous membrane, aerosol, broken skin)	**Incubation period:** 10 days to 6 months **Paralytic:** progressive paralysis; dysphagia; hypersalivation; ataxia; ascending paralysis; death in 2-6 days **Furious:** tremors; restlessness; aggression; ascending paralysis; death in 4-8 days; violent excitatory phase	**Incubation period:** a few days to several years, most commonly 1-3 mos. **Neurologic:** headache; fever; pain at inoculation site; anxiety; confusion; agitation, inability to swallow; hydrophobia; generalized paralysis; death
			Clean and disinfect; vaccinate (including dogs and cats); isolate, euthanize, test symptomatic animals; prevent access to wildlife	Wash hands; wear PPE around exposed animals (gloves, eye protection, coveralls); avoid saliva; get rabies vaccine if high-risk; cover wounds
Salmonellosis *Salmonella* spp. ser. Typhimurium ser. Enteritidis (humans)	**H**	**Ingestion:** contaminated feed, water **Direct contact:** infected animal, feces **Fomites** **Reproductive:** vertical (poultry) **Mechanical vectors:** flies	**Incubation period:** varies; less than 1-2 days if severe **Gastrointestinal:** severe enteritis +/- blood; young most affected **Reproductive:** abortion **Systemic:** septicemia; CNS signs; (piglets) pneumonia	**Incubation period:** 6-72 hours **Gastrointestinal:** acute diarrhea (+/- blood); abdominal pain; nausea; vomiting; dehydration **Flu-like:** fever; muscle pain; headache; malaise; chills **Systemic:** (immunocompromised most at risk) bacteremia; septicemia (especially ser. Choleraesuis)
			Clean and disinfect, especially equipment, buildings; remove manure; practice good biosecurity; control vectors; reduce stress; prevent overcrowding; quarantine new animals; isolate and treat, or cull carriers; all-in, all-out	Wash hands; wear gloves; wash and/or peel fruits and vegetables; cook meat to proper internal temperature; do not drink untreated water
Streptococcosis *Streptococcus suis*		**Direct contact:** infected animals **Inhalation:** aerosols **Fomites** **Ingestion:** contaminated feed, water **Mechanical vectors:** flies (*S. suis*)	**Incubation period:** varies; toxic shock within hours **Reproductive:** mastitis, metritis, placentitis, abortion **Respiratory:** purulent lung lesions; pneumonia **Musculoskeletal:** polyarthritis **Neurologic:** meningitis, ataxia, high mortality **Systemic:** septicemia	**Incubation period:** hours to 3 days **Flu-like:** chills; fever; malaise; upper respiratory disease **Gastrointestinal:** nausea; vomiting; abdominal pain **Systemic:** septicemia; endocarditis; glomerulonephritis; meningitis (especially *S. suis);* septic shock
			Clean and disinfect; remove manure; control flies; minimize stress; keep wounds clean; practice good animal husbandry; use good hygiene when milking (dip teats, keep milking machines clean, wear gloves); keep hair around udder short	Wash hands; wear PPE (gloves, coveralls) when handling animals; clean, cover wounds; don't consume raw dairy

Zoonotic Diseases of Swine, continued

Zoonotic Disease *Etiologic Agent*	R	Transmission	Clinical Signs in Swine Prevention for Swine	Clinical Signs in People Prevention for People
Swine influenza Influenzavirus A Most common: H1N1, H3N2 variant H1N2	AH	**Direct contact:** nasal discharge **Fomites** **Inhalation:** droplets and aerosols from coughing/sneezing	**Respiratory:** fever; anorexia; dry cough; labored breathing; nasal discharge; conjunctivitis **Reproductive:** abortion	**Respiratory**: fever; chills; myalgia; upper respiratory symptoms; sore throat; lethargy; headache **Gastrointestinal:** (especially children) poor appetite; nausea; vomiting; diarrhea
			Clean and disinfect; practice good biosecurity; provide good ventilation; minimize stress; prevent exposure to wild birds; all-in, all-out; vaccinate pigs (may not prevent infection and shedding); quarantine, test new animals; isolate infected animals; cull depending on virus strain; destroy infected carcasses; keep sick people away from animals	Wash hands; wear PPE (gloves, mask or respirator, coveralls); don't touch your face; get the flu vaccine every year; avoid sick animals, wild birds; do not eat or drink around animals; cook meat and eggs properly; do not cross-contaminate
Toxoplasmosis *Toxoplasma gondii*	H	**Ingestion:** soil, plants, water, or feed contaminated with cat feces **Reproductive:** vertical	**Incubation period:** not known **Reproductive:** congenital infection; abortion; stillbirth; mummification **Neurologic:** encephalitis **Respiratory:** pneumonia; cough; dyspnea	**Incubation period:** 5-23 days **Flu-like:** fever; malaise; myalgia; lymphadenopathy **Ocular:** chorioretinitis; vitreous inflammation **Reproductive:** abortion; stillbirth (1st trimester) **Congenital:** chorioretinitis; hydrocephaly; encephalitis; visual and learning disabilities later in life
			Clean and disinfect; keep cats out of animal areas; do not let cats prey on rodents or birds; remove and destroy aborted fetuses, placenta; swine housed outdoors more at-risk	Wash hands; wear gloves; do not clean if pregnant; cook meat properly; wash and peel fruits and vegetables; do not drink untreated water
Trichinellosis/Trichinosis *Trichinella* spp. (Parasitic nematode/ roundworm)	AH	**Ingestion:** raw or undercooked meat (pork, wild boar, wild game meat, horse meat) containing encysted larvae **Reservoirs:** rodents; wildlife (bears, game animals)	Asymptomatic: **detected during meat inspection**	**Incubation period:** 8-15 days **Asymptomatic** **Gastrointestinal:** nausea; vomiting; diarrhea; pain **Flu-like:** fever; myalgia; fatigue; weakness; headache; chills; cough; joint pain
			Do not feed meat scraps or uncooked meat to pigs; remove animal carcasses to prevent ingestion and scavenging by swine; raise swine indoors; minimize exposure to wildlife	Wash hands; cook meat properly; freeze pork <6 in. thick for 20 days at 5°F to kill parasites; curing, smoking may not kill larvae; clean processing equipment after use; inspect home raised meat prior to eating
Trichuris suis (Whipworms)		**Ingestion:** egg-contaminated soil, feed, water; (people) **Ingestion:** contaminated food, water, soil	**Incubation period:** 2-3 weeks **Gastrointestinal:** diarrhea; weight loss; anemia; death may occur in piglets < 3 mos.	**Gastrointestinal:** diarrhea; vomiting; abdominal pain; intestinal obstruction, anemia, slow growth in children with high worm burdens
			Clean and disinfect; remove manure; deworm; keep on concrete/slats or dry pasture; rotate pastures	Wash hands; wear gloves; wash fruits, vegetables; do not fertilize with pig manure; do not let children play in contaminated soil; do not drink untreated water

Zoonotic Diseases of Swine, continued

Zoonotic Disease *Etiologic Agent*	R	Transmission	Clinical Signs in Swine Prevention for Swine	Clinical Signs in People Prevention for People
Vesicular stomatitis *Vesiculovirus*	A	**Direct contact:** skin lesions, vesicles; saliva, nasal secretions **Fomites** **Vectors:** black flies, sand flies, others?	**Incubation period:** 3-7 days **Asymptomatic** **Cutaneous**: fever; papules, vesicles in/on oral cavity, udder, teats, prepuce, interdigital space, coronary band; inflammation; edema; pain **Musculoskeletal:** lameness	**Incubation period:** 1-6 days **Flu-like:** fever; headache; myalgia; malaise **Cutaneous:** (rare) vesicles **Gastrointestinal:** nausea; vomiting; diarrhea
			Clean and disinfect, including milking equipment; milk animals with lesions last; minimize stress; control vectors; quarantine new animals; isolate infected animals; avoid hard, abrasive feeds to prevent mucosal injury; rule out foot-and-mouth disease	Wash hands; wear PPE (gloves, coveralls); clean and cover wounds
Yersiniosis Yersinia enterocolitica		**Ingestion:** fecal-oral; undercooked or raw pork, chitterlings/chitlins can be higher risk; fecal contamination of drinking water **Direct contact:** infected animals; animal feces	**Asymptomatic** **Gastrointestinal:** diarrhea in weaned pigs; mild fever; poor appetite	**Incubation period:** 4-7 days **Gastrointestinal:** acute diarrhea; nausea; vomiting; fever; abdominal pain; (young children) pseudoappendicitis; pharyngitis; mesenteric adenitis; (children) bloody diarrhea **Musculoskeletal:** reactive arthritis **Cutaneous:** rash "erythema nodosum", more common in women **Systemic:** (infants, immunocompromised) septicemia; myocarditis
			Clean and disinfect; manure management	Wash hands; wear gloves when handling infected animals or feces; prevent cross-contamination from raw meat to surfaces or other foods; cook meat to proper internal temperatures; avoid consuming untreated water