

BIOSECURITY: CERVIDAE



BASICS

OVERVIEW

- Issues of biosecurity have gained more prominence in recent years with greater public awareness of animal diseases such as foot-and-mouth disease, bovine spongiform encephalopathy, chronic wasting disease, exotic Newcastle disease, and highly pathogenic avian influenza.
- To establish biosecurity, practices are used to prevent the introduction of pathogens or detrimental biological organisms into a defined ecosystem, landmass, unit of governmental oversight, facility, or farm. A more encompassing definition might also include noninfectious disease agents such as pollutants or toxic agents.
- Biocontainment is the prevention of the spread of a disease agent (pathogen) out of a defined area into a new area.

INCIDENCE/PREVALENCE

- Varies according to region and management.

GEOGRAPHIC DISTRIBUTION

- Worldwide.

SYSTEMS AFFECTED

- Depends on the disease.

PATHOPHYSIOLOGY

- Contagious diseases are introduced in the herd via introduction of sick or infected animals, aerosol, fomite, vectors or direct contact.
- Incubation, pathophysiology and disease manifestation depends on the susceptibility of the herd and on the pathogenicity of the agent.

HISTORICAL FINDINGS

- N/A

SIGNALMENT

- N/A

PHYSICAL EXAMINATION FINDINGS

- Important to check animals for infectious diseases prior to shipment and while in quarantine to reduce likelihood of disease transmission
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GENETICS

- N/A



DIAGNOSIS

DIFFERENTIAL DIAGNOSES

- N/A

CBC/BIOCHEMISTRY/URINALYSIS

- May be indicated before introduction of new animals

OTHER LABORATORY TESTS

- Serology or bacteriology before introduction of new animals

IMAGING

- N/A

OTHER DIAGNOSTIC PROCEDURES

- N/A

PATHOLOGIC FINDINGS

- N/A



TREATMENT

THERAPEUTIC APPROACH

- N/A

SURGICAL CONSIDERATIONS AND TECHNIQUES

- N/A



MEDICATIONS

DRUGS OF CHOICE

- N/A

CONTRAINDICATIONS

- N/A

PRECAUTIONS

- N/A

POSSIBLE INTERACTIONS

- N/A



FOLLOW-UP

EXPECTED COURSE AND PROGNOSIS

- N/A

POSSIBLE COMPLICATIONS

- N/A

CLIENT EDUCATION

- N/A

PATIENT CARE

- N/A

PREVENTION

- N/A



MISCELLANEOUS

ASSOCIATED CONDITIONS

- N/A

AGE-RELATED FACTORS

- N/A

ZOONOTIC POTENTIAL

- Rabies, plague, anthrax, salmonella, Q fever, cryptosporidiosis, brucellosis, listeriosis, yersiniosis, dermatophytosis, tuberculosis, and parapox virus.

PREGNANCY

- N/A

BIOSECURITY

- Components:
 - Appropriate security and perimeter fencing
 - Quarantine and testing of new animals
 - Vaccination protocols
 - Parasite monitoring and treatment
 - Proper cleaning and disinfection
 - Procedures to isolate, test and treat sick animals
 - Necropsy and diagnostic testing
 - Training of employees (recognize sick animals and potential sources of disease).
- Record keeping: Permanent identification, animal origin and movement, diagnoses and treatments.
- USDA-APHIS has established a CWD herd certification program to reduce the risk of transmission CWD in captive cervid herds in the United States.
(https://www.aphis.usda.gov/animal_health/animal_diseases/cwd/downloads/cwd_program_standards_2014.pdf)

Disinfection

- Not effective in the presence of large amounts of organic debris.
- Remove as much organic material as possible before using disinfectants (This includes boots).
- Composting of organic wastes (manure and organic bedding material) will deactivate many common pathogens if proper mixing and composting temperatures are obtained.
- Sealed surfaces (concrete, plastic, sealed wood) are more readily cleanable and less likely to retain pathogens than dirt or unsealed wood surfaces.
- Hosing or pressure washing with added disinfectant solutions. It is important to wear appropriate personal protective equipment (face shields, respirators, impermeable boots, gloves).
- Common classes of disinfectants are: acids, alcohols, aldehydes, alkalis, biguanides, halogens (hypochlorites and iodine-based iodophors), oxidizing agents, phenolics, and quaternary ammonium compounds.
- Consult label directions when using disinfectants. It is important to use proper concentrations and contact time. Temperature and the acidity or alkalinity of the solution and the hardness of the water can also be factors in efficacy.
- In general, phenolics are the most effective when organic materials are present, followed by quaternary ammonia compounds.

- Virkon-S®, an oxidizer/organic acid/surfactant combination, has broad antimicrobial efficacy and works in the presence of some organic material. It is relatively environmentally safe and biodegradable.
- Sodium hypochlorite (bleach), iodophors, and chlorhexidine are readily inactivated by organic material.
- Prions are extremely resistant to most disinfectants, but can be inactivated by strong sodium hypochlorite and sodium hydroxide solutions.

Quarantine

- It is important to know the health history of the individual animal as well as the herd health history from which it is being acquired.
- Risk of disease transmission can be reduced by preshipment testing and examination of the animal prior to acquisition. It is recommended to test the individual animal as well as composite herd fecal samples by direct fecal PCR for *Mycobacterium avium subsp. paratuberculosis* (MAP).
- All new animals entering a facility should be quarantined.
- The length of quarantine may vary based upon the herd of origin and disease status of that herd, but should be no less than 30 days.
- During quarantine, the animals should be observed daily for signs of illness.
- Check for gastrointestinal parasites at least three times for and treat with appropriate therapeutic agents as indicated. Following treatment the animal should be rechecked at an interval that takes into account the prepatent period of the particular parasite that was treated.
- While in quarantine, the animals should also receive physical examinations at which time diagnostic samples can be obtained. Routine tests include CBC, blood chemistry analysis, and serological testing for pathogens of concern.
- Personnel caring for animals in quarantine should be different from that caring for the main collection. If this is not possible, the animals in quarantine should be cared for after the other animals.
- Quarantine facilities should be physically separated from the rest of the animal areas and personnel entering the area should wear separate outerwear and footwear when working in the area. Separate tools should also be used in the quarantine facility.
- Use disposable latex gloves and wash hands.
- The principles of quarantine also apply to the care of sick animals within a facility.

Water and Feed Quality

- Provide high-quality, pathogen and contaminant free food and water.
- Feed storage containers should be covered or sealed.
- Fecal or urine contamination of feed or water sources by rats, opossums, or raccoons can lead to diseases such as leptospirosis, sarcocystis, and cerebrospinal nematodiasis (*Baylisascaris procyonis*).
- Feed should also be kept dry to prevent contamination by fungal and bacterial organisms.

Control of Premises

- There may be state/provincial regulations governing specifications for perimeter fencing around cervid facilities to prevent escape of animals or incursions of wild cervids into a captive facility. Regulations may require euthanasia and CWD testing of wild cervids which enter a facility.

- Check with the state/provincial veterinarian's office to make sure there is compliance with laws and ordinances.
- Even if not legally required, double perimeter fencing should be considered to prevent nose to nose contact between captive and free-range cervids. Double fencing may also help prevent some arthropod or vector transmitted diseases if the areas between the fences are sprayed and/or mowed to control vectors.
- Limit access of unnecessary vehicles and people. This is a challenge at zoos and facilities that encourage public access.
- Zoos should inform the public through signage and other forms of public education if there are reasons individuals should not visit the animal collection (e.g., signage requesting no entry if a person has visited a country with endemic foot-and-mouth disease within the past 7 days).
- Provide access points for service vehicles, particularly rendering trucks, as far away from animals as possible.
- Vehicles that have visited other animal facilities should be disinfected before entry.
- Have a single access point for visitors and provide disposable plastic boots and/or boot brushes and disinfectant footbaths.
- Those entering the facility should be wearing clean outerwear that has not been worn at another animal facility since being laundered.

Vaccination

- Cervids are commonly vaccinated for clostridial diseases, leptospirosis and rabies.
- Unless officially approved for use in cervid species, ruminant vaccines are used in an extralabel practice.

Surveillance

- Daily observation of all animals within the collection for signs of illness.
- Serological evidence of diseases, complete necropsy and histopathology of dead animals, and routine examination of feces for parasites.
- Testing of dead animals for CWD is a requirement of participation in federal or state herd certification programs in the U.S.
- In the United States, herd owners may choose to participate in a voluntary national cervid TB herd accreditation program. Two negative TB tests of all animals in the herd over 12 months of age over a 9 to 15 month interval is required to establish an accredited free herd. Herd retesting is required every 33 to 39 months from the original certification date to retain accredited status. Animals from accredited herds do not require TB testing prior to interstate shipment.

Internationally Notifiable Animal Diseases

- World Organization for Animal Health (OIE) reports diseases detected in participating countries so the information can be disseminated (www.oie.int).
- Information is sent out immediately or periodically depending on the seriousness of the disease.
- The OIE under mandate of the WTO publishes health standards for international trade in animals and animal products. As part of this endeavor, the OIE produces the Terrestrial Animal Health Code and the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

PRODUCTION MANAGEMENT

- See Federal, Provincial, and State Regulations and Internationally Reportable Diseases

SYNONYMS

- N/A

ABBREVIATIONS

- APHIS = Animal and Plant Health Inspection Service
- CWD = chronic wasting disease
- HCP = Herd Certification Program
- OIE = Office International des Epizooties
- USDA = United States Department of Agriculture
- WTO = World Trade Organization

SEE ALSO

- Abortion: Farmed Cervidae
- Cervidae: Captive management
- Cervidae: Chronic Wasting Disease
- Cervidae: Game park management
- Cervidae: Mortality
- Cervidae: Vaccination programs

Suggested Reading

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- Haigh, J. C., Hudson, R. J. 1993. *Farming Wapiti and Red Deer*. St Louis: Mosby.
- Miller, M.W. 2008, Chronic wasting disease of cervid species. In *Zoo and Wild Animal Medicine Current Therapy* Vol. 6, eds. M. E. Fowler and R. E. Miller. St Louis: Saunders Elsevier.
- Thorleifson, I., Pearse, T., Friedel, B. 2000. *Elk Farming Handbook*. St. John, New Brunswick: Abbott Richards Graphic Design Inc.
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CLIENT EDUCATION HANDOUT AVAILABLE ONLINE