



Zoonotic Disease Addendum

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I. Introduction

The Colorado Department of Agriculture's (CDA) Zoonotic Disease Addendum is a supplemental document to the Department's emergency disease response plans providing additional information on current zoonotic diseases and the threat they pose to animal and human health. This document presents information on zoonotic diseases significant to public health (as defined by the World Health Organization), addresses the threat of bioterrorism, and offers recommendations on how animal health responders can reduce the risk of exposure to a zoonotic disease during an outbreak. The addendum concludes with a brief overview of state agencies involved in responding to zoonotic outbreak.

Zoonotic Diseases

Zoonotic diseases are transmitted from animals to humans and from humans to animals. Of the 1407 known diseases that affect humans, approximately 60% are zoonotic diseases. In addition to existing zoonotic diseases, the Centers for Disease Control and Prevention (CDC) estimates 75% of new and emerging diseases (diseases that appear in the population for the first time or that may have existed previously but are rapidly increasing in incidence or geographic range) are zoonotic. Experts estimate between 1940 and 2004 over 300 pathogens have caused new diseases in humans. Table 1.0, New and Emerging Zoonotic Diseases 1976-2011 lists zoonoses of interest to public health that have emerged over the last 35 years.

New and Emerging Zoonotic Diseases 1976-2011		
Year	Disease Name	Comment
1976	Cryptosporidium	Originally thought to be a disease of reptiles and birds. Transmission occurs direct via exposure to infected feces.
1976	Ebola	Virus found in Central Africa that is transmitted via direct contact with infected bodily fluids. Source of the Ebola virus is currently unknown.
1981	HIV/ AIDS	Since 1981 AIDS has killed more than 25 million people. Currently, 1.1 million Americans are among the 33 million people living with HIV, the virus that causes AIDS.
1982	E. Coli 0157:H7	First recognized as a cause of illness during an outbreak that was traced to hamburgers contaminated with <i>E. coli</i> 0157:H7 bacteria.
1993	Sin Nombre Virus	First recognized in 1993 after the investigation of an outbreak of sudden fatal respiratory illness in the southwestern United States.
1999	West Nile Virus	WNV arrives in New York. WNV is now found in 47 States.
2003	SARS	According to WHO, a total of 8,098 people worldwide became sick with SARS during the 2003 outbreak. Of these, 774 died.
2003	Monkey Pox	Monkeypox was reported among several people in the United States.
2003	H5N1 Influenza	Human cases first reported in 2003. Sixty percent of those people reported infected with the virus have died.
2003	Mad Cow Disease	The first case of mad cow disease in the United States discovered.
2009	Novel H1N1 Influenza	In June 2009, the WHO declared the new strain of swine-origin H1N1 as a pandemic.

Increased Emergence of Zoonotic Agents

According to the CDC, emergence of new zoonotic agents are increasing for the following reasons:

- global human and livestock animal populations continual growth, bringing increasingly larger numbers of people and animals into close contact;
- transportation advancements making it possible to circumnavigate the globe in less than the incubation period of most infectious agents;
- exposure to new pathogens through ecologic and environmental changes brought about by human activity; and,
- bioterrorist activities, supported by rogue governments as well as organized amateurs, are increasing, and in most instances the infectious agents of choice seem to be zoonotic.

Zoonotic Disease Transmission

Transmission of zoonotic (and non-zoonotic diseases) requires three components: disease agent or pathogen, a host, and a mode of transmission for the pathogen. Transmission of zoonoses occurs through three main mechanisms, contact, aerosol, and vector-borne. A brief description of each transmission method follows.

Contact Transmission

Transmission via contact can occur when pathogens enter a person directly via ingestion, open, mucous membranes exposure or an open wound. Such contact transmission may occur during handling animals. Indirect contact transmission can occur when persons come in contact with a fomite, such as a contaminated surface.

Aerosol Transmission

Aerosol transmission occurs when droplets are passed through the air from an infected animal or person and are inhaled or enter through mucous membranes. Aerosol transmission can occur over short distances when droplets are created by coughing or sneezing.

Vector-borne Transmission

Vector-borne transmission occurs when an insect acquires a pathogen from one animal and transmits it to a person. Such vector-borne diseases require a mosquito, flea, tick or other arthropod to transmit the disease from animals to humans.

II. Significant Zoonoses to Animal Health & Public Health

There are over 850 known zoonotic diseases in existence that vary in their degree of significance to public health. Due to the number of zoonotic diseases, this document presents information on four categories of zoonotic diseases grouped by the World Health Organization (WHO) that present a significant threat to animal health and public health. For additional information on zoonotic diseases that are significant in the U.S., see Appendix B.

Heamorrhagic Fever Viruses (HFVs)

The hemorrhagic fever viruses (HFVs) are a diverse group of organisms that cause disease resulting in fever and bleeding disorders. HFVs can be divided into four distinct families of viruses.

1. *Filoviridae*: Ebola and Marburg viruses
2. *Arenaviridae*: Lassa fever virus
3. *Bunyaviridae*: Crimean Congo hemorrhagic fever virus and Rift Valley fever virus
4. *Flaviviridae*: dengue, and yellow fever.

Transmission

For the most part, rodents and arthropods are the main reservoirs for viruses causing VHF. Reservoir hosts include deer mouse, cotton rat and other field rodents. Arthropod vectors include ticks and mosquitoes for some VHF. Hosts for Ebola and Marburg viruses are currently unknown.

Infection Control Measures

Contact with blood and bodily fluids of infected individuals and animals should be avoided. This is essential to preventing infection. Persons caring for animals or humans with suspected or confirmed VHF should use special protective measures: strict hand hygiene and double gloves; impermeable gowns; leg and shoe coverings; face shields or goggles for eye protection; and either N-95 masks or powered air-purifying respirators (to diminish the chance of airborne transmission). If resources are available, patients should be cared for in a negative pressure isolation room to comply with airborne precautions.

Influenza

Influenza is a common disease occurring in both humans and animals. Animal species affected by influenza mainly include horses, swine, domestic and wild birds and wild aquatic animals such as whales. There are three influenza viruses, A, B, and C. Influenza A is of most concern for cross-species infections. Birds represent a large reservoir of Type A influenza and have the capacity to spread to other animal species resulting in high morbidity and mortality.

Transmission

Influenza viruses are transmitted by animals and humans in aerosols created by coughing and sneezing, and by contact with nasal discharges, either directly or on fomites. In birds, the influenza viruses are shed in feces, saliva and nasal secretions.

Infection Control Measures

Seasonal Human Influenza

An annual vaccine is available for influenza A and B. The vaccine is given in the fall before the flu season. It contains the viral strains that are most likely to produce epidemics during the following winter, and it is updated annually. Other preventative measures include the avoidance

of contact with people with symptomatic disease, as well as hand washing and other hygiene measures.

Novel H1N1 Influenza

Preventative measures for reducing the risk of exposure to H1N1 Influenza are similar to those for seasonal influenza. Good hygiene and sanitation, including frequent hand washing, can help prevent human infections with swine influenza viruses. Protective clothing, gloves and other personal protective equipment also reduce exposure.

Avian Influenza Viruses

Controlling avian influenza epidemics in poultry will decrease the risk of exposure for humans. People working with infected birds should follow good hygiene practices and wear appropriate protective clothing such as boots (or shoe covers), coveralls, gloves and respirators. Additionally, the WHO recommends prophylaxis with antiviral drugs in people who cull birds infected with H5N1 viruses.

Prion Diseases

According to the CDC, prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response. The causative agent of TSEs is believed to be a prion. A prion is an abnormal, transmissible agent that is able to induce abnormal folding of normal cellular prion proteins in the brain, leading to brain damage and the characteristic signs and symptoms of the disease. Prion diseases are usually rapidly progressive and always fatal.

Prion diseases classified as zoonotics include Bovine Spongiform Encephalopathy (BSE), also referred to as “Mad Cow Disease”, and Variant Creutzfeldt-Jakob Disease (vCJD).

Transmission

BSE is a TSE affecting cattle and was first reported in the UK in 1986. The most likely route of exposure is through bovine-based food, although infectivity is mainly found in the brain and spinal cord of clinically ill animals over two years of age.

vCJD is strongly linked with exposure to the BSE pathogen. According to WHO, from October 1996 to November 2002, 129 cases of vCJD were reported in the United Kingdom (UK), six in France and one each in Canada, Ireland, Italy and the US.

Infectious Control Measures

Transmission of TSE's between cattle and humans is thought to occur through the ingestion of infected beef. To protect both livestock and humans from exposure to BSE and vCJD, USDA

FSIS has implemented safeguards through regulatory actions by preventing prohibited materials from entering the human food supply.

Neglected Endemic Zoonoses

An endemic zoonotic disease is a zoonotic disease that is always present in a certain populations or regions. Such diseases are not always present at high levels and they can be relatively rare; however, the defining feature of a regional endemic disease is that it can consistently be found in a population or geographic region. A list of common zoonotic endemic diseases affecting Colorado and the region are listed below.

Anthrax

The disease agent is spore forming bacterium that exists in the soil. Humans can acquire anthrax by coming in contact with an infected animal, inhaling contaminated dust or ingesting undercooked infected animal products. A vaccine to protect livestock is available where Anthrax is prevalent endemic. A vaccine is also available for humans who are considered at high risk for exposure to Anthrax.

Bovine Tuberculosis

Bovine tuberculosis is caused by bacteria that are most commonly seen in cattle and buffalo. Infected animals shed bacteria in respiratory secretions, feces and milk. Humans can become infected with TB through exposure from drinking infected milk, breathing in the bacterium shed by infected animals or direct contact with a cut or other skin breaks. Currently there is no effective TB vaccine for livestock. Humans can protect themselves by not drinking or eating raw milk products.

Brucellosis

Brucellosis is an infectious disease caused by a bacterium. Animals affected by Brucellosis include sheep, goats, cattle, pigs, horse and dogs. Wild animals affected include deer bison, elk, and moose. Brucellosis is usually spread by animals through infected birthing tissues and fluids. Humans can become infected by Brucellosis by eating or drinking infected raw milk products, direct contact with infected animal fluids, or inhaling infected droplets. Thoroughly cleaning and disinfecting areas exposed to infected animals will reduce the risk of spreading the disease from animal to animal. Humans can avoid infection by not eating and drinking raw milk or unpasteurized dairy products and by wearing the appropriate PPE when handling reproductive tissues.

Tularemia

Tularemia, also known as rabbit fever, is a disease caused by a bacterium. Usually seen in rabbits and other wild rodents, Tularemia can also affect livestock. Tularemia exists in the soil, water and in vegetation. Animals are infected by ingesting contaminated food or water. Animals may also be infected by inhaling the bacterium or through direct contact with entry

through mucous membranes or skin cuts. Human can get tularemia through direct contact with an infected animal, breathing in the bacteria in contaminated food or water or from the bite of an infected insect. Tularemia is difficult to prevent since it naturally exists in the environment and is spread by insects. Keeping livestock and pets away from infected animals and controlling ticks and biting flies will help protect animals from tularemia. Humans can reduce their risk of exposure by avoiding contact with wildlife, washing hands after touching any animals, applying insect repellents, and cooking all meats and food appropriately.

West Nile Fever

West Nile Fever is a virus that causes encephalitis or meningitis. WNV primarily affects birds but also affected bats, horses, cats, dogs and humans. WNV is spread by the bite of an infected mosquito. The best way to protect animals and humans from WNV is to prevent mosquito bites by keeping horses and companion animals inside during peak mosquito times and removing mosquito breeding sites. A vaccine against WNV is available for horses. Humans can apply mosquito repellants and wearing protective and light color clothing to prevent mosquito bites. Additional information on mosquito abatement methods is located in Section II, Environmental Control Measures.

Rabies

Rabies is a virus disease that can affect all mammals. Major reservoirs of rabies include wild animals such as raccoons, skunks, and coyotes. Rabies is spread through the bite of an infected animal whose saliva contains the virus. It can also be spread between animals through ingestion of unpasteurized milk. People can contract rabies through a bite of an infected animal or less commonly by inhaling the virus from infected tissues. Animals may be protected from rabies by receiving a vaccine and staying away from wildlife. People can protect themselves from contracting rabies by not handling or feeding wildlife.

III. Potential Bioterrorism Agents

Bioterrorism is the deliberate or threatened use of biological agents--viruses, bacteria, toxins or other agents-- to cause illness or death in people, animals, or plants. Since most priority bioterrorism agents are zoonotic in origin, there is a heightened awareness and concern about the possibility of bioterrorism involving agriculture, including livestock. Veterinarians and livestock owners may be the first to diagnose the early cases of a bioterrorist act in agriculture, as livestock can be sentinels of such an exposure.

The CDC produced a list of the most likely biological agents to be used in an act of bioterrorism and has prioritized these agents into A, B & C categories (see Appendix C for a complete list of each category agent). **Category A** agents and disease are easily transmitted from animal to person, (with the exception of smallpox, which has no animal reservoir) person to person, have a high mortality rate and have the potential for a major public health impact. **Category B** agents

and disease are moderately easy to disseminate and result in moderate morbidity rates and low mortality rates. **Category C** agents and diseases include emerging pathogens that could be engineered for mass dissemination.

Intentional Zoonotic Event Indicators

Indicators for intentional zoonotic agent release may include the following:

- The presence of a large epidemic with a similar disease or syndrome, especially in a discrete population
- Many cases of unexplained diseases or deaths
- More severe disease than is usually expected for a specific pathogen or failure to respond to standard therapy
- Unusual routes of exposure for a pathogen, such as the inhalational route for diseases that normally transmitted by a vector that is not present in the local area
- Multiple simultaneous or serial epidemics of different disease in the same population
- A single case of disease by a uncommon agent (smallpox, some viral hemorrhagic fevers, inhalational anthrax, pneumonic plague)

IV. Managing the Threat of a Zoonotic Disease

As stated in all CDA response plans, a fundamental responsibility of CDA is ensuring the safety of Department employees involved in responding to a disease outbreak. To meet this obligation, the CDA Homeland Security Director developed the responder health and safety program that encompasses the following components: assessing employee fitness for emergency work; providing for personal health protection via the use of protective equipment and decontamination procedures; and, medical monitoring to assure employees maintain fitness levels needed to conduct assigned activities. In addition to the CDA Health and Safety Program, added infection control procedures as recommended in a specific outbreak should be followed to reduce the risk of exposure to a zoonotic disease for animal health personnel.

According to the National Association of State Public Health Veterinarians (NASPHV), the full extent of zoonotic disease risk has not been fully addressed¹. Furthermore, a uniform guidance for controlling the spread of disease in general veterinary practices is limited. In light of this, the NASPHV recommends the following infection control measures to prevent the spread of zoonotic disease.

Personal Protective Actions

Infection control measures included in this component should be incorporated as best management practices for personnel working with livestock and other animals.

- ✓ **Hand Hygiene** - the single most important measure to reduce the risk of diseases transmission. Hands should be washed between animal contacts and after contact with any animal body fluids.

- ✓ **Use of Gloves and Sleeves** – wearing gloves provides additional protection for personnel handling livestock reducing the risk of disease transmission. NASPHV recommends changing gloves between examinations of individual animals or animal groups. Changing gloves will reduce the spread of pathogens from an animal or a fomite to another animal or person. Gloves should also be worn when cleaning.
- ✓ **Facial Protection** – Wearing facial protection will prevent disease transmission via exposure of mucous membranes of the eyes, nose and mouth of animal caretakers.
- ✓ **Respiratory Protection** – Preventing the inhalation of a zoonotic disease transmitted via the air will require respiratory protection. Although the need of such protection is limited to concerns involving aerosol transmission, it may be necessary under certain situations.
- ✓ **Protective Outerwear** – Wearing gear such as footwear, non-sterile gowns and head covers is intended to protect street clothes from contamination. Employees should be trained on how to remove outerwear properly to avoid contaminating themselves or their environments.

Additional guidance on the use of personnel protective equipment during a zoonotic response is located in the CDA Health and Safety Program.

Protective Actions during Veterinary Procedures- During a zoonotic disease outbreak, the following protective actions may be implemented to reduce the risk of disease spread.

- ✓ **Examination of Animals** – the most important measure to prevent the transmission of zoonotic diseases, hand hygiene protocols should be implemented before all examinations of animals. Responders handling and caring for animals should have access to running water, liquid soap and towels. NASPHV recommends using alcohol-based hand gels in conjunction with hand-washing. Protective outerwear gloves and additional PPE (See CDA Employee Health and Safety Program) appropriate for the situation should be worn by responders caring for animals.
- ✓ **Obstetrics** – Common zoonotic agents, such as *Brucella* and *Listeria* may be found in high concentrations in the birthing fluids. Veterinarian personnel should wear the appropriate PPE – gloves, sleeves, mask or respirator, face shield or goggles and impermeable protective outerwear—as needed to reduce the risk of exposure to possibly infectious materials.
- ✓ **Necropsy** – Due to the contact with possibly infectious body fluids, aerosols, and contaminated equipment, necropsy is a high risk procedure. Veterinarian personnel should wear the appropriate PPE – gloves, sleeves, mask or respirator, face shield or goggles and impermeable protective outerwear—as needed to reduce the risk of exposure to possible infectious materials. NASPHV recommends wearing cut-proof gloves to prevent sharps injuries. When band saws or other power equipment are used, respirators are recommended.

Decisions on whether to perform necropsy on animals suspected of having a reportable infectious disease or foreign animal disease should be made in consultation with the state veterinarian.

- ✓ **Diagnostic Specimen Handling** – Feces, urine aspirates, and swabs should always be presumed to be infectious. Protective outerwear and gloves should be worn when handling these specimens.

C. Environmental Infection Control

- ✓ **Isolation of Infectious Animals** - Animals infected with a zoonotic disease should be clearly identified so that their infection status is clearly understood by personnel. Signage should indicate that animal may be infectious and outline any additional precautions that should be taken.
- ✓ **Disinfection of Surfaces** - Properly cleaning all surfaces, including work areas and equipment will reduce the risk of transmission of zoonotic pathogens. Such surfaces and equipment should be cleaned between uses. Surfaces where animals are housed, examined or treated should be made of easily cleanable material. Before disinfection, surfaces should be cleaned to increase the effectiveness of disinfectants. When cleaning, personnel should avoid generating dust that may contain disease pathogens.
- ✓ **Handling of Laundry**- Soiled laundry should be handled with gloves to reduce the spread of pathogens. To prevent cross-contamination, separate storage and transport bins should be used for clean and dirty laundry.
- ✓ **Decontamination and Spill Response** – Spills and splashes of blood or other body fluids should be immediately sprayed with disinfectant and contained by dropping absorbent material on them. Personnel should wear the appropriate PPE when cleaning up the spill. Spilled material should be picked up and sealed in leak-proof plastic bags. After spill is removed, the area should be cleaned and disinfected.
- ✓ **Veterinary Medical Waste** – If not handled properly, medical waste is a potential source of zoonotic pathogens. In addition to following state regulations regarding handling medical waste, the American Veterinary Medical Association (AVMA) recommends voluntary compliance with the OSHA Bloodborne Pathogen Standard in order to best protect veterinary personnel.
- ✓ **Rodent and Vector Control** – Many significant zoonotic pathogens are transmitted by rodents or insect vectors. Hence, the principles of integrated pest management (IPM) are key to prevention and control of rodents and vectors. IMP practices include:
 - Sealing entry and exit points into buildings. Common methods include the use of caulk, steel wool, or lath metal under doors and around pipes.
 - Storing food and garbage in metal or thick plastic containers with tight lids
 - Disposing of food-waste promptly

- Eliminating potential rodent nesting sites (e.g. clutter, hay storage)
- Maintaining snap traps throughout the practice to trap rodents (check daily)
- Removing sources of standing water (empty cans, tires, etc.) from around the building to prevent breeding of mosquitoes.
- Installing and maintaining window screens to prevent entry of insects into buildings.

V. Colorado Agencies Involved in Zoonotic Outbreak Response

Colorado agencies that have a primary role in responding to a zoonotic disease outbreak are the Colorado Department of Public Health and Environment, the Colorado Department of Agriculture and the Colorado Division of Wildlife. Section V, provides an overview of state agencies who have a lead role in a zoonotic disease response as defined by the Colorado Revised Statutes (CRS).

Colorado Department of Public Health and Environment

According to Colorado Revised Statutes (CRS) 25-1-102 The Colorado Department of Public Health and Environment is responsible and authorized to investigate and control the causes of epidemic and communicable disease affecting the public health. As such, in the event of a zoonotic event affecting human health, the CDPHE will serve as the lead agency in charge of the outbreak response.

Colorado Department of Agriculture

As stated in Colorado Revised Statutes (CRS) 35-50-105, “The Commissioner of the Colorado Department of Agriculture is responsible for regulation related to livestock disease or other livestock emergencies among or affecting livestock in the state.” As such, the CDA will be responsible for the command and direction of actions related to the health of livestock during an outbreak of a highly contagious disease affecting livestock in Colorado¹. It is important to note, if the event impacts animals other than livestock as defined in CRS 35-1-102, the direction and authority to respond remains with CDPHE.

Colorado Division of Wildlife

The Colorado Division of Wildlife (DOW), under the direction of the Wildlife Commission (CRS 33-1-104) is responsible for the management of wildlife within the State of Colorado. During a zoonotic disease outbreak affecting wildlife, the DOW will serve as the lead agency for any wildlife response. The US Fish and Wildlife Service (US FWS) holds jurisdictional authority for migrating birds and will manage the direction and control for such species.

Table 2.0 Responsibility Matrix for Zoonotic Disease Outbreak

Response Action	Responsible Agency			
	CDA	CDPHE	CDOW	USFWS
Lead agency for the direct and control of a zoonotic disease response as defined by CSR 25-1-102.		✓		
Lead agency responsible for all aspects of public health.		✓		
Responsible for direction and authority for Colorado livestock as defined by CRS 35-50-105. ¹	✓			
Responsible for direction and authority for Colorado wildlife as defined by CRS 33-1-104.			✓	
Provide and dispense prophylaxis to State Agency's Emergency Responders.		✓		
Responsible for direction and authority of migrant birds.				✓
¹ Livestock means cattle, sheep, goats, swine, mules, poultry, horses, alternative livestock, and such domesticated animals as fox, mink, marten, chinchilla, beaver, and rabbits, and all other animals raised or kept for profit.				

Appendix A Acronyms

AVMA	American Veterinary Medical Association
BSE	Bovine Spongiform Encephalopathy
CDA	Colorado Department of Agriculture
CDC	Center for Disease Control and Prevention
CDPHE	Colorado Department of Public Health and Environment
CRS	Colorado Revised Statutes
DOW	Division of Wildlife
HFV	Hemorrhagic Fever Viruses
IPM	Integrated Pest Management
NASPHV	National Association of State Public Health Veterinarians
OSHA	Occupational Safety and Health Association
PPE	Personnel Protective Equipment
TB	Tuberculosis
TSE	Transmissible Spongiform Encephalopathies
USFWS	United States Fish and Wildlife Service
vCJD	Variant Creutzfeldt-Jakob Disease
WHO	World Health Organization
WNV	West Nile Virus

Appendix B Zoonotic Diseases of US Significance

Zoonotic diseases of importance in the United States, 2010. ¹				
Disease	Means of Transmission	Most Common Species Associated with Transmission to Human	Nationally Notifiable Human (H) or Animal (A)	Deaths in Human Reported
Acariasis	Contact	Dogs, cats, horses, goats sheep, swine & birds	No	No
Anthrax	Contact, Aerosol, Vector	Cattle, sheep goats, horses	H, A	Yes
Avian Influenza	Contact, Aerosol	Poultry, pet birds	H, A	Yes
Babesiosis	Vector	Cattle, rodents	A	Yes
Baylisascariasis	Contact	Raccons	No	Yes
Bordetella	Aerosol	Dogs, pigs, rabbits, guinea pigs	No	No
Brucellosis	Contact, Aerosol	Goats, cattle, swine, dogs and horses	H, A	Yes
Campylobacteriosis	Contact	Cattle, sheep, goats, pigs, dogs, cats birds, mink, ferrets, hamsters	No	Rare
Capnocytophaga	Contact	Dogs and Cats	No	Yes
Cat scratch disease	Contact	Cats	No	Rare
Chlamydiosis	Aerosol, Contact	Sheep, goats, llamas, cats, cattle	No	Yes
Contagious pustular dermatitis	Contact	Sheep, goats	No	No
Cryptococcosis	Aerosol	Pigeons, other birds	No	Yes
Cryptosporidiosis	Contact	Cattle (typically calves)	H	Yes
Dermatophilosis	Contact, Vector	Goats, Sheep, Cattle, Horses	No	No
Tapeworm	Vector	Dogs, Cats	No	No
Escherichia coli 0157:H7	Contact	Cattle, Goats, Sheep, deer	No	Yes

Disease	Means of Transmission	Most Common Species Associated with Transmission to Human	Nationally Notifiable Human (H) or Animal (A)	Deaths in Human Reported
Echinococcosis	Contact	Dogs, cats, wild canids	A	Yes
Ehrlichiosis	Vector	Deer, Rodents, Horses, Dogs	H	Yes
Equine encephalomyelitis	Vector	Birds, Horses	H, A	Yes
Hantaviral Diseases	Aerosol	Rodents	H	Yes
Influenza A	Contact, Aerosol	Poultry, Swine & ferrets	H,A	Yes
Leishmaniasis	Vector	Dogs, wild canids	A	Yes
Leptospirosis	Contact, Aerosol	Rodents, Pigs, Cattle, Sheep, Goats, Horses & Dogs	H	Yes
Listeriosis	Contact	Cattle, Sheep, Goats, Pigs, Birds, Dogs, Cats	H	Yes
Monkey Pox	Contact, Aerosol	Poultry, Birds, Aquarium Fish, Reptiles	A	Yes
Pasteurellosis	Contact	Dogs, cats, rabbits, rodents	No	No
Plague	Vector, Contact, Aerosol	Rodents, Cats, Rabbits	H,A	Yes
Psittacosis	Aerosol, contact	Pet Birds, Poultry	H, A	Yes
Q Fever	Vector, Contact, Aerosol	Goats, Sheep, Cattle, Rodents, Rabbits, Dogs, Cats	H, A	Yes
Rabies	Contact	Cats, Dogs, Cattle, and other domestic animals, wild carnivores, Raccoons, Bats,	H, A	Yes
Rocky Mountain Spotted Fever	Vector	Dogs, Rabbits, Rodents	H	Yes
Salmonellosis	Contact	Reptiles, Amphibians, Poultry, Horses, Swine, Cattle, Pocket Pets many species of	H	Yes
Staphylococcosis	Contact aerosol	Swine, Fish, other mammals	H	Yes
Toxoplasmosis	Contact	Cats	No	Yes
Tuberculosis, bovine	Aerosol, Contact	Cattle, Swine, Sheep, Goats	H, A	Yes
Tularemia	Vector, Contact, Aerosol	Rabbits, Pocket Pets, Wild Aquatic, Rodents Sheep, Cats, Horses, Dogs	H, A	Yes
West Nile Fever	Vector	Wild Birds	H, A	Yes

¹Journal of American Veterinary Medical Medicine. *NASPHV. Compendium of Veterinary Standard Precaution for Zoonotic Disease Prevention in Veterinary Personnel.* Vol 233, No. 3 August 1, 2008

Appendix C Centers for Disease Control and Prevention - Critical Biological Agents

Category A

High-priority agents include organisms that pose a risk to national security because they:

- can be easily disseminated or transmitted person-to-person;
- cause high mortality, with potential for major public health impact;
- might cause public panic and social disruption; and
- require special action for public health preparedness.

Category A agents include:

- Smallpox (non-zoonotic)
- Anthrax
- Plague
- Botulism
- Tularaemia
- Hemorrhagic fevers

Category B

Second highest priority agents include those that:

- are moderately easy to disseminate;
- cause moderate morbidity and low mortality; and
- require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

Category B agents include:

- Q fever
- Brucellosis
- glanders
- Venezuelan encephalomyelitis, eastern and western equine encephalomyelitis
- ricin toxin from castor beans
- epsilon toxin of *Clostridium perfringens*
- Staphylococcus enterotoxin B
- Psittacosis

Category C

Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of:

- availability;
- ease of production and dissemination; and
- potential for high morbidity and mortality and major health impact.

Category C agents include:

- Nipah virus
- hantaviruses
- tickborne hemorrhagic fever viruses
- tickborne encephalitis viruses
- yellow fever
- multidrug-resistant tuberculosis.