EXTENSION

AGRICULTURE

Monitoring Flooded Forages for Clostridial Contamination

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There has been one confirmed case of Blackleg in Vermont, likely a result of ingesting forage harvested from flooded fields.

Introduction

After a year of record flooding and precipitation, many producers are faced with feeding forages that were harvested from fields contaminated with soil and flood water. These fields likely have high levels of ash, silt and soil microbes such as clostridia bacteria. Growth of these bacteria can occur in poorly fermented forage when pH does not drop below 4.5. There are many clostridial species, which are naturally occurring in soil, including *Cl. butyricum, Cl. botulinum, Cl. beijerinckii, Cl. chauvoei and Cl. Tyrobutyricum* that can lead to the production of butyric acid and other toxic protein compounds under these conditions. Butyric acid has the familiar odor of smelly feet, while protein compounds smell like rotting flesh - a clear indication of possible clostridia. Clostridial fermentations override the desired lactic acid fermentation which results in high silage pH (>4.5), unstable and toxic forage. Feeds with higher butyric acid levels (>0.20% of dry matter (DM)) have less energy, can reduce dry matter intake (DMI) and potentially cause health and reproductive issues.

Forage testing

Butyric acid levels can be confirmed with forage lab analysis by requesting a volatile fatty acid (VFA) test. Analyzing for specific toxic protein compounds is less common. When handling silages always wear latex gloves, especially with suspect forages. There is a real risk of contracting clostridial, listeria or other disease-causing organisms through skin contact.

Feeding at risk forages

Growth of clostridial bacteria may take months and continue in storage with rising levels of butyric acid over time. Work with a nutritionist and use frequent feed testing to monitor butyric levels and adjust rations as necessary. As a rule, keep the total amount of butyric acid fed below 50 grams per day per head on lactating dairy cows. Any butyric acid containing feed should not be fed to dry cows. Silage that is very high in butyric acid (>2% DM) should be disposed of.

Animal Signs and Symptoms

Clostridium botulinum produces a potent neurotoxin, causing **Botulism**, which impairs transmission of electrical impulses from nerves to muscles in the cow. Signs include general muscle weakness, tongue weakness (presenting as a limp tongue), drooling, difficulty swallowing, and down cows. Death is often due to respiratory failure, dehydration, or complications of being down for prolonged periods of time. Cattle can recover from moderate exposures to botulinum toxin with early intervention and supportive therapy.

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Clostridium chauvoei causes **Blackleg** in cattle. When spores are ingested by animals they enter the bloodstream, grow, and produce toxins and gas that kill muscle tissue. Early signs of blackleg in cattle include high fever, lameness due to painful swelling with air pockets under the skin characterized by a "crackling" texture -- often in the rear leg muscles (first presenting as hot to the touch and then becoming cool as muscle atrophy sets in), depression, loss of appetite, and death within 12-48 hours. Often animals that contract the infection are found dead before other symptoms become obvious and are diagnosed by way of post-mortem examination and identification of muscular lesions.

Proper Disposal

Carcasses of deceased diseased animals are a source of further contamination of soil, water, and forages. Animals that die of clostridial infections should be handled carefully with gloves and burned or covered with lime and deeply buried to limit further spread of spores. The risk of decaying carcasses being uncovered by wildlife and spreading these organisms must be avoided.

Prevention

Multi-variant clostridial vaccines have high efficacy in preventing diseases and death caused by clostridial bacteria infections, most costing $1.20-$1.60 per animal. Antibodies produced by these vaccines work by defusing the toxins created by bacterial growth. Most multi-valent clostridial vaccines can be given to calves between 60 and 90 days of age and need to be boosted three to four weeks after the initial vaccination, and then annually thereafter. While diseases may be less prevalent in mature cattle, vaccination can still be beneficial in creating an immune response and improving antibodies in colostrum. Antibodies transferred to calves from their dam's colostrum will help to protect calves from exposure during their first few months of life and strengthen their immune systems. Grazing animals may be at higher risk of infection through open wounds and soil exposure.

As producers begin to feed their 2023 forages, it is critical to be aware of possible health risks to livestock. Work closely with herd nutritionists and veterinarians to head off these issues to keep livestock and those who handle them safe and healthy. Before feeding, collect a representative sample and have it analyzed for VFAs, pH, ash, and minerals. If clostridial fermentations are suspected, further analysis of toxins and clostridial bacteria can be performed. Monitor animals closely. Vaccinate livestock - especially youngstock, with a multi-variant vaccine following your veterinarian's recommendations.

For more information or assistance with forage sampling, please reach out to the UVM Extension Northwest Crops & Soils Program at 802-524-6501 or by email to Heather Darby, heather.darby@uvm.edu or Amber Machia, amber.machia@uvm.edu.

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