

AGRICULTURAL PRACTICES CONTRIBUTING TO DISEASE



OVERVIEW

- The extensive movement of animals, animal products, and animal caretakers domestically and internationally allows for efficient production of quality animal protein and increases the risk of introduction and spread of endemic, emerging, or re-emerging diseases.
- Endemic diseases are those regularly found in that species, herd, area, or country. Details regarding prevention and control for various ruminant diseases can be found in specific chapters related to those disorders.
- Emerging diseases consist of viruses, bacteria, or protozoal infections that have not previously occurred in a country's animal herd.
- Re-emerging diseases are those that were present in the past (either nationally or in a given location), and which have been eradicated, but which reappear in outbreak situations.
- These diseases can have a devastating effect on a population of animals and on national industries.
- Should a newly emerging or re-emerging disease occur, the trade implications could be quite severe, depending on the agent. The World Organization for Animal Health (OIE) is the international governing body for animal diseases. Should an OIE-Listed disease, infection, or infestation occur in a country, trade could be temporarily stopped until the epidemiology of the disease is understood and eradication is under way or completed. The economic impact could be substantial.
- As with most diseases, young animals are the most susceptible for emerging and re-emerging diseases due to a lack of immunity. This should be a biosecurity consideration when working with livestock operations so as to minimize exposure to this vulnerable population.
- Many emerging and re-emerging diseases have zoonotic potential.

EXAMPLES OF EMERGING AND RE-EMERGING DISEASES

- Cases of bovine tuberculosis continue to re-emerge in areas of the United States that were once free from this disease in domestic cattle.
- Schmallenberg virus emerged in 2011 in cattle, bison, and small ruminants in Europe.
- Peste des petits ruminants (ovine rinderpest) continues to emerge in more areas in Africa and the Middle East. Rinderpest (cattle plague) was eradicated worldwide in 2011.

AGRICULTURAL PRACTICES

Animal introductions

- Quarantine of newly introduced animals is not commonly practiced in ruminant operations which can permit the introduction of a disease to a herd or flock. Direct contact between infected or carrier animals and susceptible animals is a primary means of spreading disease.
- Diagnostic testing prior to animal movement or introducing animals to a herd or flock is not routinely practiced in ruminant operations but has significant biosecurity benefits.
- Many emerging or re-emerging diseases do not have adequate vaccines or treatment protocols and if not identified promptly, have the potential to spread to multiple animals in a minimal amount of time, and subsequently to additional herds.

Extensive animal and product movement

- Livestock exhibitions vary in their testing requirements for animal entry and provide a location for commingling of various animal species from multiple sources. Exposure opportunities occur and could spread disease through a large geographic area without adequate biosecurity.
- Livestock markets congregate animals from multiple sources which are then transported to a variety of locations. This could expedite the spread of disease if an animal is an asymptomatic carrier or incubating an infectious disease without clinical signs.
- It is estimated that 400,000 cattle are on the road daily to harvest and other states for rearing; which is another potential risk factor for disease spread if cattle are incubating a disease without showing clinical signs.
- Livestock transportation can serve as a fomite for disease spread if trailers are not appropriately cleaned and disinfected between uses for different operations and ages of animals. There is limited availability of commercial truck washes in the United States. This was identified as a risk factor in the spread of porcine epidemic diarrhea virus.

Consolidation

- As the world population grows, so does the need and demand for protein. Raising food-producing animals in larger groups on fewer operations allows for efficient use of resources – human and capital – to meet this need.
- Raising cattle near their food source has consolidated large operations in fairly small geographic areas. A single emerging, or re-emerging disease could spread rapidly within large groups, negatively impacting animal health and the economic survivability of the industry.

Exposure to insects, rodents, wildlife

- Implementing biosecurity protocols that would completely exclude insect vectors, rodents, and wildlife (birds, deer, feral hogs, etc.) are costly and difficult to achieve on many ruminant operations.

- Should a vector-borne disease such as Schmallenberg or heartwater emerge, competent vectors exist in many areas where ruminants are raised and could spread disease.
- Wildlife, some of which are ruminant species, commonly interact with domestic ruminant species as a result of the husbandry methods practiced in most countries.
- Epizootic hemorrhagic disease (EHD) is most commonly seen in wild deer populations and transmission has occurred to cattle.
- Securing feed and water sources from wildlife and rodent exposure is often difficult given the pasture, cropping, and natural water sources used for ruminant species.
- If a disease such as foot-and-mouth disease (FMD) were to emerge in a disease-free country, control would be difficult but would become almost impossible if it became enzootic in wildlife such as deer and feral pigs.

Globalization

- International trade of animals and animal products and human travel continue to expand.
- Endemic diseases present in parts of the world could be transported to non-endemic countries and emerge in the animal population.
- Today people and animals can travel throughout the world in less time than it takes many disease agents to incubate. This increases the ability to spread endemic diseases from other parts of the world to emerge in developed countries.



MISCELLANEOUS

ABBREVIATIONS

OIE = Office International des Epizooties, referred to as the World Organization for Animal Health

EHD = epizootic hemorrhagic disease

FMD = foot-and-mouth disease

SEE ALSO

- Biosecurity: Beef Cow/Calf (www.fiveminutevet.com/ruminant)
- Biosecurity: Cervidae (www.fiveminutevet.com/ruminant)
- Biosecurity: Dairy (www.fiveminutevet.com/ruminant)
- Biosecurity: Goats (www.fiveminutevet.com/ruminant)
- Biosecurity: Research Herds (www.fiveminutevet.com/ruminant)
- Biosecurity: Sheep (www.fiveminutevet.com/ruminant)
- Epizootic Hemorrhagic Disease Virus
- Foot and Mouth Disease
- Heartwater (Cowdriosis)
- Schmallenberg Virus

SUGGESTED READING

- Boyles S. 2015. Trucking cattle accessed at: <http://www.cattlenetwork.com/advice-and-tips/cowcalf-producer/trucking-cattle>
- Palmer M.V. 2007. Tuberculosis: A Reemerging Disease at the Interface of Domestic Animals and Wildlife. <https://www.nceas.ucsb.edu/~sjryan/PPP/readings/Palmer,%202007.pdf>
- Randle R. 2012. EHD Cases Confirmed in Nebraska Cattle accessed at: <http://beef.unl.edu/cattleproduction/ehd-nebraskacattle>
- USDA-APHIS-VS. 2012. Schmallenberg Virus: Case Definition and Guidance accessed at: https://www.aphis.usda.gov/animal_health/animal_diseases/schmallenberg/downloads/schmallenberg_case_definition_guidance.pdf
- USDA National Agricultural Statistics Service. 2015. Cattle Industry 2012 Census of Agriculture Highlights accessed at: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Cattle/Cattle_Highlights.pdf
- USDA National Agricultural Statistics Service. 2015. Sheep and Goat Farming 2012 Census of Agriculture Highlights accessed at: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Sheep_and_Goat/Sheep_and_Goat_Farming.pdf
- World Organisation for Animal Health (OIE). 2016. OIE-Listed diseases, infections and infestations accessed at: <http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2016/>
- World Organisation for Animal Health (OIE). Rinderpest Disease Information Sheet http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/Disease_cards/RINDERPEST-EN.pdf
- Lowe J, Gauger P, Harmon K, Zhang J, Connor J, Yeske P, et al. 2014. Role of transportation in spread of porcine epidemic diarrhea virus infection, United States. *Emerg Infect Dis.* <http://dx.doi.org/10.3201/eid2005.131628>
- Moore, D.A., Kohrs, P., Baszler T., Faux C., Sathre, P., Wenz, J.R., Eldridge, L., Li, H. 2010. Outbreak of malignant catarrhal fever among cattle associated with a state livestock exhibition. *J Am Vet Med Assoc.* 237:87-92.
- Spickler, A.R., Roth, J.A., Galyon, J., Brown, G. 2016. *Transboundary and Emerging Diseases of Animals*
- Villarroel A., Dargatz D.A., Lane V.M., McCluskey B.J., Salman M.D. 2007. Suggested outline of potential critical control points for biosecurity and biocontainment on large dairy farms. *J Am Vet Med Assoc.* 230(6):808-19.

Author Danelle Bickett-Weddle

Consulting Editor Erica McKenzie