

Schmallenberg Virus

Be aware of newly discovered virus that affects reproductive health.

by Kasey Miller, associate editor

Do you know what a healthy herd looks like? This may sound silly, but it is not without base. Can you tell if there is reproductive disease present before birth? Does the herd look or act differently? If so, how can you be sure animals aren't showing symptoms of another disease? How many animals have to be affected before concern sets in?

Reproductive diseases can be some of the most costly. Therefore, it is imperative to know their ramifications.

The Schmallenberg virus is a newly discovered reproductive disease from, you guessed it, Schmallenberg, Germany. It is a new disease, discovered in November 2011, according to the World Organization of Animal Health (OIE) fact sheet on the virus. Much epidemiological, immunological and

virological research is being done on it, meaning there is much still to learn.

Signs of Schmallenberg

Julia Ridpath, research microbiologist with the Ruminant Diseases and Immunology Research Unit at the National Animal Disease Center of the USDA Agricultural Research Service, explains that in August to October 2011 there was an outbreak of disease in adult cattle, mostly dairy, reported in the Netherlands and Germany. The cattle exhibited signs of mild to moderate fever, reduced milk yield, loss of appetite, loss of body condition and diarrhea.

The symptoms looked like symptoms of other diseases, so no one thought much of them at the time. She explains that the symptoms were seen mostly in dairy herds

Herd Health



and were noticed only because of a drop in milk yield. Yields recovered in about a week, so even that may not have raised flags except for the number of herds affected.

In November and December 2011, abortions and stillbirths were associated with fetal central-nervous-system (CNS) abnormalities. The disease was affecting mainly sheep, though it was present in cattle and goats. It was in the Netherlands, Germany and Belgium at this point.

In January 2012, abortions and stillbirths associated with fetal abnormalities in cattle were reported in the same countries.

The OIE expands on symptoms by adding that adult cattle's signs are probably not apparent, with fever, impaired general condition, anorexia, reduced milk yield, diarrhea and, ultimately, abortions. Most individual animals recover from their symptoms within a few days, and herds within two to three weeks. Calves, lambs and kids of infected dams were malformed at birth or stillborn. The OIE adds that the exact rate of malformation is not known and varies depending on the stage of gestation when the dam was infected. This means that it is unknown whether a calf can be saved if the virus is detected early enough.

The virus is carried by insects, she says, and it spreads quickly. It is, so far, thought to affect only ruminants. Though it started as relatively isolated incidences in the Netherlands, Germany and Belgium, the disease spread rapidly. Within six months, from January 2012 to June 2012, 4,000 farms were affected across Europe. In June of 2012, Ridpath notes, 17% of cattle farms in the Netherlands and 30% of sheep and goat farms tested positive. In Belgium, 33% of cattle farms and 65% of sheep and goat farms tested positive for the virus.

So far, incidents of the virus have been documented in the Netherlands, Belgium, Germany, United Kingdom, France, Luxembourg, Spain, Italy, Switzerland, Austria, Ireland, Sweden, Norway, Finland, Poland and Estonia, according to the OIE. While the virus is currently contained to Europe, it is important to understand the impact of it and its symptoms in case of potential spread.

Discovering the virus

It is believed that the virus originated in Africa, as it is similar to a Shamonda-like virus. These particular viruses are present in Africa, but not Europe, Ridpath explains.

She said it is hypothesized that the virus was introduced via importation of cut flowers, which harbored very small biting insects from Africa. The cooler temperatures used to store flowers in transit slowed the insects but did not kill them, which allowed for the virus the insects carried to survive the

Minimize reproductive diseases with biosecurity

Reproductive diseases affect cattle at all stages of reproduction, from preconception to postcalving, and can cause significant losses. Russ Daly, Extension veterinarian at South Dakota State University, says the biggest risk factor to an operation's biosecurity is incoming animals.

Due to the severity of these diseases, it is imperative to keep the problems out of the herd with a biosecurity plan. The factors of disease — host, environment, agent and management — all interact with each other, so solutions must encompass all four factors.

Daly says that visitors, equipment, etc., are also considerations, but they pale in comparison to the risk associated with incoming animals.

In developing a biosecurity plan, Daly recommended four steps:

►Do your homework on the source of animals. Find out what testing and vaccination programs are used at the source and the herd's performance. Daly suggested veterinarian-to-veterinarian consultation.

►Isolate or quarantine new animals. Daly recommended isolating new animals for 30-60 days to allow for organism shedding, which increases with stress. New animals should have no nose-to-nose contact with existing animals in the herd until after isolation. This time period also allows for diagnostic testing or vaccination and acclimation. However, he warned, no amount of time will protect against cattle persistently infected with bovine viral diarrhea (PI-BVD), so testing is great insurance against contamination.

►Vaccination. Daly reminds that vaccination does not necessarily equate to immunity as individual response to vaccines varies. The goal of vaccination, he says, is not to render an individual immune to disease, but to stimulate sufficient immunity within a herd to prevent an epidemic, or widespread outbreak.

►Environmental control. The environment affects the ease with which a disease can be transmitted, as well as the resistance animals have to the disease agent.

Other management considerations he mentioned included the group composition (number of new animals and number of new sources), segregation from higher-risk groups (keeping new animals away from breeding females) and group size.

The most prevalent reproductive diseases, such as BVD, trichomoniasis (trich), infectious bovine rhinotracheitis (IBR), leptospirosis, vibriosis and neospora, are some of the most devastating reproductive diseases, so it is imperative to develop a biosecurity program and working relationship with your veterinarian to combat these diseases. Work with your veterinarian to develop a testing, preventative treatment and vaccination protocol that works for your operation, he urges.

trip. The imported insects could not survive European winters, but they spread the virus to native Belgian insects, which caused the virus to spread throughout Europe.

Identifying a new virus is not easy, especially one with symptoms so similar to other diseases. The virus was identified by a metagenomics approach, Ridpath describes. Researchers compared DNA and RNA isolated from clinically ill dairy cattle to normal cattle in the German outbreak. She said the virus couldn't be regrown by the researchers, which added to the complexity of its discovery. They found RNA sequences similar to a Shamonda-like virus, which lead to its identification and determination of origin.

It was discovered that this elusive virus was of the simbu serogroup of the genus *Orthobunyavirus*, of the family *Orthobunyaviridae*. Researchers learned this by using a polymerase-chain-reaction diagnostic, which was developed by using one-third of the banked blood from clinically ill adult cows drawn during the Dutch August-September outbreak. It was isolated and a serology test was developed, she says.

The OIE explains that, to diagnose live cattle for acute infection, it is best for a veterinarian to take a blood sample with EDTA (ethylene-diamine-tetra-acetic acid), a colorless compound used to keep blood samples from clotting before tests are run, or at least 2 milliliters of serum. To detect the virus in stillborns, have your veterinarian take tissue samples from the brain (cerebrum and brainstem) or amniotic fluid. From a live but malformed newborn, they suggest samples of amniotic fluid and placenta.

The future

The increased clinical symptoms in cattle as opposed to sheep and goats suggests a more recent adaptation to cattle, she warns. Typically, the longer a virus circulates within a species, the less damaging it becomes. This is good in that it doesn't kill its host, but it also spreads more easily. This is evident because the majority of calves were abnormal in the early onset of the virus, but now that is less than half.

For now, it is subclinical in adult animals, but deadly in fetuses. While a crystal ball would be handy, there are a few options she predicts could happen with the virus. In a best-case scenario, the virus may burn itself out over the next year as the number of naïve animals decreases. Since many animals have been exposed to it in Europe, they may form a resistance to it.

The less-than-best-case scenario is that the virus replicates in its insect vectors during warm weather, and survives in the ruminant host during the winter.

She explains, "The virus has developed a sophisticated way of staying alive in winter through the fetus. In most infections of adult animals, a virus replicates for a limited amount of time, but it is eventually eliminated by the animal's immune system. Animals still *in utero*, however, are not able to clear the virus, and so it is maintained in the fetus until birth or abortion."

Because of this replication in warm weather, the OIE suggests insect control during the spring and summer months. Rescheduling the breeding season outside of prime insect season is suggested, though that

may be impossible on a practicality standpoint.

Worst-case scenario, she adds, would be if the virus were introduced to wild ruminants like deer, thus increasing the potential of animal-to-animal spread of the virus.

Unfortunately, there is no specific treatment or vaccine for the Schmallenberg virus, says the OIE. However, a first prototype vaccine has been announced.

So far, the virus has been contained to Europe. However, as it originally came from Africa, there is potential for it to spread elsewhere. Biosecurity plans are imperative for your operation. 