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Shipping Fever and Its Prevention

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Each year millions of dollars are lost by the American beef and dairy industries to shipping fever, a debilitating disease of cattle and other large animals. Shipping fever, the layman's term for infectious bronchopneumonia, is primarily associated with cattle which have been transported from the farm to feedlots; however, the disease can strike a herd which has never left the farm.

"The organisms causing infectious bronchopneumonia are everywhere," said Dr. Robert M. Dyer, a researcher and lecturer in medicine at Veterinary School of the University of Pennsylvania. "Cattle are constantly exposed to them. However, to have an outbreak of the disease, three factors must be present: the viral component, the bacterial component, and a stress factor."

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Dr. Dyer explained that at least 20 different viruses are associated with the disease and that eight or nine have been definitely identified as causative. In addition to viruses, bacteria play a major role in the disease process. Stress, the third major factor contributing to the susceptibility to bronchopneumonia can be transportation, overcrowding, mishandling, poor ventilation, starvation, or dehydration.

It has been found that infection due to one virus alone will cause just a mild respiratory infection in unstressed, healthy cattle. However, in animals that are stressed, the immune system is less resistant. The initial infection by one agent weakens it further and paves the way for the invasion of other organisms, causing multiple infections resulting in bronchopneumonia.

"In many outbreaks, it is not uncommon to find multiple infections occurring simultaneously," explained Dr. Dyer. "The morbidity may be as high as 100% in a herd with a mortality rate of up to 20%. One animal may have a viral infection, this begins the chain of events. Bacteria which are normally present in its upper airways invade the lower airways in the lung and severe disease results. The animal sheds the viruses and bacteria, and disease spreads."

Normally a large number of particles and organisms are filtered out as the animal breathes. Particles which do reach the lungs are expelled by means of the mucociliary apparatus, cells which line the trachea and the bronchioles and which produce a constant mucous flow that is expelled. If these cells are damaged by infectious agents, gaseous irritants or extremes in temperature, the clearance of infectious agents may be hindered. Antibodies and cell-mediated immunity protect the upper and lower airways against infectious agents. Another protective mechanism is alveolar macrophages, cells which will ingest and destroy viruses and bacteria. The whole defense mechanism is in a state of delicate balance and it takes very little to upset it. Elevated corticosteroid levels, inhaled pollutants, viral infection and a number of other factors can render the defense mechanism of the pulmonary system ineffective, leaving the animal vulnerable to bronchopneumonia.

Dr. Dyer explained that the most commonly found viruses associated with shipping fever are herpes viruses, parainfluenza viruses, bovine syncytial virus, adenoviruses, bovine rhinovirus and bovine viral diarrhea virus. Each of these produces slightly different symptoms. Some, like the parainfluenza virus, are shed for up to 20 days following infection. A number of bacterial infections occur simultaneously to or shortly after exposure to the viruses. The most common are those caused by pasteurella organisms. Vaccines have been developed against three of the viruses and one of the bacterial agents. However, because of the multitude of infectious agents, the best weapon against shipping fever is prevention.

"Farmers obviously cannot remove the infectious agents from the environment as they are all around us," said Dr. Dyer. "But they can limit the stress factor." He explained that the nature of the beef industry requires extensive shipping of cattle destined for the feedlot. "It's a geographic problem," he said. "Cattle are raised on pasture in one part of the country and then, when they are about four to five months old, are sent to the feedlots located in the grain producing areas of the country." Normally these calves are with their dam one day, nursing and grazing. The next day they find themselves in a truck being transported to a salesbarn and then to a feedlot. The animals suddenly must feed on grain and silage, learn to eat from a trough instead of grazing or suckling. They can obtain water only from an automated watering device instead of a stream or tub. Conditions in a feedlot are crowded and the young animals must find their place in the new social order of the herd. In addition, the calf is dehorned, wormed and castrated. This places considerable stress on the young animal. Many calves refuse to eat or drink and become starved and dehydrated. Also, during the transport and in the feedlot they are exposed to new infectious agents which their stressed systems cannot effectively combat.

The calf becomes sick with bronchopneumonia. As the disease develops the animal sheds the virus infecting others in the herd. Because the margin of profit in cattle raising is so small, the feedlot operator often treats a sick animal with antibiotics. If the first drug doesn't work, another one is tried. This practice can have dangerous consequences because bacteria quickly become resistant to drugs and often only the more costly preparations will effectively combat the infection. It is an expensive proposition, not only in terms of the money spent for antibiotics but also in terms of the money realized later from the sale of the feedlot cattle. "A sick animal is a poor weight gainer," said Dr. Dyer. "It does not convert the feed to bodyweight efficiently. If it is sick for a while, it will never reach the optimum slaughter-weight and becomes an economic burden."

According to Dr. Dyer there are some measures that can be taken to reduce the susceptibility to shipping fever. The stress factor can be reduced by preconditioning the young calves. "They could be weaned and accustomed to the feedlot food while still with their dams," said Dr. Dyer. "Deworming, castration and dehorning could take place while they are still in a familiar environment, about four weeks prior to shipping." In a study conducted at New Bolton Center it was shown that preconditioned calves exposed to stress outperformed stressed calves not receiving preconditioning. Others have shown that the preconditioned calves experience less weightloss upon arrival at the feedlot and gain weight at a greater rate than unconditioned animals. They showed an overall higher degree of wellbeing for the first 150 days after the arrival on the feedlot. This period is the most important for calves to do well as most losses due to respiratory disease occur during the first 45 days following arrival at the lot.

Dr. Dyer also pointed out that cattle acquired in groups should be kept together to minimize social stress. It has been found that when groups of cattle from different sources are mixed in the feedlot, widespread shedding of viruses occurs and infection results. He feels that feedlot operators should buy cattle from fewer sources and keep each lot of cattle separate for at least the first 14 days in the feedlot.

Beef farmers are not the only ones who have to contend with shipping fever. It also affects dairy cattle. Here the disease most often occurs when

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calves are housed together in calf houses. Frequently the ventilation in these structures is poor, resulting in very moist air and an abundance of ammonia gases from urine and feces. High concentration of these gases have been shown to damage the airpassages, making the animal more vulnerable to disease. Because calves are concentrated in an enclosed environment, bronchopneumonia, once in the barn, can spread like wildfire.

An additional risk on the dairy farm is that the infection can spread to the adults, causing abortions and resulting in great losses of future stock and milk production.

According to Dr. Dyer, dairy calves should be housed individually in hutches to minimize the spread of infectious diseases. If they must be housed in a barn then this structure should be well ventilated and frequently cleaned to prevent the build-up of gases and infectious agents.

Dr. Dyer is currently investigating the immunologic mechanisms of the lung. He is looking at how the organ protects itself biochemically and how the cells kill bacteria. "It is basic research," he said. "Not much is known about the defense mechanism in the respiratory tract, how it functions and why it breaks down. We need to gather much more information to find a more efficient way to combat bronchopneumonia in cattle and other large animals. The traditional means of vaccines and antibiotics are not working too well. Until we find a better way of treating these animals, prevention is the key. Good animal husbandry and reduction of stress, be it environmental or due to transportation, are vital to reducing the losses incurred by shipping fever."

Dr. Dyer graduated in 1975 from Penn's veterinary school. He did graduate work at the University of Michigan. Now he is a lecturer in medicine and is working on his Ph.D. His research is supported by the USDA and the Pennsylvania Department of Agriculture. *H.H.*

Resource Update VHUP

The exotics clinic will be held Tuesday nights only.