Dairy Session

Moderators: *Jessica McArt, Gabe Middleton, Callie Willingham*

Seeing what clients miss – Finding opportunities to improve animal and caretaker health

Danelle A. Bickett-Weddle, DVM, MPH, PhD, DACVPM
Center for Food Security and Public Health, Iowa State University, College of Veterinary Medicine, Ames, IA 50011,
dbw@iastate.edu

Abstract

Worldwide, there are 45 bovine zoonotic diseases and many more animal-only diseases. Veterinarians understand the potential health risks associated with disease transmission. Educating clients and staff on practical, easily implemented steps to protect themselves from zoonotic diseases is an important professional task. Veterinarians are the best resource to help identify opportunities to improve animal and human health on dairies. A risk analysis approach combined with hierarchy of controls can be applied in a practical manner, making veterinarians an indispensable resource for their clients.

Key words: animal health, biosecurity, infection control, public health, zoonotic disease

Résumé

Il existe dans le monde 45 maladies zoonotiques bovines et de nombreuses autres maladies restreintes aux animaux. Les médecins vétérinaires comprennent bien le risque de santé potentiel associé à la transmission de la maladie. L'éducation des clients et du personnel concernant les mesures pratiques facilement mises en place pour se protéger des maladies zoonotiques est une tâche professionnelle importante. Les médecins vétérinaires sont la meilleure ressource pour aider à identifier des opportunités pour améliorer la santé de l'homme et des animaux à la ferme laitière. Une approche d'analyse du risque combinée avec une hiérarchisation des mesures de contrôle peut s'appliquer concrètement faisant ainsi des vétérinaires une ressource indispensable auprès de leurs clients.

Introduction

The impetus for this manuscript stemmed from the multidrug-resistant *Salmonella* Heidelberg outbreak in 2017 that caused illness in 56 people living in 15 states.[2] The epidemiology and diagnostic laboratory results early in the outbreak led investigators to dairy calves that were shedding, and in some cases were ill from, the outbreak strain of *Salmonella.* Twenty of the cases affected children less than 5 years old. Fortunately, no patients died from this infection but 35% were hospitalized to treat the dehydration from the profuse diarrhea. This outbreak highlights the importance of biosecurity and infection control practices to protect personnel, and animals, from potential exposure to zoonotic diseases.

Bacteria, like *Salmonella*, comprise the majority of the 45 bovine zoonotic pathogens.[8] Veterinarians understand the potential health risks associated with transmission of zoonotic and animal-only infectious diseases. Educating clients and staff on practical, easily implemented steps to protect themselves from zoonotic disease is an important professional task. If animal caretakers are informed and have the right resources, they can help prevent zoonotic disease exposure and spreading an infectious disease throughout a livestock operation.

The first step in prevention begins with awareness of the risk. A risk analysis approach is one way to uncover each operation's disease risk. Components of risk analysis include:

- Risk perception;
- Risk assessment;
- Risk management;
- Risk communication.[4]

The first phase, risk perception, describes an individual's acceptance and tolerance of various diseases. This is often influenced by previous experience, the media, and the in the case of producers or veterinarians, what is happening in their local area.[10] People who contacted the calves in the 2017 *Salmonella* Heidelberg outbreak and became ill likely have a different perception of the risk than someone who has not had a *Salmonella* infection. Veterinarians working with producers on disease prevention issues should begin by asking: What diseases are you most worried about occurring at your facility? Follow this with the question: What do you perceive as the biggest biosecurity risk/challenge(s) for your facility? The responses to these questions can guide the management recommendations that follow the disease risk assessment.

Assessing Disease Risk

Risk assessment is the next phase in the analysis process and there are a variety of tools available to veterinarians to accomplish this. The food industry is very adept at assessing critical control points for hazards that may threaten food quality or safety. The Hazard Analysis Critical Control Points (HACCP) approach has been described as 1 option to evaluate disease entry and spread risk on dairy farms.[11]

There are also disease specific assessments such as the "Risk Assessment for Salmonella in Dairy Herds",[5] "BVD Consult",[6] and "Trich Consult".[7] Each provides guiding questions to uncover management practices that may result in disease exposure. These are beneficial resources for veterinarians to use with their clients to uncover specific disease challenges and address them.

Another approach to risk assessment is more holistic. This is the approach taken by the Biological Risk Management (BRM) program developed by veterinarians at the Center for Food Security and Public Health at Iowa State University's College of Veterinary Medicine. The BRM method evaluates risk based on how animals or humans are exposed to disease, through various routes of transmission, rather than being disease-specific.[1] Controlling exposure can prevent disease in humans and animals.

Disease agents can be spread between animals, or animals to humans, through a variety of exposure routes. Many infectious agents are transmitted by more than 1 route of exposure. The recommendations in BRM focus on 6 transmission routes: aerosol, direct contact, oral, fomite, vector, and zoonotic. Producers quickly grasp that some diseases, like *Salmonella*, are acquired orally by calves and people and others, such as *Mycobacterium tuberculosis*, are breathed in via aerosol.[8] This understanding allows people to gain control without extensive knowledge about a wide range of diseases. From a management standpoint, start by identifying risk areas, such as fomites, and then design protocols to minimize exposure.

Managing Risks and Protecting Human and Animal Assets

Risk management steps should focus on minimizing human and animal exposure through practical steps that producers, veterinarians, and caretakers should implement to protect themselves and avoid spreading disease between animals or premises.

When determining the most effective options to protect people, public health professionals rely on a hierarchy of controls to find feasible solutions.[9] This begins with the most effective approach – eliminating the hazard whenever possible. This is impossible for zoonotic diseases of cattle because of their endemic nature in many herds. The next hierarchy control step is to substitute the hazard. This is often not practical for livestock diseases. Next are engineering controls that aim to separate the hazard from the person. This applies to many zoonotic diseases and examples are provided later in this manuscript. Another step is using administrative controls to change the way people work, or are potentially exposed. Habits can be hard to break. Explaining the potential health benefits of minimizing disease exposure may help motivate some people to implement change. The last step in the hierarchy is often the first form of protection people reach for: personal protective equipment (PPE) like gloves and coveralls. It may be easier to put on something to prevent exposure compared to changing behaviors. However, this control is least effective in preventing disease exposure as the only step, often due to the way PPE is worn and handled. When worn properly, PPE can be very effective. The best approach to disease prevention, to people or among animals, is a combination of controls. Practical approaches are described below.

Preventing Oral Exposure

There are a number of diseases that humans and cattle can acquire orally including anthrax, campylobacteriosis, *E. coli*, cryptosporidiosis, *Giardia* spp, leptospirosis, *Salmonella*, and tuberculosis.[3] Applying engineering controls to prevent many of these diseases involves:

- Handling food properly,
- Using recommended food cooking temperatures,
- Cleaning vegetables,
- Boiling/treating water,
- Pasteurizing milk, and
- Ensuring certain populations of people such as children, adults over 65, pregnant women, and the immunocompromised avoid all contact with sick or dead livestock and items contaminated with animal feces.

Administrative controls include:

- Washing hands frequently using soap and water after handling animals, their bodily fluids, or removing gloves.
- Changing clothing and footwear after working with calves who may be shedding 1 or more of these organisms.
- Leaving contaminated work clothes at work for laundering or transporting home in a garbage bag or disposable laundry bag that can be placed directly into the washer without contacting the home environment.
- Leaving contaminated footwear at work or effectively cleaning and disinfecting them before wearing around other animals or home environment.
- Ensuring animal caretakers handling food have a clean space to prepare meals or eat snacks on breaks.

Personal protective equipment should be worn when handling animals known or suspected to be shedding any of these organisms. PPE such as gloves to prevent hand contami-

nation and a face shield to prevent feces or urine splashing into the mouth can protect people.

Risk Communication Resources

There are a number of resources available free of charge to veterinarians and livestock producers aimed at assessing risk, promoting biosecurity and infection control, and communicating disease prevention practices.

- Biosecurity posters for beef and dairy operations: http://www.cfsph.iastate.edu/Infection_Control/Species/cattle.php
- Cattle disease risk management tools: www.preventingdisease.org
- Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2017: http://nasphv.org/documentsCompendiumAnimals.html
- Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel, 2015: http://nasphv.org/documentsCompendiaVet.html
- Disinfection guidance: http://www.cfsph.iastate.edu/Disinfection/index.php
- Healthy Pets, Healthy People: Farm Animals: https://www.cdc.gov/healthypets/pets/farm-animals.html
- Signs and visitor information: http://www.cfsph.iastate.edu/Infection_Control/Sign/index.php
- Stay healthy at animal exhibits: https://www.cdc.gov/features/animalexhibits/index.html
- Youth in animal agriculture: Excellence in exhibition: http://www.cfsph.iastate.edu/YouthInAg/

Conclusion

Animal care is dependent upon adequate personnel – both in number and in capabilities. Anyone who has ever held a job working with other people understands the impact a fellow employee's absence has on the rest of the team. There are only so many hours in a day to accomplish the necessary tasks. When someone is absent, either it creates more work for everyone else, or tasks are skipped.

When those tasks relate to biosecurity or infection control practices, animal and caretaker health could be negatively impacted. Even though people are vulnerable to zoonotic diseases, prevention practices can minimize exposure risk. Implementing basic prevention practices to keep people healthy allows them to give 100% to the animals.

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