BALANTIDIASIS (pigs)
Balantidiasis is caused by the large ciliated protozoan Balantidium coli. Infection has been identified in many animal species including pigs, rabbits, rats, nonhuman primates, and guinea pigs. Affected animals may not display any signs of illness or may have watery diarrhea with weight loss and rectal prolapse. Pigs are the most common animal source of infection in humans. The disease is transmitted by the fecal-oral route. Symptoms in humans may include diarrhea, abdominal pain, nausea, vomiting, or stools containing blood or mucus. Infected humans are frequently treated with antibiotics and provided with supportive care. Transmission of the protozoan can be prevented through use of appropriate personal protective equipment (including gloves and protective clothing), strict hygiene, and appropriate environmental sanitation.

Additional information regarding balantidiasis can be found at:
http://www.cdc.gov/ncidod/dpd/parasites/balantidium/default.htm

BRUCELLOSIS (cattle, pigs, sheep)
In animals, this disease is also known as Bang’s disease or contagious abortion. In humans, it is referred to as Mediterranean fever or undulant fever. Brucellosis is caused by infection with bacteria within the genus Brucella including Brucella abortus, B. canis, B. melitensis, B. ovis, and B. suis. Animals most frequently infected include cattle, sheep, goats, pigs, and dogs. It is unlikely that animals raised for use in research will harbor the disease. Symptoms in animals include abortion, infertility, and testicular abnormalities. Infected animals may also not display any signs of illness. Transmission to humans in a laboratory setting is by the direct contact of broken skin or the mucous membranes (such as eyes or mouth) with infected animal birth products (aborted fetuses, fetal fluid and membranes, and secretions), blood, or urine. The bacteria can also be transmitted through inhalation of aerosols. Symptoms usually develop in humans within one-two months of infection.

Clinical signs in humans may include fever, headaches, nausea, weight loss, orchitis (inflammation of testicles), painful joints, and swollen lymph nodes. The chronic (undulant) form may present as acute and intermittent attacks of illness and fever. Without treatment, these symptoms may persist either continuously or intermittently for years. The treatment of infected humans involves the prolonged administration of antibiotics. Transmission of Brucella can be prevented through utilization of good personal hygiene and strict sanitization methods, and by wearing personal protective equipment especially when working with pregnant host species or their birth products. Birth products should be disposed of.
promptly and carefully. Contaminated surfaces should be appropriately disinfected.

Additional information regarding brucellosis can be found at:  
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_g.htm

CAMPYLOBACTERIOSIS (pigs and sheep)  
*Campylobacter* spp. bacteria can be found in numerous species of animals including: pigs, chickens, sheep, dogs, cats, ferrets, hamsters, and nonhuman primates where the bacteria frequently colonizes the gastrointestinal tract. Infected sheep, pigs, and poultry have been most frequently implicated in zoonotic disease transmissions. Infected animals may display diarrhea, abortion, stillbirths, fever, reduced appetite, and vomiting. However, an infected animal may not show any signs of illness. Even after an animal is treated it may appear healthy but will typically continue to shed this bacteria and thus be a carrier of the disease.

In the laboratory environment, *Campylobacter* spp is transmitted to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human’s mucous membranes. Infected humans may either display no signs of illness or may develop abdominal pain, malaise, fever, nausea, vomiting, or diarrhea. Illness usually occurs within 1-10 days of exposure, most frequently within 2-5 days. In humans, infection is diagnosed through a stool culture. The practice of good personal hygiene, such as handwashing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.

Additional information regarding *Campylobacter* can be found at:  
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/campylobacter_g.htm

*Chlamyphila abortus* (sheep)  
*Chlamyphila abortus* is a zoonotic disease that causes chlamydiosis in humans in close contact with pregnant sheep. *C. abortus* has been reported in most countries around the world. Transmission can occur through ingestion, aerosols and direct inoculation into the eye. Large amounts of the organism are present in the uterus and placenta of sheep and can be released into the environment during abortion and birthing. Shedding of the organism can occur up to 2-3 weeks after an abortion. *C. abortus* is relatively contagious in both people and animals.

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C. abortus causes a disease in pregnant sheep called ovine enzootic abortion (OEA). Abortion in the affected ewes typically occurs in the last few weeks of pregnancy. If the dam does carry to term, the surviving lamb may be weak, with a low birth weight or the lamb may be still born. Usually there are no clinical signs present in the ewe before the abortion. Reddish-brown vaginal secretions may be present for several days after the abortion, but otherwise the ewe is healthy.

Initial symptoms of the C. abortus infection in humans tend to be non-specific. People will exhibit influenza-like symptoms including fever, headache, dizziness, and vomiting. Abortions can occur in pregnant women around the 14th-36th week of pregnancy. If left untreated chlamydia infection can develop into septicemia, hepatitis, fatigue, and fever. While zoonotic chlamydia can be transmitted between animals and people, there have been no reports of the zoonotic form being transmitted between people.

Pregnant women are susceptible to C. abortus at all stages of pregnancy and should therefore avoid handling pregnant or aborting sheep whenever possible. Sheep should be purchased from reliable sources known to be free of disease. Lab workers should practice good hygiene; including hand washing, disinfecting foot wear and wearing appropriate PPE. If an animal is suspect for C. abortus infection, it should be kept in isolation for 3 weeks to prevent the spread of disease amongst other animals in the area.

For more information on C. abortus and chlamydiosis infection please consult: [http://www.cfsph.iastate.edu/Factsheets/pdfs/chlamydiosis.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/chlamydiosis.pdf)

CRYPTOSPORIDIOSIS (cattle, pigs, sheep)
Cryptosporidiosis is caused by infection with a protozoa in the genus Cryptosporidium. Infection has been diagnosed in ruminants (i.e. sheep, cattle), pigs, cats, dogs, chickens, ferrets, nonhuman primates, and humans. Clinical disease in animals is most frequently diagnosed in young livestock who have not developed a sufficient level of immunity to the organism. Calves and lambs may have severe watery diarrhea. Chickens may have respiratory tract disease. The organism is most frequently transmitted by ingestion of contaminated materials but may also be transmitted by aerosols. The organism can survive in the environment for extended periods.

In humans, the disease may not induce any signs of illness or may be characterized by severe watery diarrhea, fever, nausea, vomiting, anorexia, weight loss, or respiratory illness. These symptoms usually occur within 5 to 28 days of exposure. In otherwise healthy individuals, the illness is usually self-limiting (1 to 2 weeks) and only supportive care is required. However, a more severe and chronic disease may develop in immunocompromised patients. Transmission of the disease can be prevented through utilization of good hand washing practices.
personal hygiene and by wearing personal protective equipment especially when working with young animals with diarrhea.

Additional information regarding Cryptosporidiosis can be found at: http://www.cdc.gov/crypto/

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**ERYSIPELAS (pigs and sheep)**

Erysipelas is a disease caused by the bacteria *Erysipelothrix rhusiopathiae*. In the laboratory, it is most frequently a disease of pigs and less frequently birds, sheep, and fish. Infected animals may show signs of fever, lethargy, septicemia, arthritis, and sudden death. Certain symptoms are specific to pigs such as diamond-shaped skin lesions and necrosis of the ear and tail tips. Erysipelas is transmitted to humans by direct contact with infected animals, tissues, or feces. Infected humans most frequently exhibit well-defined skin lesions such as redness or swelling but may also exhibit fever, a generalized bacterial infection, endocarditis (inflammation of the inner lining of the heart), encephalitis (inflammation of the brain), and septic arthritis within one to three days of exposure. Infection is usually treated with antibiotics. The practice of good personal hygiene, such as hand washing after contacting animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.

Additional information regarding Erysipelas can be found at: http://www.vetmed.wisc.edu/pbs/zoonoses/Erysipelas/erysipelasindex.html

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**GIARDIASIS (sheep and pigs)**

Numerous mammals including dogs, cats, nonhuman primates, pigs, sheep, and goats, can all be natural hosts for giardia, a protozoa. Additional laboratory animals (i.e. rabbits, mice) can become infected with Giardia. However, due to the strictly controlled environment in which the animals are raised, natural infection is unlikely. Infected animals may not show any signs of illness or may exhibit diarrhea, weight loss, vomiting, or anorexia. Management of infected animals includes sanitation of the environment, prompt removal of feces, and treatment with antiparasitic agents. Giardia infection is transmitted to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human’s mucous membranes. Infected humans may develop diarrhea, a loss of appetite, abdominal cramps, vomiting, fever, and chills. These signs appear approximately 7-10 days after infection. Infection is diagnosed by testing of a stool sample and is treated with antiparasitic agents as well as through supportive care. The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective
equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.

Additional information regarding Giardia can be found at:
http://www.cdc.gov/Ncidod/dpd/parasites/giardiasis/factsht_giardia.htm

LEPTOSPIROSIS (sheep)
A spirochete bacteria, *Leptospira interrogans* can infect a wide range of laboratory animal species including mice, rats, hamsters, guinea pigs, gerbils, dogs, cats, pigs, sheep, hamsters, and nonhuman primates. However, infection is highly unlikely in animals specifically bred and raised for use in research. Infection can result in varying symptoms across species. Mice and rats may be asymptomatic, while dogs may exhibit kidney and liver disease and sheep may experience reproductive failure. Nonhuman primates may exhibit blood clotting abnormalities or abortion. Transmission to humans may occur if the individual’s abraded skin or mucous membranes come in contact with the urine or tissues of infected animals or equipment contaminated with these substances. It is also possible for humans to contract the disease through inhalation of fine particles of contaminated fluids that may be generated during high-power washing of contaminated equipment. Symptoms in humans may include fever, chills, weakness, pain, and headache. The severe form of the disease results in impaired kidney and liver function, as well as mental status changes, and possible death. The best methods of control are good sanitation with appropriate animal waste control and appropriate use of personal protective equipment when handling animals.

Additional information regarding Leptospirosis can be found at:
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis_g.htm

ORF DISEASE (sheep)
Orf disease is a parapoxvirus infection that is common in many sheep flocks throughout the United States. The disease affects all age groups, although young animals are most often and most severely affected. Orf produces crusty, pus-filled blisters on the lips, nostrils, mucous membranes of the oral cavity, and urogenital orifices of infected animals.

Orf virus is transmitted to humans by direct contact with virus-filled matter originating from a lesion. External lesions are not always apparent, so recognition may be difficult. The virus is very hardy and can contaminate equipment, supplies, or even the skin and wool of uninfected sheep. Humans can become infected from these sources as well as directly from infected animals. The disease in humans is usually characterized by the development of a single lesion on the hand, arm, or face. The lesion is sometimes mistaken for an abscess. Occasionally, several bumpy lesions are present, each measuring up to 3 cm. in
diameter, persisting for 3-6 weeks, and regressing spontaneously. Progression to generalized disease is considered rare. The characteristic appearance of the lesion and a history of recent contact with sheep are diagnostic of this condition in humans. Vaccination of susceptible sheep is effective in preventing the disease. Personnel who handle sheep are urged to wear protective clothing and gloves and to practice good personal hygiene.

Additional information regarding orf can be found at:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5503a1.htm

Q FEVER (sheep and cattle)
Q fever is a disease caused by the bacteria *Coxiella burnetii*. It can be acquired by exposure to placental membranes and fetuses of infected animals or to environments or equipment contaminated with the excretions of infected animals. Sheep, goats, and cattle (ruminants) are the laboratory species most frequently infected. Dogs, cats, and chickens can also be infected however it is very unlikely in animals of these species bred and raised for use in research. The bacteria is shed in the milk, feces, and urine of infected animals; the number of bacteria shed may be especially high when an infected female is pregnant or has recently given birth. Therefore, increased levels of precautions must be instituted when working with pregnant females, newborn offspring, and tissues and body fluids associated with pregnancy. This includes the placenta, amniotic fluid, blood or soiled bedding. In addition, individuals who handle young sheep, goats or calves up to six months of age are at higher risk for exposure, as are individuals who participate in the routine care of the animals. It should be noted that the bacteria can be airborne, particularly during births and cleaning of birthing areas. Exposure of humans to only a small number of organisms can result in infection. The organisms are very resistant to heat, drying, and many disinfectants and may survive for prolonged periods in the environment.

In most infected humans develop an acute illness that could be mistaken for the flu. A fever of 104-105°F may develop and may be accompanied by general malaise (a vague feeling of discomfort), significant muscle aches and pains, and very frequently a cough. Unexplained weight loss may also occur. Up to half of the individuals who develop this acute disease will develop pneumonia that can be seen on chest x-rays. A large number of people will also develop hepatitis (inflammation of the liver). In most patients the disease is self-limited, resolving after 10-14 days. In older or ill individuals, acute illness may take 1-2 months to resolve.

Due to the low rate of Q fever infection in the general population, physicians may not consider this disease when examining an ill individual. As a result the infection may be overlooked. Therefore, employees who work with pregnant or
newborn sheep or cattle and who develop a flu-like infection should discuss the possibility of their exposure to Q fever with their physician.

Less than 1% of infected individuals develop a chronic (> 6-month) infection with the Q fever organism. In these cases, endocarditis, an infection of the inner lining of the heart, may develop and is frequently fatal. Ninety percent of the people who develop endocarditis have some previous problem with their heart valves. Because of this, people who have congenital heart disease, prior heart valve disease, or an impaired immune system should consult a physician prior to working with or near ruminants (especially sheep).

Women of child-bearing age should be aware that there is a risk of Q fever infection resulting in miscarriage or other problems with the human fetus. It is advisable that pregnant women, or those thinking of becoming pregnant, consult with their own physician prior to working with or near ruminants.

Additional information regarding Q fever can be found at:
http://www.cdc.gov/ncidod/dvrd/qfever/

RINGWORM (DERMATOPHYTOSIS) (sheep)
Ringworm can be found in the following lab animal species: dogs, cats, guinea pigs, nonhuman primates, sheep, and goats. The causative organism is a fungus, not a worm, that may infect fur/hair, skin, and nails. The organism can persist in the environment for extended periods of time. Infected animals may not exhibit any signs of infection or may develop areas of alopecia (hair loss) and erythema (redness/inflammation). Lesions may or may not be itchy. The rate of infection is typically low in rodents, dogs, cats and rabbits raised for use in research. Ringworm can be transmitted to humans by direct contact with infected areas of skin or through contact with a contaminated object. Lesions in humans may appear as flat, spreading, ring-shaped lesions in the skin and often appear within 10-14 days of the exposure. As the lesions increase in diameter, the center often returns to a normal appearance. However, skin lesions may develop different appearances and can only be definitively diagnosed through culture or laboratory examination of the skin. Transmission of an infection can be prevented through use of appropriate personal protective equipment including gloves and protective clothing and through appropriate environmental sanitation. Infected humans are frequently treated with a topical antifungal ointment for a prolonged period. If the lesions are extensive then oral fungicides may also be used.

Additional information regarding ringworm infection can be found at:
http://www.cdc.gov/healthypets/diseases/ringworm.htm
**SALMONELLOSIONS (pigs and sheep)**

Many species are susceptible to infection with bacteria within the genus *Salmonella* including guinea pigs, mice, rats, chickens, pigs, sheep, cats, rabbits, reptiles, and nonhuman primates. However, rodents and rabbits raised for use in research are very rarely infected. Infected animals may display no signs of infection or be severely affected with diarrhea, dehydration, or systemic bacterial infection.

In the laboratory environment, *Salmonella spp* may be transmitted to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human’s mucous membranes. Infected humans may have diarrhea (with or without blood), fever, and stomach cramps. More severe signs and symptoms may develop especially in individuals with compromised immune systems. Onset of signs will usually occur 12-72 hours after infection and last for 4-7 days. In humans, infection is diagnosed through laboratory testing of a stool sample or vomitus. The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel. Although the disease may be treated with antimicrobials, infected individuals most frequently are provided supportive care (i.e. electrolyte replacement, intravenous fluids) until they recover.

Additional information regarding Salmonellosis can be found at: [http://www.cdc.gov/ncidod/diseases/submenus/sub_salmonella.htm](http://www.cdc.gov/ncidod/diseases/submenus/sub_salmonella.htm)

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**Variant Creutzfeldt-Jakob Disease (vCJD) (cattle)**

Variant Creutzfeldt-Jakob disease (vCJD) is a rapidly progressive neurodegenerative disease that is always fatal. The disease is caused by an infectious agent called a prion which is an abnormal, misfolded protein. vCJD differs from the classic Creutzfeldt-Jakob disease, in that classic CJD occurs is caused by spontaneous transformation of normal prion proteins into abnormal prion proteins. There is no evidence that classic CJD is linked to any animal disease. However, vCJD in humans has been linked to the consumption of meat from cattle suspected of having bovine spongiform encephalitis (BSE).

BSE, also known as mad cow disease, is a progressive neurological disorder of cattle caused by infectious prions. It is suspected of being transmitted to cattle by feeding cows sheep carcasses infected with scrapie. Affected animals may display changes in temperament, such as aggression, incoordination and difficulty walking and standing, decreased milk production, and loss of body weight. Any animal suspected of BSE should be reported to the Centers for Disease Control and Prevention (CDC).
The primary concern of vCJD transmission in laboratory workers is by accidental parenteral inoculation or ingestion when working with bovine neuronal tissues, such as brain and spinal cord. The median duration of the illness for vCDJ is 14 months, and the median age at death is 28 years. The symptoms of the disease include progressive dementia, gait and speech abnormalities, and muscle jerks. Progression of the disease leads to complete immobility, loss of speech, and death.

To date, there have been no confirmed cases of laboratory workers acquiring vCJD from neural tissue. However, vCJD is a serious and fatal disease in humans, and it is extremely important to take the appropriate precautions when handling bovine brain matter and spinal cord. BSE agents are highly resistant to heat, radiation, and chemical inactivation. All instruments with the potential of being contaminated with BSE agents should be sterilized at 134-138°C for no less than 18 min. All lab workers handling bovine brain matter and spinal tissue must wear appropriate PPE at all times. Any animal tissues, including brain and spinal cord, that are suspected of containing infectious human prions should be handled at biosafety level-3.

For more information on Variant Creutzfeldt-Jakob disease and BSE refer to: http://www.cdc.gov/ncidod/dvrd/vcjd/index.htm
For additional information on how to safely handle prion-infected tissues refer to: http://www.biosafety.msu.edu/current_topic/Prions/working_with_prions.pdf

If you have had an exposure, illness symptoms, and need medical attention please refer to the information in the Bite Scratch Protocol.

Contact the UCUCA Office at 763-8028

References:
