by Neil Forsberg

New findings on jejunal hemorrhagic syndrome

JEJUNAL hemorrhage syndrome (JHS) is a relatively new disorder affecting dairy cattle across North America and throughout the world. It was first noted by Bruce Anderson at the University of Idaho in 1991. At that time, he referred to it as "point source hemorrhage." It is now referred to with a variety of names including "hemorrhagic bowel syndrome (HBS)," "acute hemorrhagic enteritis," and "dead gut."

It is believed that incidence of JHS now accounts for at least 1 to 2 percent of the deaths in the adult cow population in North America. Cows afflicted with JHS typically die rapidly, often with little indication. Postmortem exam reveals a blood clot in the jejunum which may range in size from 6 inches to 30 feet. The cows die from anemia, obstructed bowel, or both. The disease typically is fatal.

No known treatments or surgical interventions have proven to be successful. Cows most typically afflicted are high-producing cows in their first 100 days in milk and at least have had their second calf. The disease typically occurs in the cooler winter months.

Suspected clostridia . . .

Several investigators have thought that *Clostridium perfringens* may be a cause of JHS. However, doubt about this link has come from detection of *C. perfringens* in asymptomatic cows and failure to detect the organism in some JHS-positive cows.

Our group at Oregon State University has been investigating a potential cause of JHS and is working on strategies by which dairy producers can minimize or avoid the devastating effects of this disease.

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At the Southwest Animal Nutrition and Management meeting held in Phoenix, Ariz., in late February, we reported that infection of dairy cattle by a common mold (*Aspergillus fumigatus*) likely is a cause of the disease. As a result of this discovery, S. Puntenney, I, and other co-workers have developed methods to detect *A. fumigatus* infection in blood and tissues. We also have provided some recommendations to reduce incidence of the disease and have developed a compound that when fed we believe minimizes or eliminates incidence of JHS.

Mimics human disorder . . .

The hemorrhagic condition seen in JHS cows is similar to enteric hemorrhagic diseases caused by *A. fumigatus* in immunosuppressed humans. Specifically, *A. fumigatus* is a harmless, ubiquitous mold in healthy individuals. However, in patients with a suppressed immune system (examples include AIDS, bone marrow, and organ transplant patients), *A. fumigatus* becomes a deadly pathogen. For example, bone marrow transplant patients infected with *A. fumigatus* have mortality rates of 50 to 85 percent.

A. fumigatus is one of the few mold species which has the ability to digest its way through gastrointestinal or pulmonary epithelia and to enter the blood. Once in blood, *A. fumigatus* continues to secrete toxins which suppress blood clotting. As a result, uncontrolled bleeding (coagulopathy) is typical of spreading aspergillosis and can result in bleeding into the human jejunum.

We know that some cows experience stress during lactation. Stressors include a high-energy diet (and potential for acid reflux), ketosis, milk fever, lameness, more frequent handling, postpartum stress, poor feeding practices, and social isolation in the sick pen. Immunosuppression is a common result.

Based on these observations, we proposed that *A. fumigatus* may infect cows that are stressed, immunosuppressed, or both and that cattle may exhibit symptoms similar to those reported in humans. To test this hypothesis, we developed a quantitative polymerase chain reaction (PCR) test to detect *A. fumigatus* DNA in blood and tissues of JHS-affected and healthy cows. We also adopted a second PCR test to test for the presence of clostridial toxin genes in the same samples.

Our investigations involved samples collected from JHS and healthy cows from Idaho, Iowa, Oregon, and Washington over a six-month period. All JHS cases were confirmed by field or university vets.

All cows with JHS were infected with *A. fumigatus* in blood and tissues. Tissue infections were detected in jejunum, jejunal-associated mesenteric lymph nodes, liver, and cotyledon. Additional animals with idiopathic abomasal hemorrhage (of an unknown cause) also tested positive for *A. fumigatus*.

While *C. perfringens* toxin genes alpha and epsilon were detected, they were not detected in all JHS cows. Furthermore, some healthy cows also tested positive for *C. perfringens* beta-toxin gene. Hence, JHS correlated strongly with infection by *A. fumigatus*. The disease in cattle appears to be similar to aspergillosis in humans.

Having discovered the potential significance of *A. fumigatus* in JHS, we then evaluated compounds for their potential to inhibit the growth of *A. fumigatus* in culture and in livestock. We formulated a combination of GRAS ingredients (generally recognized as safe) based on their abilities to inhibit fungal growth in the laboratory and then tested them in the field.

A field trial we then completed involved 1,700 cows in herds which had experienced incidence of mycotic abortions, JHS, or both. The study revealed that the experimental product appeared to successfully prevent occurrence of both mycotic abortions and JHS.

This research caught the attention of a feed manufacturing and distribution company. That firm has developed a working relationship with our research group and has developed manufacturing and distribution capability for the product.

What you can do . . .

Based on this research, new recommendations for prevention of JHS and mycotic abortions have been developed. They are:

- Follow best management practices for proper storage of feed ingredients and ensiled forages.
- Do not feed moldy feeds to pregnant or producing animals.
- Feed a ration that avoids conditions that could lead to acidosis.
- Have a veterinarian routinely conduct postmortem examinations on cows suspected of having JHS.
- Submit blood samples for analysis of *A. fumigatus* when you suspect mycotic abortions or JHS.

Analysis of *A. fumigatus* DNA is available by working with your veterinarian or nutritionist or by contacting the author: neil.forsberg@orst.edu.

- Consider feeding products that reduce susceptibility to *Aspergillus fumigatus* growth.

Would your wiring pass inspection?

by Robert E. Graves

LAST winter, Nebraskan LaVerne Stetson, an expert in farm wiring and the National Electric Code (NEC), spent several days visiting Pennsylvania dairy farms. He reviewed farms' wiring methods and condition. This was part of a Pennsylvania Department of Agriculture project investigating stray voltage problems and mediation.

Proper wiring is important both for safety reasons (fire and electrocution of people or animals) and to minimize on-farm sources of stray voltage. Farm wiring is different from residential and light commercial and is recognized in the NEC as having unique requirements.

Particular characteristics include moist or dusty environments, wide variations in temperature, presence of corrosive materials, including manure, gases and cleaning agents, and vulnerability to physical damage from animals and equipment. Most buildings and areas on dairy farms will require wiring methods and devices that are corrosion resistant, water-tight, and dust-tight. Today's plastic materials are ideal for most of these conditions.

The author is an extension ag engineer at The Pennsylvania State University. This article was adapted from the Penn State Dairy Digest.

General observations on dairy farms reveal the following:

- Wiring on many farms has deteriorated, is poorly maintained, and represents a real threat to life safety and fire.
- Many new installations still are being made with ordinary galvanized boxes, loose fitting covers, and NM (household grade) wire.

Some general recommendations to follow include:

- High-quality plastic (PVC) boxes, covers, and conduit; UF type cable; and water-tight box connectors installed to be water- and dust-tight are a must for milking centers, housing, and feed storage areas.
- Do not run cable inside wall cavities or attic spaces where undetected rodent damage can occur. Protect surface-mounted cable from physical damage by animals or equipment.
- Light fixtures should have gasketed covers to protect light bulbs and interior wiring, ballasts, and other components from moisture and dust.

Common wiring problems that can lead to stray voltage include:

- Improper procedures and equipment that result in interconnection of the grounding system (green or bare wire) and the neutral (white wire) supply system often are involved. This frequently happens in subpanels found in utility rooms and feed centers.
- Excessive voltage drop from long service drops or feeder runs to subpanels may be a problem.
- Poor connections including over- or undertightening of compression lugs, failure to use corrosion inhibitors on connections, and old loose pole top splices can contribute to voltage problems.

Electrical systems require proper design, installation, and maintenance. A regular preventive maintenance routine is important to ensure that your electrical system is performing in a safe and effective manner. The National Food and Energy Council provides specific information on farmstead wiring. Their website is www.nfec.org.