

Diseases of interest (February 2018)

Disease	Description	Distribution	Spread	Eradication
Classical swine fever (CSF, hog cholera)	<ul style="list-style-type: none"> • Fever, anorexia, lethargy • Haemorrhagic lesions on the skin, conjunctivitis • Cyanosis of the extremities (ears, limbs, tail, snout) • Diarrhoea, vomiting (occasional) • Dyspnoea, coughing • Ataxia, paresis and convulsion • Pigs huddle together • Death occurs 5-15 days after onset of illness • Mortality in young pigs can approach 100% 	Parts of Europe, South and Central America, parts of Asia.	<ul style="list-style-type: none"> • Direct contact between animals (secretions, excretions, semen, blood) • Spread by farm visitors, veterinarians, pig traders • Indirect contact through premises, implements, vehicles, clothes, instruments and needles • Insufficiently cooked waste food fed to pigs • Transplacental infection 	<ul style="list-style-type: none"> • Slaughter of all pigs on affected farms • Disposal of carcasses, bedding, etc. • Thorough disinfection • Designation of infected zone, with control of pig movements • Detailed epidemiological investigation, with tracing of possible sources (up-stream) and possible spread (down-stream) of infection • Surveillance of infected zone, and surrounding area
African swine fever	Similar syndrome to CSF.	Africa, Europe, Central Asia, Russia.	<ul style="list-style-type: none"> • Direct transmission <ul style="list-style-type: none"> ○ Contact between sick and healthy animals • Indirect transmission <ul style="list-style-type: none"> ○ Feeding with garbage containing infected meat ○ Biological vectors: soft ticks of the genus <i>Ornithodoros</i> ○ Fomites: premises, vehicles, implements, clothes 	<ul style="list-style-type: none"> • No vaccine • Proper disposal of waste food from aircraft or ships coming from infected countries • Efficient sterilisation of garbage • In outbreaks <ul style="list-style-type: none"> ○ Rapid slaughtering of all pigs and proper disposal of cadavers and litter is essential ○ Thorough cleaning and disinfection ○ Designation of infected zone, with control of pig movements ○ Detailed epidemiological investigation, with tracing of possible sources (up-stream) and possible spread (down-stream) of infection ○ Surveillance of infected zone, and surrounding area

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Porcine Reproductive Respiratory Syndrome	<ul style="list-style-type: none"> • Pneumonia • Poor growth performance • Reproductive failure 	Worldwide except NZ, Australia, Sweden, Finland, Switzerland, and Norway	<ul style="list-style-type: none"> • Direct contact between animals (secretions, excretions, semen, blood) • Spread by farm visitors, veterinarians, pig traders • Indirect contact through premises, implements, vehicles, clothes, instruments and needles • Insufficiently cooked waste food fed to pigs • Aerosol spread 	<ul style="list-style-type: none"> • Cease stock movement • Quarantine suspicious herds • Establish diagnosis • Slaughter
Porcine circovirus associated disease (PCVAD)	<ul style="list-style-type: none"> • Five major genotypes (PCV2a through e). PCV2d currently most prevalent in much of the world, NZ genetic diversity unknown. • Chronic wasting syndrome • Interstitial pneumonia • Enteric disease • Occasional reproductive losses 	Worldwide	<ul style="list-style-type: none"> • Direct contact between animals (secretions, excretions, semen, blood) • Indirect contact through premises, implements, vehicles, clothes, instruments and needles • Transmission through meat unknown • Semen transmission confirmed but of unknown importance 	<ul style="list-style-type: none"> • Eradication not practical • Control strategies: <ul style="list-style-type: none"> ○ Porcine circovirus type 2 vaccination ○ Improved management, hygiene, and care ○ Control of concurrent diseases • Current vaccines (derived from PCV2a or b strains) appear to be efficacious across genotypes. Clinical signs are controlled but infection is not prevented.
Porcine Coronaviruses (Transmissible gastroenteritis or TGE, porcine epidemic diarrhoea or PED)	<ul style="list-style-type: none"> • Severe, acute, fatal enteritis in young pigs • Non-fatal diarrhoea and vomiting in growers and adults 	Worldwide except Australia and NZ	<ul style="list-style-type: none"> • Faecal-oral transmission • Contaminated fomites and equipment • Site-to-site transmission via birds has been speculated • Aerosol transmission over several kilometres during acute outbreaks has been observed. 	<ul style="list-style-type: none"> • Cease stock movement • Quarantine suspicious herds • Control people and vehicle traffic • Establish diagnosis • Eradication on individual farms through mass-exposure to virus with subsequent immunity
Systemic salmonellosis (<i>S. choleraesuis</i>)	<ul style="list-style-type: none"> • Septicaemic disease in weaned pigs <ul style="list-style-type: none"> ○ Pneumonia ○ Poor growth ○ Diarrhoea 	Worldwide Not present (or at undetectable levels) in Australia and NZ	<ul style="list-style-type: none"> • Faecal-oral route • Carrier pigs • Contaminated fomites 	<ul style="list-style-type: none"> • Quarantine suspicious herds • Establish diagnosis • Depopulation of affected farms • Eradication at an industry-level is untested
<i>Brucella suis</i>	<ul style="list-style-type: none"> • Infertility and abortion • Lameness • Paralysis (rare) 	Europe, North America, Australia (wild pigs)	<ul style="list-style-type: none"> • Venereal spread through semen or sexual contact with infected boars • Contact with infected wild pigs 	<ul style="list-style-type: none"> • Cease stock movements • Quarantine suspicious herds • Establish diagnosis • Slaughter positive pigs/farms

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Aujeszky's disease (AD, pseudorabies or PRV)	<ul style="list-style-type: none"> • Central nervous system (CNS) signs and high mortality rates in young animals • Abortion • Respiratory disease in older pigs • Acute lethal infection in pets and cattle 	Parts of Europe, South and Central America, Asia and Oceania. US feral population is endemically infected.	<ul style="list-style-type: none"> • Respiratory or oral routes • Virus persists for several weeks in the tonsil and other body fluids • Direct transmission between animals by nose-to-nose transmission • Aerosol (up to several kms) • Semen and venereal transmission is common • Piglets can be infected transplacentally • Recovered pigs can become lifetime carriers 	<ul style="list-style-type: none"> • Quarantine suspicious herds (detect by abattoir test cull sows) • Identify exposed herds through serology • Intensive vaccination of infected herds, and un-infected herds known to be at risk <ul style="list-style-type: none"> ○ Vaccinated pigs can be differentiated from infected pigs using serology • New variants of unknown consequence reported from China since 2016.
Vesicular diseases (foot and mouth, vesicular disease of swine, vesicular stomatitis, vesicular exanthema)	<ul style="list-style-type: none"> • Lameness and foot lesions particularly when housed on concrete • High mortality in young piglets • Vesicles or blisters <ul style="list-style-type: none"> ○ Tongue, gums, cheek, hard and soft palate, lips, nostrils, snout ○ Coronary bands, dewclaws and inter-digital space 	South America, Asia, parts of Oceania	<ul style="list-style-type: none"> • Incubating and clinically affected animals <ul style="list-style-type: none"> ○ Breath, saliva, faeces, and urine; milk and semen (up to 4 days before clinical signs) • Inanimate vectors (vehicles, implements) • Airborne, especially temperate zones (up to 60 km overland and 300 km by sea) • Meat and by-products in which pH has remained above 6.0 	<ul style="list-style-type: none"> • Animal movement control and surveillance • Slaughter of infected, recovered, and FMD-susceptible contact animals • Disinfection of premises and all infected material (implements, cars, clothes, etc.) • Destruction of cadavers, litter, and susceptible animal products in the infected area • Effective vaccines are available but not necessarily approved for use in NZ
Swine influenza	<ul style="list-style-type: none"> • Respiratory disease, especially coughing • Nasal discharge • High fever • Type A most common • Type C and Type D recently discovered in livestock 	Worldwide. Clinical disease appears to be very infrequent in Australia and NZ	<ul style="list-style-type: none"> • Acutely or recently infected pigs • Virus doesn't persistent in pigs or the environment • The virus can be transmitted among poultry, pigs and people • The importance of aerosol spread between farms is unknown • Types A, C, and D seem to cause similar typical clinical signs in pigs. Little work has been done on Types C and D to understand their epidemiology as a zoonotic pathogen. 	<ul style="list-style-type: none"> • Eradication from pig farms, regions, or countries has not been attempted • Disease is self-limiting in most situations • Quarantine of actively infected herds • Vaccination may be useful

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Japanese encephalitis B	<ul style="list-style-type: none"> Usually characterized by reproductive disease <ul style="list-style-type: none"> Stillborn or mummified fetuses, usually at term Piglets born alive often have tremors and convulsions, and die soon after birth Pregnant sows may abort. Nonpregnant animals are usually asymptomatic In people, causes flu-like symptoms +/- encephalitis 	Asia, Indonesia, parts of Australia, and Papua New Guinea	<ul style="list-style-type: none"> Usually transmitted by mosquitoes in the genus <i>Culex</i> Boars can transmit the virus in semen Birds are the most important reservoir hosts, and usually maintain the virus cycle in nature The Southern Salt Marsh mosquito identified in NZ in 1998 is thought to be a competent vector for the disease 	<ul style="list-style-type: none"> Japanese encephalitis vaccines can prevent disease in horses and pigs. Vaccines are protective for all genotypes Stabling animals in screened barns can be partially protective, particularly during outbreaks. Peak mosquito biting activity is usually from dusk to dawn. Barn fans are helpful, as mosquitoes do not fly well in strong winds The environment may also be sprayed with insecticides Once a region is affected, the potential for eradication is low
Zika virus	<ul style="list-style-type: none"> Flaviviridae 	Flavi also includes yellow fever virus, West Nile virus, Japanese encephalitis B, Murray River fever virus, and Dengue Fever. Human cases in 2016 in American Samoa, Fiji, Marshall Islands, Samoa, and Tonga.	<ul style="list-style-type: none"> Spread by daytime-active <i>Aedes</i> mosquitoes, such as <i>A. aegypti</i> and <i>A. albopictus</i>. <i>Culex quinquefasciatus</i> is established in much of the NZ North and South Islands and can become infected with the virus, but it is not known if it can transmit the disease to man. No evidence of infection in pigs but no specific research on topic could be found. 	<ul style="list-style-type: none"> Unlikely
Porcine pestivirus (emerging)	<ul style="list-style-type: none"> Novel porcine pestivirus (US) Bungowannah (AU) Border/BVD (NZ, global) Shaker pig associated novel pestivirus LINDA virus (Bungowannah-like) in Austria 2015 	Global emergence of new strains of porcine pestivirus'. Traditional porcine viruses likely also continue to evolve. No current or on-going research/surveillance in NZ pigs.	<ul style="list-style-type: none"> Usually direct pig-to-pig transmission. Vertical (transplacental) transmission important. Aerosol transmission between farms possible but not thought to be critical factor in outbreaks. Virus will survive in untreated pork for days to weeks; will survive indefinitely in frozen pork. 	<ul style="list-style-type: none"> Likelihood of eradication variable amongst different viruses. Bungowannah apparently did not spread beyond initial outbreak and herd immunity developed over several months that stopped clinical outbreak. Evidence that virus continues to circulate at low levels on affected farms.

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Filoviruses: African and Reston species	<ul style="list-style-type: none"> Filoviruses are enveloped, pleomorphic RNA viruses that belong to the family Filoviridae The genus Ebolavirus contains five species, commonly named Ebola virus, Sudan virus, Tai Forest virus, Reston virus and Bundibugyo virus 	Ebola and Reston known to infect pigs. Ebola endemic in certain wildlife species in West Central Africa, Reston appears limited to Philippines.	<ul style="list-style-type: none"> Pigs probably infected through direct contact with infected wildlife or scavenging dead carcasses. Pig to pig transmission possible with Reston, unknown for Ebola Bats appear to be the endemic reservoir for these viruses (insectivorous and fruit-eating) 	<ul style="list-style-type: none"> Unknown
Paramyxoviridae	<ul style="list-style-type: none"> Menangle virus, Nipah virus (NiV), Sendai virus, and Rubulavirus (blue eye) Menangle has moderate reproductive effects in swine. Nipah causes severe respiratory disease in pigs. Blue eye disease causes moderate reproductive disease and infertility in males; can cause inflammation of the cornea [blue eye] 	Viruses are quite diverse in their geographical distribution though both Menangle (Australia) and Nipah (Philippines and New Caledonia)	<ul style="list-style-type: none"> Through direct contact with wildlife reservoir (fruit bats) and possibly aerosolization by infected pigs. Direct contact between infected pigs. Important zoonotic pathogens 	<ul style="list-style-type: none"> Unknown, though Nipah has been eradicated from limited number of commercial farms by complete depopulation. Menangle has only been diagnosed on a single Australian farm which was ultimately eradicated using test and removal.
Hepatitis E virus	<ul style="list-style-type: none"> Hepeviridae Generally, infection in pigs is asymptomatic 	Worldwide	<ul style="list-style-type: none"> HEV-1 and HEV-2 are human viruses; human outbreaks are related to consumption of human sewage contaminated water HEV-3 and HEV-4 are zoonotic with swine serving as the reservoir host 	<ul style="list-style-type: none"> Developed countries in Europe are currently seeing increasing cases of HEV-3 and HEV-4 in people without a clear explanation. Eradication not feasible, infection is endemic in most domestic swine herds
Other porcine picornaviruses	<ul style="list-style-type: none"> Sapelovirus, Teschovirus, Kobuvirus, Seneca Valley virus Clinical signs variable amongst these viruses but include reproductive and gastrointestinal. Seneca Valley virus or 'Senecavirus A' can cause lesions indistinguishable from FMD 	Worldwide	<ul style="list-style-type: none"> This family of viruses in emerging or re-emerging worldwide. Senecavirus has been a significant problem in the US in recent years as it produces vesicular lesions that are indistinguishable from those produced by FMD. 	<ul style="list-style-type: none"> Unknown, though at least Senecavirus is likely eradicable at a herd level through eradication. Specific diagnostic tests are available for each of these viruses but one needs to be aware of their potential to cross-react (or not) with FMD virus.

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Porcine astrovirus	<ul style="list-style-type: none"> • Astroviridae • Pigs experimentally inoculated orally with PAsTV develop a mild, self-limiting enteric disease characterized by secretory diarrhoea. • Relationship to porcine failure to thrive syndrome (PFTS) is inconclusive. 	Unknown, probable worldwide	<ul style="list-style-type: none"> • Probably pig to pig • Potential for spread between pigs, people, and other mammals. 	<ul style="list-style-type: none"> • Unknown
Porcine torovirus	<ul style="list-style-type: none"> • Coronaviridae • Infection with porcine ToV is generally subclinical. However, associated signs have included diarrhoea, anorexia, dehydration, lethargy, depression, and potentially neurological or respiratory signs. 	China, one isolate from United States, other countries likely infected but no organised prevalence studies have been completed.	<ul style="list-style-type: none"> • Transmission of porcine ToV is thought to be faecal-oral. Rapid spread of porcine ToV between facilities seems to coincide with the practice of moving and regrouping weaned pigs. • Adults may be chronically infected, acting as reservoir hosts. 	<ul style="list-style-type: none"> • Unknown
Swinepox	<ul style="list-style-type: none"> • Poxviridae • Swine are the only natural hosts, humans are not affected • Characterized by formation of macules, followed by progression to papules, vesicles, pustules, and crusts. Secondary bacterial infections can also occur. • Disease primarily occurs in pigs up to four months of age, while infection in adults is typically self-limiting. 	Worldwide, though no infection documented in New Zealand	<ul style="list-style-type: none"> • Mechanically transmitted by the hog louse (<i>Hematopinus suis</i>) and possibly by biting flies (<i>Stomoxys calcitrans</i>) and black flies (<i>Simuliidae</i>). • Pig-to-pig transmission can also occur 	<ul style="list-style-type: none"> • Unknown

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Getah virus (GV), Chikungunya virus (CV), Ross River virus	<ul style="list-style-type: none"> • Togaviridae • GV (related to Ross River virus) <ul style="list-style-type: none"> ○ CNS signs, diarrhoea, and death in piglets, as well as reproductive failure in sows and gilts. Infection in adult animals is often subclinical • CV <ul style="list-style-type: none"> ○ Evidence pigs can become infected but their role in epidemiology of the diseases is unknown. No apparent clinical disease. 	<p>GV: Eurasia, South- and Far East Asia, Australia, and New Zealand</p> <p>CV: Africa, Asia, South America</p>	<ul style="list-style-type: none"> • Mosquito-human-mosquito transmission (<i>Culex</i>) 	<ul style="list-style-type: none"> • Unknown