

# Bovine zoonoses

Institutional Animal Care and Use  
Committee

3/11

# Rabies

- Clinically ill cows are a source of infection for humans
  - DO NOT place hands in the mouth of cow that appears to be choking or having trouble swallowing
- Transmitted by a bite wound/contact with virus-laden saliva
- Cows are infected by exposure to a wild reservoir
  - Striped skunk
  - Various species of bats
- Prevention through
  - Judicious handling of cows showing central nervous system disease

# Rabies

- Any type of behavioral abnormality, in particular, aggression, should be considered a potential clinical sign of rabies. Do not attempt to handle an animal like this without appropriately trained personnel.
- Contact the University Attending Veterinarian immediately.



<http://wahrefugecentre.org/Quickstart/ImageLib/Skunk.jpg>

Skunks active in the daytime are always suspect for rabies. North Dakota has a high incidence of rabies in the skunk population. Avoid any contact.

Bats should not be handled without gloves. In fact, it is advisable to place them in container and submit them to the laboratory for testing.

<http://static.howstuffworks.com/gif/bat-1.jpg>





# Brucellosis

- Various species of *Brucella* bacteria affect animals and humans
- *Brucella abortus* is the organism in cattle
- This is typically an infection of the female or male reproductive tract
- Signs of clinical disease in humans includes fever, sweats, headaches, back pains and physical weakness
- More severe infections are possible

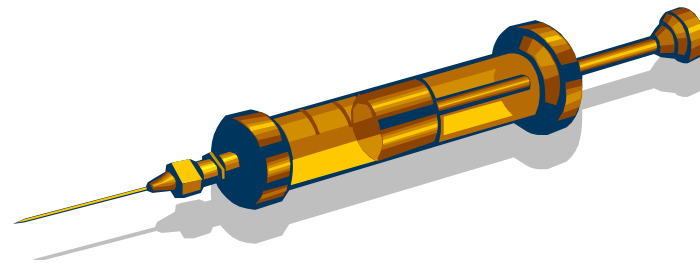


# Brucellosis

- Humans are infected by eating or drinking contaminated material, inhaling the bacteria, or having the bacteria enter a skin wound
- Humans do not transmit the bacteria to one another
- Avoid contact with blood, semen or placenta from cows with signs of reproductive disease
- Immune suppressed individuals should not handle cows with signs of reproductive disease

# Brucellosis

- Diagnosis can be done with serology, culture or PCR
- Treatment is available, however, chronic infections can develop
- Contact the Attending Veterinarian if you suspect brucellosis



# Campylobacteriosis

- Infectious disease caused by the bacteria, *Campylobacter* spp.
- Sick humans see diarrhea, cramping, abdominal pain, fever, nausea, vomiting
- 2 to 5 day incubation period followed by a week of illness
- Lasts longer in immunocompromised patients
- In rare cases can develop into a widespread, blood borne infection



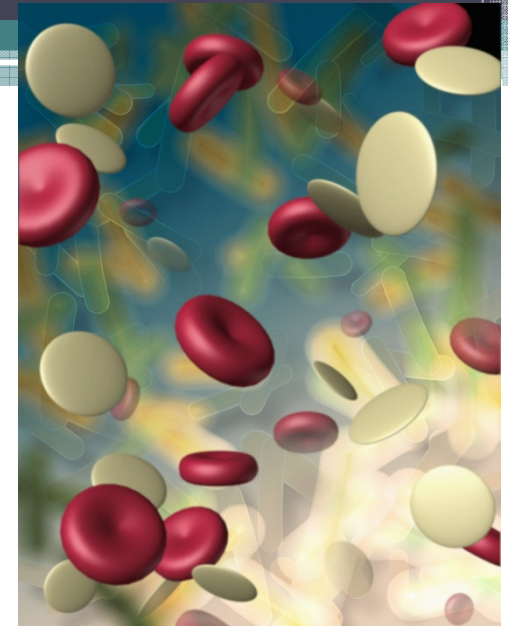


# Campylobacteriosis

- Common diarrheal illness in the United States
- More common in the summer
- More commonly isolated from young patients
- Most cases recover within a week
- Rare serious disease such as arthritis or Guillain-Barre syndrome (a patients own immune system attacks nerves and leads to paralysis)
- Diagnosis through isolation and identification of the bacteria

# Campylobacteriosis

- Human exposure:
  - Poultry or poultry products
  - Unpasteurized milk, contaminated water
  - Contact with aborting cattle, goats or sheep
    - *C. fetus*
  - Contact with feces of ill animals
    - Dog
    - Cat
    - Sheep, goat, cow



# Campylobacteriosis

- Prevention

- Cook all foods thoroughly
- Wash hands with soap and water
- Avoid consuming unpasteurized milk or untreated water
- When working with animals, particularly animals with diarrheal or reproductive illness, wear gloves and wash hands frequently



# Salmonellosis

- Caused by bacteria, *Salmonella* spp.
- Diarrhea, fever, abdominal cramps roughly 12 to 72 hours after infection
- Illness last about a week after which most people recover
- In uncommon situations, severe bloody diarrhea may develop as well as bloodstream infections
- More serious in elderly, infants and immunocompromised individuals

# Salmonellosis



- Diagnosis by growing the organism in a lab
- Most cases resolve without treatment, but antibiotics and fluids may be indicated
- *Salmonella* is common in many species of animals. Humans are exposed by consumption of food from these animals or contact with fecal matter from ill animals or carrier animals.
- Found in reptiles, birds, sick calves, lambs

# Leptospirosis

- *Leptospira interrogans*, worldwide distribution in domestic and wild animals
  - *L. hardjo* (cattle)
- Shed in urine
- Cow can be infected for years
- In humans flu-like symptoms, rash, orchitis (inflammation of testicle), cutaneous hemorrhage, anemia, hepatorenal failure, jaundice, encephalitis (inflammation of brain), pulmonary disease
- Diagnosis by serology, culture, PCR

# Leptospirosis



- Cows that shed the *Leptospira* organism do not always show clinical disease
- The *Leptospira* organism can penetrate mucous membranes
- Wear gloves when working around cow urine and feces
- Animal vaccines are available
- Antibiotics will help reduce shedding of bacteria, but not eliminate it from the dog kidney
- Consult with the Attending Veterinarian about any cows that test positive for *Leptospira*

# Ringworm

- Actually a fungal infection of the epithelium
- Not invasive
- Can grow on scalp, skin or nails
- Contagious by direct contact
- Thrives in warm, moist areas
- In humans see itchy, red, raised patches that blister and ooze
- Ring appearance; bald patches



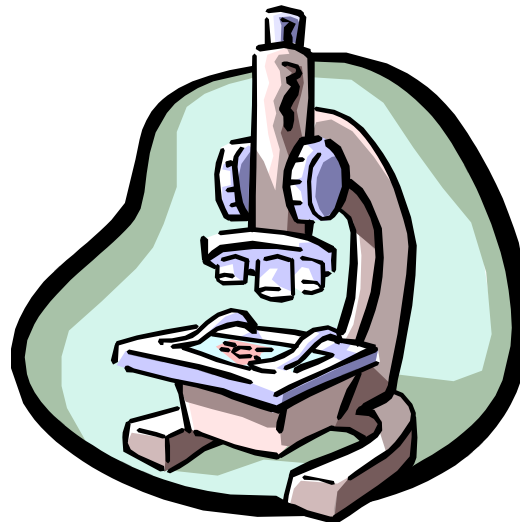
# Ringworm



- Diagnosed by various methods with the help of your physician
- Condition may be self-limiting, but may need the help of topical antifungals
- Gloves, hand-washing
- Cows develop scaly, hairless patches anywhere on the body

# Bovine spongiform encephalopathy

- Bovine spongiform encephalopathy (BSE), widely referred to as "mad cow disease," is a chronic degenerative disease affecting the central nervous system of cattle.



# BSE



- Clinical signs

- Progressive degeneration of the nervous system. Affected animals may display changes in temperament, such as nervousness or aggression, abnormal posture, incoordination and difficulty in rising, decreased milk production, or loss of body weight.
- Affected cattle die. The causative agent of the disease is not completely characterized, and there is neither any treatment nor a vaccine to prevent the disease.

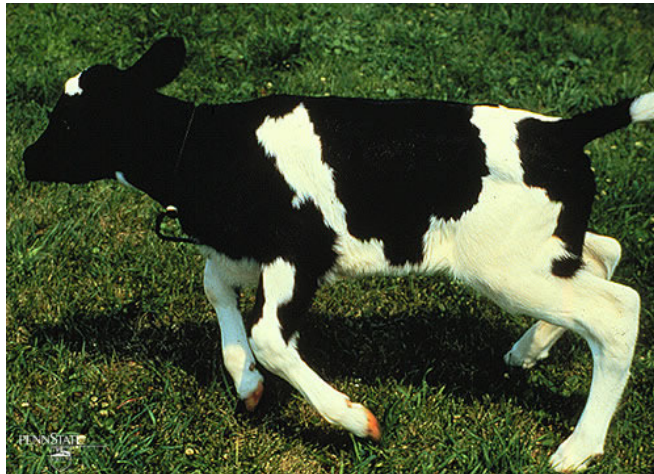
# BSE - Transmission

- Oral inoculation early in life
- No horizontal transmission
  - Not infectious
- Vertical transmission  $\leq 1\%$ 
  - Will not perpetuate outbreak
- Infective agent is a prion



# BSE - transmission

- The incubation period is from 2 to 8 years. Following the onset of clinical signs, the animal's condition deteriorates until it either dies or is destroyed. This process usually takes from 2 weeks to 6 months.



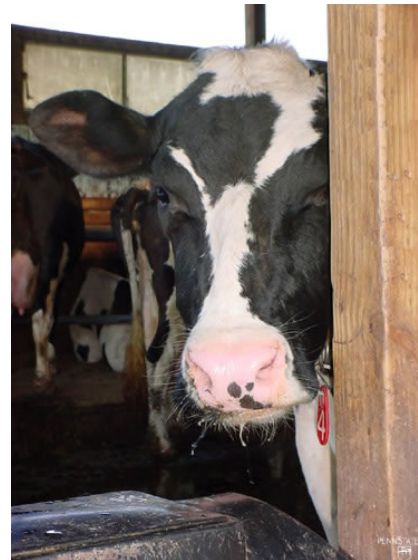
# BSE



- Currently, there is no test to detect the disease in a live animal
- Veterinary pathologists confirm BSE by postmortem microscopic examination of brain tissue or by the detection of the abnormal form of the prion protein.
- BSE is so named because of the spongy appearance of the brain tissue of infected cattle.

# BSE

- In cattle naturally infected with BSE, the agent has been found only in brain tissue, spinal cord, and retina.
- To date, there has been no evidence of prion detected in milk or muscle tissue.

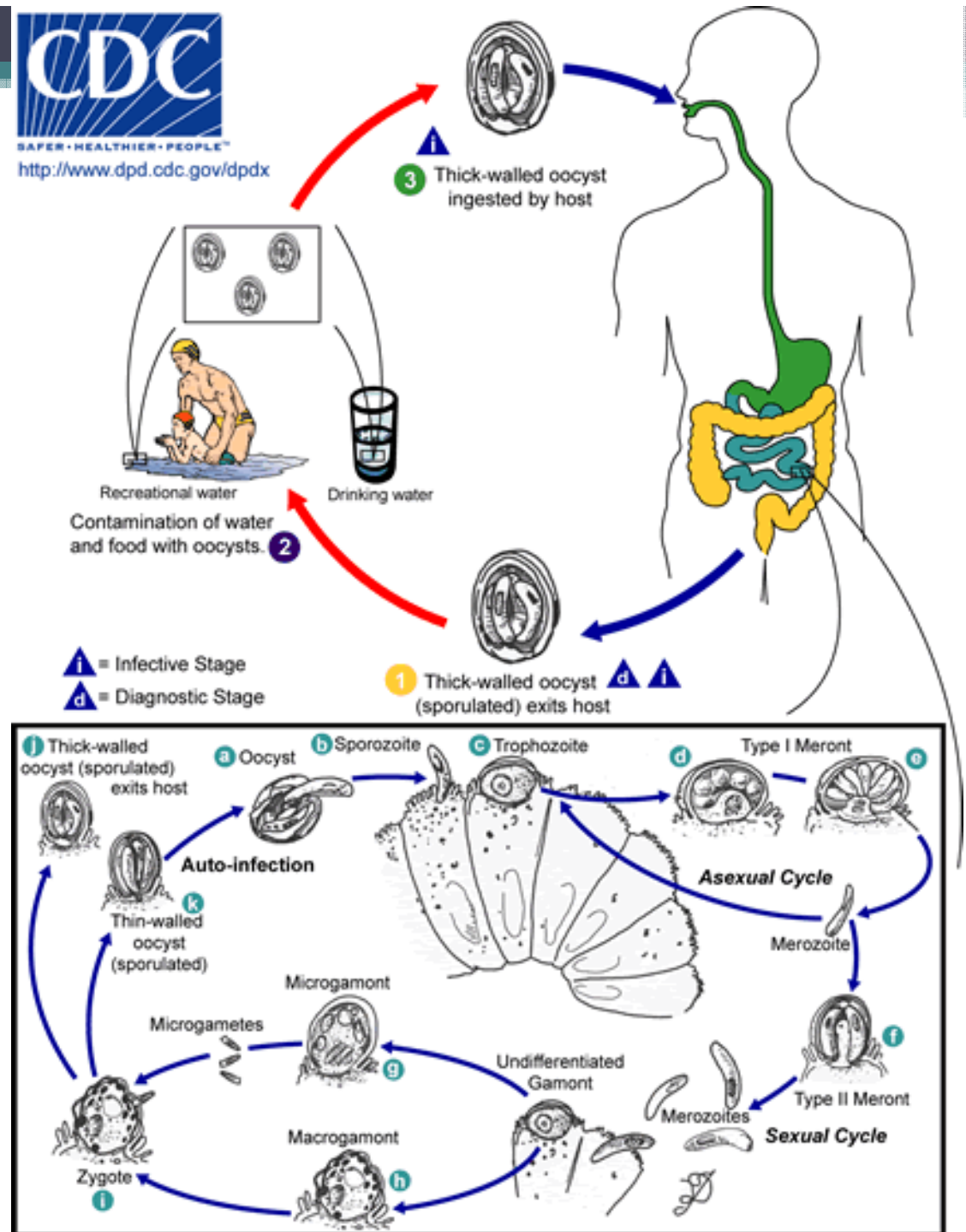






<http://www.dpd.cdc.gov/dpdx>

## *Cryptosporidium* spp.





# Clinical disease

- Nausea, low-grade fever, abdominal cramps, anorexia, diarrhea
- Self-limiting in an immunocompetent person
- Failure to thrive in infected infants
- Variable amounts of inflammation in the small intestine





# Diagnosis

- Small or large bowel biopsy
- Fecal exam
- Fluid fecal matter indicative of more oocysts being shed
- If initial tests are negative and the disease is still suspected, test several samples
- May occur along with other pathogens

# Epidemiology and prevention

- Organism passed by oocysts that are infective when passed in feces
- Susceptible to a variety of chemicals
  - Ammonia, 10% formalin, 50% chlorine
- Oocysts exposed to soils that are frozen at 10°C become inactivated within 50 days
- Exposure to temperatures above 65°C for 30 minutes
- Animals may serve as reservoirs for human infections
  - Calves
  - Production animal wastewater runoff



# Epidemiologic considerations

- Environmentally resistant oocysts
- Numerous potential reservoir hosts
- Person to person transmission
- In hospital transmission
- Carrier state of infected animals and humans
- Immunosuppressed patients are more susceptible

## *E. coli*



- Common bacteria capable of causing disease in humans
- Some types more pathogenic than others
- Watery or bloody diarrhea, fever, abdominal cramps, nausea, vomiting
- Severe cases can lead to kidney failure
- Passed to people in contaminated food
- Also passed through contact with manure from calves and cattle



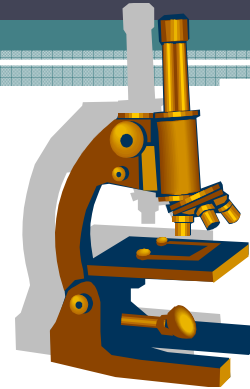
## *E. coli*

- Animals do not have to be ill to transmit the bacteria
- Avoid contact with fecal material
- Wash hands thoroughly with running water and soap
- Be cautious with children around animals (including petting zoos)
- If you experience gastrointestinal illness inform your supervisor, the Attending Veterinarian and your physician.

# Q fever

- Caused by a bacteria, *Coxiella burnetti*
- Primary reservoirs are cattle, sheep and goats
- Linked to abortion in sheep and goats
  - Bacteria shed in amnionic fluid, placenta
- The bacteria is excreted in the milk, urine and feces of the infected animal
- The bacteria is resistant to heat, drying, and many common disinfectants
- Human exposure is by inhalation of dried excreta, or ingestion of contaminated milk
  - The incubation period is 2 to 3 weeks

# Q fever



- Diagnosis is difficult as the clinical signs are non-specific
- Serology can be helpful – look for antibody to the disease agent
- Tetracycline is the drug of choice for treatment
- Chronic Q fever is much more difficult to treat
- This is an occupational exposure for anyone working in animal health related industries



# Q fever



- Most infected humans do not show clinical illness
- Those that do get sick develop flu-like illness and most recover
- Pneumonia can develop; 1 to 2 % of acute cases can result in fatalities
- Chronic disease develops in a small percentage of patients
  - Tend to see infections of the heart valves, particularly in patients that have a history of valvular disease or valve surgery
  - Chronically ill patients (cancer, kidney disease) are also at risk

# Q fever

- Prevention

- Education about the disease
- Appropriate disposal of birth products from sheep and goats
  - Wear gloves when handling placenta and fetus
- Use only pasteurized milk
- Laboratory safety where appropriate
- Vaccinate where appropriate
- Quarantine animals where appropriate

# Anthrax



- Caused by the bacterium, *Bacillus anthracis*
- The spore form of the bacteria is found in the environment and transmitted to people and animals
- There are basically three types of infection
  - Skin
  - Pulmonary
  - Digestive
- The bacteria is not spread from human to human
- Infection in humans is due to exposure to the spores either on the skin of infected animals, by aerosol or through ingestion

# Anthrax

- Occurs in a variety of wild and domestic animals
  - Particularly serious in cattle, sheep, goats, bison, horses, deer
- Testing for the organism is typically done in a laboratory setting
- Vaccination is available for at risk groups
- Spores can remain dormant in the soil for years, therefore, an infected premise is considered contaminated from that point forward

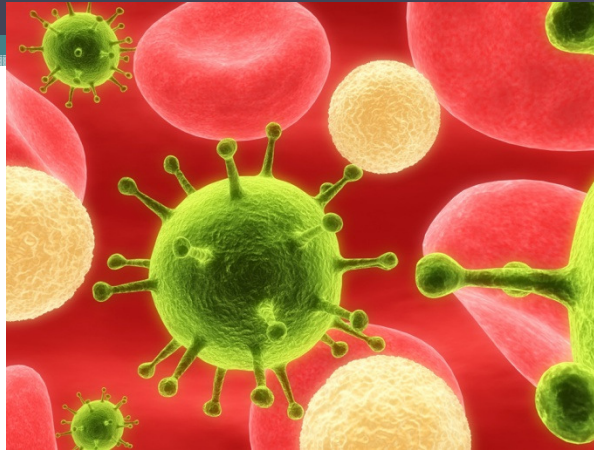


# Anthrax

- Cutaneous infections form a non-healing ulcer with a black center
- Digestive infections result in nausea, anorexia, bloody diarrhea, fever, stomach pain
- Pulmonary infections include a wide variety of respiratory signs and flu-like illness
- Clinical signs typically occur within a week of exposure
- Treatment is with antibiotics



# Anthrax



- Prevention is through judicious handling of anthrax suspect cases
  - Gloves
  - Do not eat meat from animals that die of unknown causes
  - Care in handling animal hides
- Proper disposal of anthrax positive cases
  - Burn on site