

Master of Public Health

Applied Practice Experience

by

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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Chapter 1 - Portfolio Products

For my Applied Practical Experience (APE), I partnered with the National Agricultural Biosecurity Center (NABC). The NABC was developed from Kansas State University's Homeland Defense Food Safety, Security, and Emergency Preparedness Program in 1999. The center works with local, state, and federal agencies, as well as with experts from around the world on topics such as homeland security and one health. The center's objectives include reviewing agricultural policy, procedures, and training, as well as educating the public about agroterrorism. The NABC is housed at the Biosecurity Research Institute (BRI) in Manhattan, Kansas.

For my APE Project, I worked with the NABC to create educational resources for multiple different audiences to use when faced with common zoonotic diseases, especially zoonotic diseases found in Kansas. Through discussions with experts from the NABC and the Kansas Department of Health and Environment (KDHE), we were able to determine the top zoonotic diseases of concern in Kansas as well as identify information important for both human and veterinary medical professionals to know about each disease. This information included topics such as common signs and symptoms, diagnostics, routes of transmission, treatment options, and client/patient communication. I then used the collected information to create seven informational handouts for practitioners to use when faced with these zoonotic diseases,

After the creation of the "One Health Briefs for Practitioners," we decided to further the project and create similar handouts for animal owners. The ten owner handouts I created included nine focusing on specific zoonotic diseases and one covering the potential health hazards of feeding raw meat-based diets to pets. I gathered my information for these handouts through a variety of sources including the Centers for Disease Control and Prevention, the American Veterinary Medical Association, the World Health Organization, and the Kansas State Veterinary Diagnostic Laboratory. All information was reviewed by Kansas's State Public Health Veterinarian, Dr. Erin Petro.

Table 1.1 Summary of Portfolio Products

Portfolio Product		Description
1.	One Health Briefs for Practitioners: Tularemia	I created an information handout for both human and veterinary practitioners to reference information about tularemia. The

		handout includes basic information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
2.	One Health Briefs for Practitioners: Toxoplasmosis	I created an information handout for both human and veterinary practitioners to reference information about toxoplasmosis. The handout includes basic information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
3.	One Health Briefs for Practitioners: Rabies	I created an information handout for both human and veterinary practitioners to reference information about rabies. The handout includes basic information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
4.	One Health Briefs for Practitioners: Q Fever	I created an information handout for both human and veterinary practitioners to reference information about Q fever. The handout includes basic information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
5.	One Health Briefs for Practitioners: Ringworm	I created an information handout for both human and veterinary practitioners to reference information about ringworm. The handout includes basic information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
6.	One Health Briefs for Practitioners: Zoonotic Influenza	I created an information handout for both human and veterinary practitioners to reference information about zoonotic influenza. The handout includes basic

		information about the disease itself, pathology, clinical signs, diagnostic tests, and more.
7.	One Health Briefs for Practitioners: Backyard Poultry	I created an information handout for both human and veterinary practitioners to reference information about diseases associated with backyard poultry. The handout includes basic information about what backyard poultry is, common zoonotic diseases, and how to prevent disease transmission.
8.	Owners' Guide to Tularemia	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with tularemia.
9.	Owners' Guide to Toxoplasmosis	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with toxoplasmosis.
10.	Owners' Guide to Rabies	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with rabies.
11.	Owners' Guide to Q Fever	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with Q fever.
12.	Owners' Guide to Ringworm	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with ringworm.
13.	Owners' Guide to Zoonotic Influenza	I created an informational handout that veterinarians can provide clients if an animal is

		suspected to have or diagnosed with influenza.
14.	Owners' Guide to Helminthiasis	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with helminthiasis.
15.	Owners' Guide to Cryptosporidium	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with cryptosporidium.
16.	Owners' Guide to Giardia	I created an informational handout that veterinarians can provide clients if an animal is suspected to have or diagnosed with giardia.
17.	Owners' Guide to Raw Meat-Based Diets	I created an informational handout that veterinarians can provide clients if they currently feed or are thinking about feeding their pets raw meat-based diets (RMBDs). The handout focuses on some of the infectious disease implications for both pets and owners.

Table 1.2 Portfolio Products and Competency Addressed

Portfolio Product		Number and Competency Addressed	
1-16	One Health Briefs and Owners' Guides	13	Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
		18	Select communication strategies for different audiences and sectors
		19	Communicate audience-appropriate public health content, both in writing and through oral presentation
		21	Perform effectively on interprofessional teams
17	Owners' Guide to Raw Meat-Based Diets	19	Communicate audience-appropriate public health content, both in writing and through oral presentation
		22	Apply systems thinking tools to a public health issue

Chapter 2 - Competencies

Competency #13: Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes

At the beginning of my Applied Practical Experience, I needed to identify important stakeholders that could best assist me in creating informational handouts about zoonotic diseases. After attending an informational session on current efforts in Kansas to prevent the spread of rabies, I reached out to some of the professionals in attendance. These health professionals included the state public health veterinarian, Dr. Erin Petro, DVM, MPH, a vector-borne disease epidemiologist, Stephanie Lindemann, MPH, and an infectious disease physician, Dr. Kellie Wark, MD, MPH. Discussions were held with these health professionals, along with members of the National Agricultural Biosecurity Center to determine what diseases and information are most important for veterinary and human medical professionals to know.

Competency #18: Select communication strategies for different audiences and sectors

An important task for this project was to find ways to effectively communicate with veterinary and human medical professionals as well as with animal owners. We discussed multiple different methods for our target audiences to find information about zoonotic diseases. We decided to create brief informational handouts to cover the important information for both practitioners and pet owners. These handouts needed to be brief summaries of the important topics that people should understand when faced with zoonotic diseases. By keeping the handouts short, but also providing links or QR codes to more information, practitioners and owners can quickly pick out the information they need immediately, but also have resources to learn more about the topic if they choose.

Competency #19: Communicate audience-appropriate public health content, both in writing and through oral presentation

To build the multidisciplinary team to create the handouts, I had to present my project idea to the selected group of individuals. This required me to engage people from multiple professions to explain why these handouts are important. Further, to create the handouts, I had to think specifically about who would be utilizing each handout and what information would be valuable and

understandable. For the “One Health Briefs for Practitioners,” the general information about the diseases needed to be understood by both veterinary and human medical professionals. The later sections needed to be more focused on either veterinarians or human practitioners. When creating the “Owners’ Guides,” I needed to ensure the handouts were written using lay terms that the general public could understand. Through changing writing and oral presentation styles based on the intended audience, I was able to effectively share information on zoonotic diseases.

Competency #21: Perform effectively on an interprofessional team

A large part of this experience was building and working with an interprofessional team consisting of public health professionals, veterinarians, epidemiologists, and an infectious disease physician. Team interactions took place through multiple platforms including Zoom meetings, emails, and in person discussions. The team’s main goal was to identify zoonotic diseases of highest concern to Kansas, what information should be provided in the handouts, and what platforms the handouts should be shared through. I also worked with members of the team to reference information and review the handouts.

Competency #22: Apply systems thinking tools to a public health issue

Systems thinking is important when discussing public health issues. One specific example of how a systems thinking tool was used in this project was for the “Owners’ Guide to Raw Meat-Based Diets” handout. As raw pet diets are becoming more popular in the United States, there is an increasing risk of zoonotic and/or foodborne diseases to be spread. A causal loop diagram was used to best identify causes of disease transmission from raw meat-based diets to pets and pet owners. I used the information gained from the diagram to determine what information was most critical to include in the handout.

Table 2.1 Summary of MPH Foundational Competencies

Number and Competency		Description
13	Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes	I proposed and built a team of stakeholders that have direct impacts on zoonotic disease spread in Kansas.

18	Select communication strategies for different audiences and sectors	I created brief informational handouts for veterinarians, human practitioners, and pet owners to reference when faced with different zoonotic diseases.
19	Communicate audience-appropriate public health content, both in writing and through oral presentation	I presented information about the importance of accessibility to zoonotic disease information for health professionals. I then created different informational handouts for various audiences about the common zoonotic disease.
21	Perform effectively on interprofessional teams	I worked with an interprofessional team including public health professionals, veterinarians, and physicians to identify zoonotic diseases of concern in Kansas.
22	Apply systems thinking tools to a public health issue	I used a causal loop diagram to determine what information is important for owners to know about disease transmission from feeding pets raw meat-based diets.

Table 2.2 MPH Foundational Competencies Course Mapping

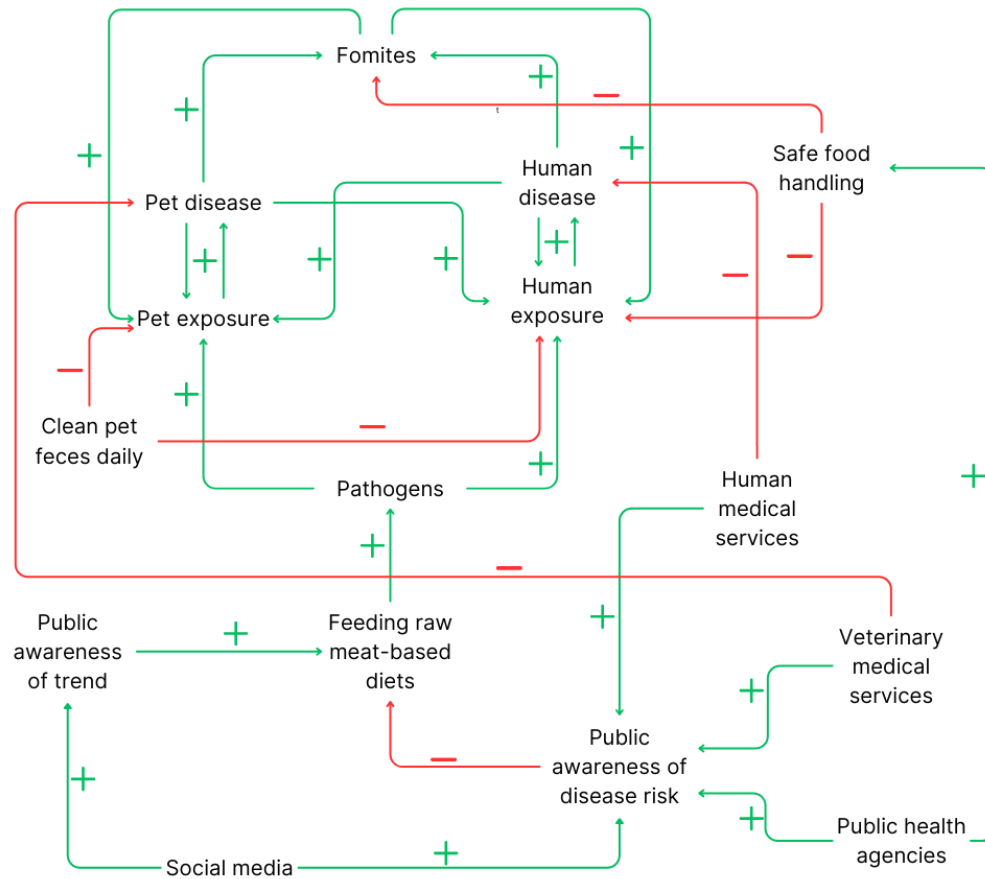
22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
Evidence-based Approaches to Public Health					
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	x		x		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	x	x	x		
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	x	x	x		
4. Interpret results of data analysis for public health research, policy or practice	x		x		
Public Health and Health Care Systems					
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		x			
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels					x
Planning and Management to Promote Health					
7. Assess population needs, assets and capacities that affect communities' health		x		x	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs					x
9. Design a population-based policy, program, project or intervention			x		

10. Explain basic principles and tools of budget and resource management		x	x		
11. Select methods to evaluate public health programs	x	x	x		
Policy in Public Health					
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		x	x	x	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		x		x	x
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		x			x
15. Evaluate policies for their impact on public health and health equity		x		x	
Leadership					
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		x			x
17. Apply negotiation and mediation skills to address organizational or community challenges		x			
Communication					
18. Select communication strategies for different audiences and sectors	DMP 815, FNDH 880 or KIN 796				
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	DMP 815, FNDH 880 or KIN 796				
20. Describe the importance of cultural competence in communicating public health content		x			x
Interprofessional Practice					
21. Perform effectively on interprofessional teams		x			x
Systems Thinking					
22. Apply systems thinking tools to a public health issue			x	x	

Table 2.3 Application of Systems Thinking Tools to a Public Health Issue

Use of Systems Thinking Tools	
Systems Thinking Tool	Description of Use
Causal Loop Diagram	A causal loop diagram (CLD) was used to help examine the relationships of variables surrounding diseases spread from feeding raw meat-based diets (RMBDs) to pets. The casual relationships outlined in the diagram were used to better understand the diseases can be spread and what entities should be involved with the mitigation of the diets. This information was then used to create the “Owners Guide to Raw Meat-Based Diets” handout (Portfolio Project 17).

Disease from RMBDs Causal Loop Diagram



Appendix

Appendix 1: One Health Briefs for Practitioners: Tularemia

One Health Briefs For Practitioners: Tularemia

What is Tularemia?

Tularemia, also called Rabbit Fever or Deer Fly Fever, is a disease caused by the gram-negative coccobacillus, *Francisella tularensis*.

Tularemia has over 100 host species with the most common being rodents, rabbits, cats, humans, dogs, sheep, and birds.

How is Tularemia spread?



Tularemia is primarily spread through arthropod vectors. Tick species in the U.S. that can transmit the bacteria are the American Dog Tick (*Dermacentor variabilis*), Wood Tick (*Dermacentor andersoni*), and the Lonestar Tick (*Amblyomma americanum*). Deer flies (*Chrysops* spp.) can transmit the bacteria as well.

Other methods of transmission include contact with or consumption of infected animal tissues or contaminated water, cat bites, and inhalation.

Veterinary Medical Professionals

Common signs and symptoms: Symptoms vary based on route of entry with ulceroglandular tularemia being the most common type. Signs in cats and rabbits can include lymphadenopathy, lingual or oral ulcers, abscesses, fever, splenomegaly, and hepatomegaly.

Diagnostics: Veterinarians with patients suspected to be infected with *Francisella tularensis* should contact the Kansas Veterinary Diagnostic Laboratory to submit samples. Necropsies should only be performed by a qualified pathologist under a biosecurity hood.

PPE: Veterinary staff should use gloves, eye and face shields, and gowns when working with suspected infected animals. All surfaces and instruments that contact the animal should be cleaned with an appropriate disinfectant.

Owner Communication: Owners should be informed of the zoonotic potential and that animals treated with antibiotics are no longer infectious after 72 hours. Clients are encouraged to discuss health concerns with their local health department or medical provider.



Human Medical Professionals

Common signs and symptoms: Symptoms vary based on route of entry with ulceroglandular tularemia being the most common type. Most signs are non-specific and can include fever, chills, headache, malaise, and chest pain.

Diagnostics: The most common diagnostics used for Tularemia in human patients include culture and serology. Wounds believed to have caused the infection should be cultured. Suspected cases without wounds or ulcers should utilize serology.

Patient Communication: Patients should be asked if they have any exposure to animals such as cats or rabbits, whether domestic or wild, as well as raw or under cooked meat. They should also be asked if they have been to an area infested by ticks or deer flies, or if they have recently mowed. Patients should be informed that there is no evidence that Tularemia can spread from person to person.

References

American Veterinary Medical Association. (2003). Tularemia facts. <https://www.avma.org/tularemia-facts>
Centers for Disease Control and Prevention. (2018). Tularemia. <https://www.cdc.gov/tularemia/index.html>

Appendix 2: One Health Briefs for Practitioners: Toxoplasmosis

One Health Briefs For Practitioners: Toxoplasmosis

What is Toxoplasmosis?

Toxoplasmosis is a zoonotic disease caused by the intracellular protozoal parasite, *Toxoplasma gondii*.

T. gondii can infect nearly all warm-blooded animals, however, cats are the only definitive host.

How is Toxoplasma spread?

Toxoplasmosis is the leading cause of death due to foodborne disease. Consumption of contaminated water, produce, and raw or under-cooked animal tissues, such as meat, are the most common routes of infection.

Other methods of transmission include fecal-oral from improper hygiene techniques when cleaning cat feces or gardening, and transplacentally from mother to fetus.



Veterinary Medical Professionals

Common signs and symptoms: Most patients are typically asymptomatic. However, some patients may present with diarrhea, fever, emesis, abortion, and/or respiratory, ocular, or neurological disease. Species of most concern include cats, goats, and sheep. This disease can be fatal in some cats.



Diagnostics: A centrifugal fecal exam can be performed to determine if cats are shedding the protozoan in their feces due to intestinal infections. Serologic testing can be performed to detect systemic infections in cats as well as other species.

PPE: Veterinary staff should use gloves when working with patients or fecal material. Hands should be washed after removing gloves and following exams or diagnostics tests on suspect animals.

Owner Communication: Owners, especially those who may be pregnant, should be informed of the zoonotic potential and encouraged to talk to their medical provider about diagnostic testing if concerned. Veterinarians should discuss safe methods of cleaning pet feces and that cat feces is typically only infectious for two weeks, and stress the importance of keeping cats indoors.

Human Medical Professionals

Common signs and symptoms: Although most patients infected will be asymptomatic, fever, muscle pains, and other flu-like symptoms can develop. Pregnant women infected are at the highest risk of complications, including spontaneous abortion. Fetuses with congenital infections can develop serious conditions such as ocular disease, mental disability, or seizures.

Diagnostics: The most common test used for the diagnosis of Toxoplasmosis is serology. Immunofluorescence (IFA) stains can be used to detect the protozoal organisms from tissue biopsies and cerebral spinal fluid.

Patient Communication: Patients should be asked about their diet and food handling techniques, including if raw or under-cooked animal tissues or raw goat milk are included in their diet. Patients should also be asked if they have had any exposure to animals, especially cats that are allowed to hunt or eat raw meat based diets, if they have come into contact with sand boxes that may be used by cats, and about hobbies, such as gardening, which may expose people unknowingly to cat feces.

References

American Veterinary Medical Association. (2023). Toxoplasmosis. <https://www.avma.org/resources/pet-owners/petcare/toxoplasmosis>

Centers for Disease Control and Prevention. (2023). Toxoplasmosis. <https://www.cdc.gov/tularemia/index.html>

Appendix 3: One Health Briefs for Practitioners: Rabies

One Health Briefs For Practitioners: Rabies

What is Rabies?

Rabies is a deadly zoonotic disease caused by the negative-sense RNA Lyssavirus, Rabies virus.

Rabies can infect all mammals and is considered to have a 100% fatality rate after the onset of symptoms.

How is Rabies spread?

Rabies is primarily spread through direct contact with the saliva of infected animals. Mostly commonly, this occurs through a bite. However, contact of saliva with open wounds or mucus membranes should also be considered.

Other less potential methods include scratches and contact with nervous or brain tissue.



Veterinary Medical Professionals

Common signs and symptoms: Symptoms of rabies in animals can vary based on the stage of disease and species. Some of the most common symptoms can include ataxia, paralysis, seizures, aggression, and excessive salivation.



Diagnostics: The most common diagnostic test is a postmortem direct fluorescent antibody test (dFA) of brain tissue. Rabies in animals is reportable in the state of Kansas and samples should be submitted to the Kansas State Veterinary Diagnostic Laboratory (KSVDL).

PPE: Veterinary staff should use extreme caution when working with suspected rabid animals. Heavy rubber gloves, masks, eye protection, and protective gowns should be worn when decapitating suspected animals. Staff should be vaccinated against the virus.

Owner Communication: Owners and those who have come into contact with the animal should be informed of the zoonotic potential. They should be encouraged to talk to the local health department and/or their medical provider, especially if they have come into contact with saliva.

Human Medical Professionals

Common signs and symptoms: Symptoms of rabies in humans typically begin as non-specific flu like symptoms that progress to cerebral disease, agitation, hydrophobia, and hallucinations. Patients suspected to be infected with rabies should immediately be reported to the state health department.

Post-Exposure Prophylaxis (PEP): Not all animal bites require PEP. State and local guidelines should be used to determine when PEP should be administered with bite and non-bite exposures. Bats found in rooms with children as well as adults who are asleep or impaired are considered exposed.

Diagnostics: Multiple ante-mortem tests including RT-PCR and virus isolation can only be performed to diagnose rabies in the terminal stage of disease. Collected samples should include CSF, skin biopsies, saliva, and serum.

Patient Communication: Bites and scratches from wildlife, bats, and stray animals present the greatest risk for rabies exposure. Patients should be educated to avoid handling or petting these animals and to seek medical care if they are bitten or scratched or consult public health if they find a bat in their home.

References

Kansas State Veterinary Diagnostic Laboratory. (2023). Rabies Laboratory. <https://ksvdl.org/laboratories/rabies-laboratory/>

Centers for Disease Control and Prevention. (2022). Rabies. <https://www.cdc.gov/rabies/index.html>

Appendix 4: One Health Briefs for Practitioners: Q Fever

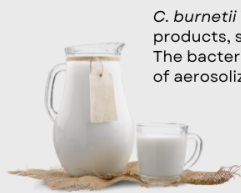
One Health Briefs For Practitioners: Q Fever

What is Q Fever?

Q Fever is a disease caused by the gram-negative, obligate intracellular bacteria, *Coxiella burnetii*.

C. burnetii can infect many animals, but, is most commonly associated with infections in cattle, sheep, goats, and occasionally humans.

How is Q Fever spread?



C. burnetii is shed from the milk, urine, feces and birth products, such as the placenta, of infected animals. The bacteria is primarily spread through the inhalation of aerosolized dust particles that contain the bacteria.

Another route of infection is through the consumption of undercooked animal tissues or unpasteurized milk products. Some species of ticks may also play a role in transmission, however, this is considered controversial and not proven.

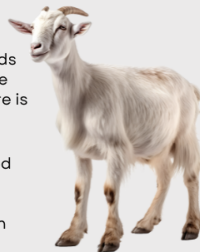
Veterinary Medical Professionals

Common signs and symptoms: The most common signs of Q Fever infection in animals such as cattle, goats, or sheep are abortions or stillbirths. Other symptoms are typically non-specific and can include fever, anorexia, and lethargy.

Diagnostics: As many animals may be asymptomatic, diagnosis may be difficult. Serological testing can be used to screen herds for *C. burnetii*. Other diagnostic tools available include PCR or immunohistochemistry. Culture is typically not used due to the bacteria being highly pathogenic.

PPE: Gloves should be worn and hands washed when handling tissues or excretions from animals that may be infected. Masks are also recommended when assisting with parturition of a suspect animal.

Owner Communication: Owners of animals infected with *C. burnetii* should be informed of the zoonotic potential of the bacteria. They should be encouraged to use proper PPE and hand hygiene when working with potentially infected animals.



Human Medical Professionals

Common signs and symptoms: Many people infected with *C. burnetii* are asymptomatic. Symptomatic individuals may develop non-specific symptoms such as fever, headache, and muscle pain. More serious infections may lead to miscarriage, pneumonia, or chronic Q fever.

Diagnostics: For definitive diagnosis of Q Fever PCR and/or serological testing on acute and convalescent samples is used. Treatment should not be withheld pending laboratory results and should be initiated based on clinical signs and patient history. Culture is not typically useful in the diagnosis of Q fever.

Patient Communication: Patients suspected of having Q Fever should be asked if they have come into contact with agricultural animals, particularly sheep, goats, or cattle or if they consume raw milk or dairy products. Patients should be informed of the zoonotic potential of the disease and should be advised on proper safety precautions to minimize the risk of future infections.

References

World Organization for Animal Health. (2023). Q Fever. <https://www.woah.org/en/disease/q-fever/>
Centers for Disease Control and Prevention. (2019). Q Fever. <https://www.cdc.gov/qfever/index.html>

Appendix 5: One Health Briefs for Practitioners: Ringworm

One Health Briefs For Practitioners: Ringworm

What is Ringworm?

Ringworm, also known as tinea or dermatophytosis, is an infectious disease caused by fungus. There are multiples species that cause ringworm.

Ringworm can affect many species, especially mammals such as humans, dogs, cats, sheep, and cattle. Many species of fungus that cause dermatophytosis are species specific, however, some are zoonotic .

How is Ringworm spread?



Ringworm is primarily spread through direct contact with three primary sources. These include direct contact with infected people, infected animals, or contagious spores in the environment.

Since the fungus prefers dark, moist environments, places such as locker rooms and communal showers often harbor ringworm.

Veterinary Medical Professionals

Common signs and symptoms: Animals that contract ringworm will likely present with round, hairless areas on their skin. Some of the most common species infected include dogs, cats, sheep, and cattle.

Diagnostics: There are multiple different diagnostic tools and tests that can be used to diagnose ringworm. Some tests include the Wood's Lamp Examination, direct microscopic examination, and culture.

PPE: Since ringworm is a highly contagious disease, veterinary professionals should not allow bare skin to come into contact with infected patients. Gloves and gowns should be worn to prevent the spread of disease. Hands should also be washed thoroughly afterwards.



Owner Communication: Owners should be informed of the zoonotic potential of the fungus. They should be encouraged to not allow their animals to come into contact with other animals and hands should be washed after handling infected animals or items that may act as fomites such as halters, collars, or leads.

Human Medical Professionals

Common signs and symptoms: Ringworm in humans typically presents with circular areas of red, scaly, and often itchy skin.

Diagnostics: There are multiple options for ringworm diagnostics. Potassium hydroxide preparation of skin scrapings, fungal culture, PCR, and the Wood's Lamp Examination are all accepted methods to diagnose ringworm.

Patient Communication: Patients should be asked if they have any exposure to animals such as dogs, cats, or cattle, whether domestic or wild. They should also be asked if they regularly use public showers or locker rooms. If the fungus is determined to be a zoonotic species, patients should be informed of its potential to spread to pets in addition to the typical transmission to other humans.

References

Centers for Disease Control and Prevention. (2014). Ringworm.
<https://www.cdc.gov/healthypets/diseases/ringworm.html>
Centers for Disease Control and Prevention. (2022). Ringworm.
<https://www.cdc.gov/fungal/diseases/ringworm/health-professionals.html>

Appendix 6: One Health Briefs for Practitioners: Zoonotic Influenza

One Health Briefs For Practitioners: Zoonotic Influenza

What is Zoonotic Influenza?

Influenza, commonly called the flu, can infect multiple different species. However, most influenza viruses are species specific and not zoonotic.

Although uncommon, influenza A is known to occasionally be spread from animals to humans. The most common animals implicated in the spread of the disease to humans include poultry and swine.

How is Influenza spread?

Influenza virus is primarily spread through aerosolized respiratory droplets. Outbreaks are most likely to occur when large quantities of sick animals are kept in close quarters with limited ventilation or airflow.



Veterinary Medical Professionals

Common signs and symptoms: Swine typically present with respiratory disease with signs including coughing, conjunctivitis, and pyrexia. Poultry infected with influenza often present with both respiratory and digestive symptoms and very high mortality rates.



Diagnostics: Common diagnostic tests used to identify influenza virus in poultry and swine include RT-PCR, virus isolation, and ELISA.

PPE: Veterinary professionals who come into contact with poultry, swine, or other animals potentially infected with influenza should use caution. Gloves should be worn while handling animals and hands should be washed afterward. N-95 masks are also recommended to be worn.

Owner Communication: Owners of animals infected with influenza should be informed of the risk of zoonotic infection. They should be encouraged to avoid face-to-face contact with their animals, wash hands immediately after handling or feeding sick animals, and consult their healthcare provider if they develop fever, cough, or other upper respiratory symptoms. Depending on the species, public health monitoring may occur after an individual has been exposed to zoonotic influenza.

Human Medical Professionals

Common signs and symptoms: Zoonotic influenza presents with the same symptoms as typical influenza found in humans including fever, sore throat, cough, conjunctivitis, and fatigue. Although typically uncomplicated, some patients, especially those who are immunocompromised, may have more severe symptoms including encephalitis, sepsis, or even death.

Diagnostics: Multiple different tests are available to diagnose influenza, the most common being the "rapid influenza diagnostic tests" (RIDT). Other tests available include rapid molecular assays, RT-PCR, viral culture, or immunofluorescence assays.

Patient Communication: Patients presenting with symptoms of influenza should be asked if they regularly work with or come into contact with animals such as poultry or swine. Although zoonotic influenza infections are rare, rapid identification is necessary. If you suspect your patient has zoonotic influenza, contact the state or local health department for confirmatory testing. Patients who work with ill swine or poultry animals should be encouraged to use PPE, including fit-tested N-95 masks.

References

World Health Organization. (n.d.). Zoonotic Influenza. <https://www.who.int/news-room/spotlight/influenza-are-we-ready/zoonotic-influenza>

Centers for Disease Control and Prevention. (2022). Influenza (flu). <https://www.cdc.gov/flu/other/animal-flu.html>

Appendix 7: One Health Briefs for Practitioners: Backyard Poultry

One Health Briefs For Practitioners: Backyard Poultry

What is Backyard Poultry?

Keeping backyard poultry has become a popular hobby with increasing prevalence over the years. Poultry animals can include many different species with some of the most popular birds being chickens, ducks, turkeys, and geese.

Although many poultry animals are raised for egg and meat purposes, some may be raised as pets or for educational purposes.

How are diseases spread?

Poultry can be carriers of multiple infectious and zoonotic diseases. Some of these diseases can include *Salmonella*, *E. coli*, *Campylobacter*, and avian influenza.

Most zoonotic diseases spread by poultry are spread through fecal-oral routes, however, some may be aerosolized. Owners should wash their hands after handling their birds. Eggs should also be brushed off before storage in a refrigerator.



Veterinary Medical Professionals

Common signs and symptoms: Zoonotic diseases found in backyard poultry can have varying symptoms. Veterinarians should look for diarrhea, sudden death, decreased appetite and respiratory signs.

Diagnostics: Necropsy is often an integral part of poultry disease diagnosis, however, PCR and culture and sensitivity can also be used to more specifically identify pathogens.

PPE: Veterinary professionals should take the proper precautions when working with sick poultry animals including wearing gloves and washing their hands and equipment used.

Owner Communication: Clients that own backyard poultry should be informed of common zoonotic diseases such as *Salmonella*, and encouraged to take proper precautions to minimize disease transmission. Birds should only be purchased from reliable sellers and should be quarantined for 4 weeks before introducing them to the rest of the flock. Birds should also receive their recommended vaccinations.



Human Medical Professionals

Common signs and symptoms: Patients that have backyard poultry animals may become infected with various diseases. The clinical signs will vary based on the disease. Most commonly, these diseases will be enteric diseases such as Salmonellosis, resulting in diarrhea, abdominal pain, and fever.

Patient Communication: Patients should be asked if they keep poultry animals or eat farm-fresh eggs. Patients that may have contracted a disease from their poultry animals should be informed of zoonotic potential and educated on best practices to prevent themselves from becoming infected in the future by methods such as wearing gloves, washing hands, and cleaning bedding. Patients that consume farm-fresh eggs should also be encouraged to brush off eggs before storage or consumption.

References

Centers for Disease Control and Prevention. (2023). Backyard Poultry. <https://www.cdc.gov/healthypets/pets/farm-animals/backyard-poultry.html>
Centers for Disease Control and Prevention. (2023). Salmonella Outbreaks Linked to Backyard Poultry. <https://www.cdc.gov/salmonella/backyardpoultry-05-23/index.html>

Appendix 8: Owners' Guide to Tularemia



What is Tularemia?

Tularemia, also called Rabbit Fever, is a zoonotic disease caused by the bacteria *Francisella tularensis*. The disease can cause varying symptoms depending on the species infected and method of infection.

How did my pet become infected?

Tularemia can be transmitted through multiple pathways. Most commonly, infection happens from the bite of an infected tick or consuming animal tissues or milk from infected animals.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

Pets infected with tularemia are no longer considered infectious after 72 hours of antibiotic treatment and clinical improvement. Pet owners should use flea and tick preventatives to avoid future infections. They should also work to reduce fly populations and use tick repellents in infested areas. People should avoid animal bites/scratches and seek medical care if they feel unwell.

Should I seek medical treatment?

People who are exposed to Tularemia positive animals should contact their medical provider to determine the next steps.



Scan to learn more about tularemia from the Centers for Disease Control and Prevention (CDC).

Appendix 9: Owners' Guide to Toxoplasmosis



What is Toxoplasmosis?

Toxoplasmosis is a zoonotic disease caused by a protozoal parasite called *Toxoplasma gondii* which can infect many different species. The most commonly affected species includes cats, goats, sheep, and humans. Although most do not have any clinical signs, some pets may present with diarrhea, fever, or other symptoms such as respiratory disease.

How did my pet become infected?

Cats commonly are infected with *T. gondii* by eating infected mice or birds. It can also be spread through other routes including fecal contamination of water and vegetation, consuming raw animal products such as meat or raw goat milk.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted from animals to humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

Owners of pets infected with *Toxoplasma gondii* should take appropriate actions to prevent transmission to humans. Gloves should be worn when cleaning up pet feces, and hands washed thoroughly afterwards. Owners should not feed pets raw animal products such as raw or undercooked meat or unpasteurized milk, and cats should be kept indoors.

Should I seek medical treatment?

Most people do not need to seek medical treatment if a pet has toxoplasmosis. However, pregnant or immunocompromised individuals should consult with their primary medical provider due to risk of severe health complications in the fetus.



Scan to learn more about toxoplasmosis from the Centers for Disease Control and Prevention (CDC).

Appendix 10: Owners' Guide to Rabies



What is rabies?

Rabies is a zoonotic disease caused by the rabies virus. Rabies is fatal and considered to be incurable after the onset of symptoms in all species. Early symptoms typically begin with fever, weakness, or discomfort but then progress to symptoms such as agitation or aggression, hallucinations, hydrophobia (fear of water), salivation and eventually, death.

How do pets become infected?

The virus is transmitted through the saliva of infected animals. Animals typically become infected by being bitten by an infected wild animal, such as a skunk. Less commonly, scratches can also transmit the virus.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

What will happen to my pet?

If your pet has been bitten by another animal, you should immediately contact your local veterinarian. Your veterinarian may recommend that your pet receives additional vaccinations. Quarantine or observation may also be required depending on your pet's rabies vaccination status..

Should I seek medical treatment?

People who come into contact or own animals suspected to be infected with rabies should contact their health providers to discuss potential treatment.

How can I prevent myself or others from becoming infected?

To avoid contracting rabies virus, people should avoid coming into contact with wild or stray animals and animals expressing aggressive behaviors.



Scan to learn more about rabies from the Centers for Disease Control and Prevention (CDC).

Appendix 11: Owners' Guide to Q Fever



What is Q Fever?

Q Fever is a disease caused by infection with the bacteria, *Coxiella burnetii*. In animals, the bacteria most commonly causes abortions or stillbirths in cattle, sheep, and goats. In humans, the bacteria often does not cause illness. Those who do become sick may have symptoms such as headaches and fevers. Some cases can be more severe and lead to miscarriages, heart valve infections, or chronic symptoms.

How did my animal become infected?

The most common route of infection is through the inhalation of the bacteria from excretions or tissues such as milk, urine, feces, or reproductive tissues, such as placentas, from infected animals.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

Owners of animals infected with Q Fever should take appropriate precautions to prevent themselves from becoming infected. Gloves should always be worn and hands washed after handling potentially infected animals. This should also be done when handling reproductive tissues or when assisting an animal with delivery. Masks should be worn when working near or with infected animals.

Should I seek medical treatment?

Most people do not need to seek medical treatment if an animal is diagnosed with Q Fever. However, owners can inform their medical provider of the specific infection and ask what symptoms to watch for in all people in the household.



Scan to learn more about Q Fever from the Centers for Disease Control and Prevention (CDC).

Appendix 12: Owners' Guide to Ringworm



What is ringworm?

Ringworm, also called, dermatophytosis, is a zoonotic disease caused by fungus. The most common species in dogs and cats is *Microsporum canis*. In dogs and cats, ringworm typically appears as dry, patchy, bald spots on their skin. Treatment of ringworm in pets is a long process that typically takes weeks to months.

How did my pet become infected?

Ringworm is highly contagious through direct contact. Pets become infected by coming into contact with contagious fungal spores. These could be from their environment, however, direct contact with other infected animals is the more common transmission route.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

Infected animals should be kept away from other animals to reduce the spread. It is ideal to wear gloves when applying topical medication, otherwise, thoroughly wash hands with soap and hot water after petting or handling pets. Owners should also avoid face-to-face contact or nuzzling their pets. Infected pets should not be allowed to sleep with owners while they are being treated. All blankets, bedding, or places where pets lay should be cleaned.

Should I seek medical treatment?

Owners of pets diagnosed with ringworm should contact their health care provider to determine what symptoms to watch for.



Scan to learn more about ringworm from the Centers for Disease Control and Prevention (CDC).



What is zoonotic influenza?

Zoonotic influenza is caused by a similar virus that causes the flu in humans. Most types of influenza viruses can not spread to different species, however, a few such as Avian and Swine Influenza occasionally can spread to humans. Influenza viruses mainly cause respiratory illness with symptoms including cough, nasal and ocular discharge, fever, and fatigue. Those who are immunocompromised may be at risk for more severe symptoms.

How did my animal become infected?

Influenza viruses are spread through respiratory droplets. Animals become infected through contact with other sick animals or contaminated objects.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

People most at risk of being infected are those who work with swine and poultry, especially in enclosed spaces with minimal ventilation. To reduce the risk of contracting the flu, people who work with infected animals should wear gloves and wash their hands afterwards, wear N-95 face masks to prevent the inhalation of respiratory droplets and avoid face-to-face contact with their animals. Annual flu vaccination is also recommended.

Should I seek medical treatment?

Most people do not need to seek medical treatment if an animal is diagnosed with influenza. However, owners should inform their medical provider of the specific infection if they develop symptoms of influenza or upper respiratory illness.



Scan to learn more about influenza from the Centers for Disease Control and Prevention (CDC).



What is Helminthiasis?

Helminthiasis is an infection with a group of parasites called helminths. In small animals, these are commonly roundworms, tapeworms, and whipworms. Adult worms migrate to the digestive tract and live in the intestines. Sometimes the immature stages can migrate to other organs such as the eyes or brain and cause more severe symptoms like blindness.

How did my pet become infected?

Most pets become infected by ingesting feces or infected animal tissues. However, some of the parasites can penetrate the skin or be transmitted during lactation or pregnancy.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted from animals to humans. Animals do not have to show signs of illness to transmit some diseases. Not all helminths can be transmitted to humans, but, some specific species can.

How do I prevent myself or others from becoming infected?

Owners of pets infected with helminths should take precautions while pets are shedding the parasite eggs in their feces. Feces should be picked up and disposed of daily using good sanitation and hand washing techniques. Ensure pets do not eat their own or other animal's feces. Owners should not walk barefoot in any area where pets may defecate and should avoid allowing pets to lick their face or mouths.

Should I seek medical treatment?

Most people do not need to seek medical treatment if a pet is diagnosed with a helminth infection. However, owners can inform their medical provider of the specific infection and ask what symptoms to watch for in all people in the household. Children are especially susceptible to infection.



Scan to learn more about helminthiasis from the Centers for Disease Control and Prevention (CDC).



What is Cryptosporidium?

Cryptosporidium or "Crypto" is a protozoal parasite that can cause disease in animals and humans. There are many different species of *Cryptosporidium*, however, the species found in cattle is known to infect humans as well. The parasite most commonly causes severe, watery diarrhea. Most cases of disease in humans are caused by contaminated water and not contact with animals.

How did my animal become infected?

The parasite is spread through the feces of infected animals. When animals such as cattle consume food or water that has been contaminated with the feces of infected animals, they too can become infected with *Cryptosporidium*.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted between animals and humans. Animals do not have to show signs of illness to transmit some diseases.

How do I prevent myself or others from becoming infected?

As most outbreaks of *Cryptosporidium* in humans are caused by contaminated water, the best way to prevent infection is to avoid consuming water from places such as pools or standing water. People who work with cattle should take proper precautions as well. Hands should always be thoroughly washed after handling cattle. Gloves should also be worn when handling calves with diarrhea and hands washed promptly after removing gloves.

Should I seek medical treatment?

Most people do not need to seek medical treatment if a pet is diagnosed with cryptosporidium. However, owners can inform their medical provider of the specific infection and ask what symptoms to watch for in all people in the household.



Scan to learn more about cryptosporidium from the Centers for Disease Control and Prevention (CDC).



What is Giardiasis?

Giardia is a protozoal parasite that can infect both animals and humans. Most types or “assemblages” of *Giardia* are not zoonotic; however, *Giardia* Assemblage A is. Most commonly, the parasite causes symptoms such as diarrhea and abdominal pain. Some patients infected, both human and animal, may be asymptomatic and have no signs of disease.

How did my pet become infected?

Giardia is spread through the feces of infected animals and humans. When animals consume either water or food that has been contaminated with feces from other infected animals, they too can become infected.

What is a zoonotic disease?

Zoonotic diseases are diseases that can be transmitted from animals to humans. Animals do not have to show signs of illness to transmit some diseases. Not all *Giardia* types can be transmitted to humans, however, some can.

How do I prevent myself or others from becoming infected?

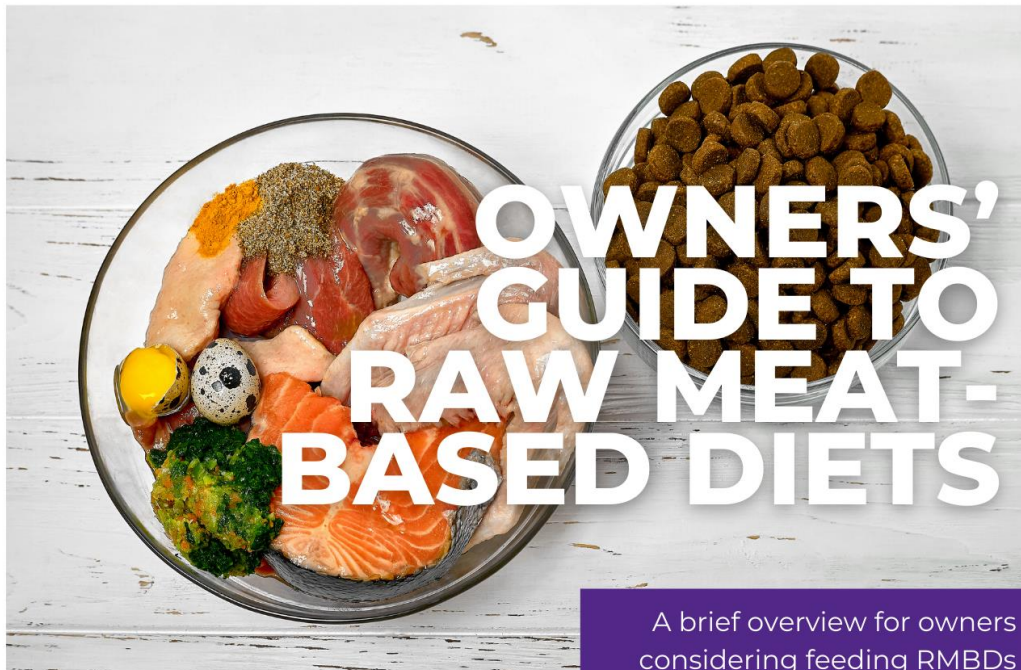
Giardia is most often spread to humans through contaminated water or improper hand hygiene. People should avoid drinking from unsafe sources such as pools, lakes, or ponds. Owners of infected animals should take precautions by wearing gloves when cleaning up feces and washing hands thoroughly after handling feces or petting unknown animals. Infected pets should be bathed to remove any feces.

Should I seek medical treatment?

Most people do not need to seek medical treatment if a pet is diagnosed with a *Giardia* infection. However, owners can inform their medical provider of the specific infection and ask what symptoms to watch for in all people in the household.



Scan to learn more about giardiasis from the Centers for Disease Control and Prevention (CDC).



What is a RMBD?

Raw meat-based diets (RMBD) are diets made for pets containing raw meat or other raw animal tissues.

Why do owners choose these diets?

Pet owners may choose to feed RMBDs to their pets because of multiple reasons. Some reasoning is that these diets are perceived as “healthier” or more “natural” compared to traditional kibble.

Do RMBD have health benefits?

Currently, there is no research-based evidence to prove that RMBDs have any health benefits compared to traditional kibble. However, RMBDs have been linked to pet illnesses due to improperly balanced diets and numerous bacterial and parasitic infections.

Can RMBD transmit diseases to pets?

Although all foods can potentially transmit diseases, raw meat or other raw animal tissues have a higher chance of transmitting serious pathogens such as *Salmonella*, *E. coli*, *Clostridium*, *Trichinella*, and *Toxoplasma gondii*.

Are there risks to humans?

Numerous disease outbreaks in humans have been linked to RMBDs, including *Salmonella* and *Listeria*. Immunocompromised persons and children are especially at risk for infection and severe outcomes.



Scan to learn more about pet food safety from the Centers for Disease Control and Prevention (CDC).