Managing Cattle Health Issues When Grazing Cover Crops

Cover crops can offer excellent feed value when properly incorporated into beef cattle diets. However, common cover crop species sometimes pose potential health issues. These issues are managable, and producers should educate themselves on potential risks and associated mitigation strategies. The focus of this factsheet is to discuss common potential health issues associated with cover crop species of the Midwest.

Small Grains – Cereal Rye, Wheat, Triticale, Oats, and Barley

Cereal rye, for a variety of reasons, is the most commonly used cover crop in the Midwest. When grazed or harvested appropriately, this winter annual can be a very high quality forage for beef cattle. Several other small grains such as wheat, triticale, oats, and barley can also be used for cover crops and livestock forages. These small grains are relatively safe to use for beef cattle feed but can pose some risk for grass tetany, ergot poisoning, and nitrate toxicity.

Grass tetany

Grass tetany (or hypomagnesemia) is a magnesium deficiency of grazing cattle. Iowa cattle are most susceptible in the spring when consuming fresh, lush grass. This grass tends to be high in protein, moisture, and potassium but low in magnesium, calcium, and sodium. Spring-calving cows in early lactation have high requirements for magnesium and calcium as they share these electrolytes with calves through their milk. Although most grass tetany cases occur in the spring, it is important to recognize the potential risk with fall growth as well. New growth of cereal rye and other small grains, spring or fall, can contribute to hypomagnesemia of grazing cattle.

Affected cattle will become nervous, agitated, and may experience muscle tremors. Additional clinical signs can include staggering, paddling, convulsions, lack of coordination, grinding of teeth, aggressiveness, excessive vocalization, and blindness. Grass tetany requires emergency therapy and veterinary diagnosis is usually made based on history and clinical signs.

Ergot poisoning

Ergot poisoning is caused by infection of the forage plant with *Claviceps purpurea*. This fungal organism most commonly affects small grains and grasses. The organism is common in the environment and seems to be most commonly found in plants during the summer months when cool, wet springs are followed by dry, hot summers.

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Ergot bodies on seed heads of infected plants

Sclerotia, or ergot bodies, replace seed heads of infected plants and produce alkaloids similar to those produced by the endophyte of infected tall fescue. Ergot alkaloids cause vasoconstriction of peripheral blood vessels and contribute to gangrene of extremities, hyperthermia, heat stress, and decreased milk production. Additionally, cattle can sometimes show neurologic signs such as hyperexcitability and muscle tremors.

The toxic sclerotia develop at approximately the same time as seed heads so the greatest risk would be when grazing or harvesting infected plants that have matured and developed seed heads. Grazing prior to the development of seed heads can help reduce the risk of ergot poisoning. Cereal rye and other small grains, seeded in the fall as cover crops, are often grazed in the fall or early spring before seed head development, thus making this risk relatively low.

Nitrate poisoning

Nitrate levels can be a concern with some cover crops, including small grains and brassicas. Nitrates can accumulate in many plant species, especially when nitrogen is readily available but plants are unable to utilize it, such as in drought conditions. When consumed, nitrates are converted to nitrites in the rumen. Nitrites move into the blood and disrupt hemoglobin molecules, making them unable to carry oxygen. Clinical signs include weakness, lethargy, incoordination, increased heart rate, increased respiratory rate, and dark, chocolate-colored blood. Upon observation of these clinical signs, producers should contact a veterinarian for assistance with diagnosis and treatment.

Many plants can accumulate nitrates, including numerous cover crops such as cereal rye, oats, wheat, rape, Sudangrass, and alfalfa. Numerous weeds such as pigweed, Canada thistle, lamb's quarter, and Johnson grass can also accumulate nitrates. The greatest concentration of nitrates is usually in the lower part of the plant stalk.

Fertilization rates affect the available nitrogen, thus well-fertilized crops are more likely to accumulate nitrates.

Drought conditions often cause plants to accumulate nitrates thus increasing the risk for nitrate toxicity. Establishment of cover crops may prove difficult in drought conditions. Depending on weather patterns and available nitrogen in the soil, drought-stressed cover crops may accumulate nitrates. Producers should test drought-stressed cover crop forages to ensure safe nitrate levels.

Small grain cover crop

Tips for grazing small grain cover crops

- To prevent grass tetany, it can be helpful to provide high magnesium mineral mixes during times of high risk grazing on tetany-prone cover crop fields. It is best to begin feeding high magnesium mineral mixes up to two weeks prior to grazing tetany-prone fields. Although they cannot effectively store magnesium, this allows cattle to establish desired intake and homeostasis of magnesium levels.
- To minimize risk of ergot poisoning, producers should graze small grain fields while plants are in the vegetative stages of growth or prior to the development of seed heads. If grazing mature, reproductive plants, producers can scout for sclerotia. If sclerotia are prominent, clipping seed heads may reduce risk of ergot poisoning.
- For high-risk plant species, especially in early growth stages and for plants stressed by poor growing conditions, producers should consider testing for nitrate levels.

Cereal rye cover crop in cornstalk residue

Brassicas

Brassicas such as radishes, turnips, and rape are cool season annuals that are often used for cover crops in the Midwest. They can be planted in the late summer for fall grazing. Brassicas are unique plants that present both interesting opportunities and challenges. Plant material includes leaves and bulbs or roots, both of which can be consumed by cattle. Anecdotally, cattle will eat bulbs but may take some time learning to consume the bulbous material found at or below the ground's surface. Bulbs can become quite large and present at least a mild risk of choking.

Lack of dry matter and fiber

On a dry matter basis, bulbs and leaves are extremely nutrient dense. Leaves can contain 18-30 percent crude protein and 55-80 percent, or greater, total digestible nutrients (TDN). Roots can contain 8-18 percent crude protein and 65-90 percent TDN. In terms of nutrient content, brassica forage is more comparable to concentrate than traditional forages. Brassica plants can be extremely high in moisture, making their feed value much less on an as-fed basis. Leaves and roots both can be upwards of 90 percent moisture. With such great moisture content and conversely so little dry matter, it can be difficult for cattle to eat enough material to meet nutrient requirements and to maintain a healthy rumen environment.

Sulfur toxicity

Brassicas tend to be relatively high in sulfur. The maximum tolerable limit for sulfur in beef cattle diets has been suggested to be 0.3 percent sulfur in diets containing greater than 85 percent concentrate, and 0.5 percent in diets containing greater than 40 percent forage. Brassica samples have been known to contain greater than 0.5 percent sulfur, thus posing a risk for sulfur toxicity, reduced performance, and poorer mineral absorption. Sulfur toxicity can manifest as polioencephalomalacia, sometimes called "polio" or "PEM" for short. This neurologic disease can cause blindness, ataxia, recumbency, seizures, head pressing, coma, and death. More mild clinical signs associated with PEM may include lesser dry matter intake, lesser average daily gain, and lesser hot carcass weight, as well as trace mineral deficiencies caused by antagonism between sulfur and absorption of numerous trace minerals.

Nitrate toxicity

Brassicas can also accumulate nitrates and pose a risk for nitrate poisoning. Nitrate levels greater than 1,500 parts per million (ppm) of nitrate-nitrogen are considered potentially toxic. In an Iowa State University study conducted at the Iowa State Beef Teaching Farm, a cover crop mixture of radishes, turnips, and oats was tested for nutritional values and nitrate levels. Mixed samples of leaves tested in October, November, and December were 1,960, >5,000, and 3,880 ppm of nitrate-nitrogen, respectively. Bulbs tested in October and December were 3,420 and 1,380 ppm nitrate-nitrogen, respectively. This cover crop mix also contained sulfur at levels capable of causing sulfur toxicity. Due to high nitrate and sulfur concentrations, researchers utilized strip grazing to control intake and provided ad libitum access to corn stalk bales.

Tips for grazing brassicas

- Brassicas are best utilized as forage when planted with grass species as a cover crop mix. The brassicas can offer abundant nutrients and the grasses can offer dry matter and fiber to help balance the overall diet. The grasses can also serve to dilute out the high sulfur levels of the brassicas.
- It may also be helpful to offer hay, cornstalk residue, or stockpiled grass in addition to brassicas. The dry matter and fiber of these feeds can help to balance the consumed diet.
- Producers should not supplement with high sulfur feeds or use high sulfur water sources while grazing brassicas.
- Brassica forage should be introduced gradually, and may be best managed through rotational or strip grazing.

Turnips and radishes as cover crops

Sorghum, Sorghum–Sudangrass, and Sudangrass

Warm season annuals such as sorghum, sorghum-Sudangrass, and Sudangrass are sometimes used in crop rotations to provide cover or forage during the heat of mid to late summer. These plants are productive, drought tolerant, and grow well in the warm season, making them useful as summer forage that can be used while resting cool season perennial pastures. Sorghum and related species can cause prussic acid poisoning and must be managed appropriately in order to prevent problems.

Prussic acid poisoning

Sorghum and related species contain cyanogenic glycosides that with plant injury such as freezing, crushing, or cutting can be converted to hydrocyanic acid (HCN), also known as prussic acid or cyanide. Cyanide potential is greatest during early growth stages and following severe, widespread plant injury such as a frost or hail event. Although sorghum and Sudangrass species are most commonly implicated in prussic acid poisoning, cyanogenic glycosides are found in numerous other plants such as milo, Johnson grass, elderberry, wild black cherry trees, and some clovers, vetches, and trefoils.

Prussic acid is extremely toxic and acts very quickly. Affected livestock may show clinical signs within minutes and often expire quickly enough that clinical signs are not readily observed. Prussic acid interferes with aerobic metabolism and animals thus succumb to hypoxia, or lack of oxygen, at the cellular level. Clinical signs may include difficulty breathing, muscle spasms, staggering, excessive salivation, increased heart rate, convulsions, and collapse. Blood of affected animals will often appear bright red.

Tips for grazing sorghum, sorghum-Sudangrass, and Sudangrass

- Risk of prussic acid poisoning can be mitigated through good management. First, choose species carefully as sorghum would pose a greater cyanide risk than sorghum-Sudangrass hybrids and such hybrids would pose a greater cyanide risk than Sudangrass.
- Do not graze until plants are 24-30 inches tall, thus avoiding the early growth period when cyanide risk is great. In some cases, sorghum is not safe to graze until it is fully headed.
- Producers should allow cattle to eat well and become full before first exposure to cyanogenic forages.
- Avoid feeding sorghum or related species as green chop silage and avoid grazing young regrowth.
- Do not graze during or immediately following events that are stressful or damaging to plants such as drought, hailstorm, or frost. Following a killing frost or other event that damages plants, wait 7-14 days for cyanide levels to decline before grazing.

Diverse cover crop mix

Legumes

With plant diversity and nitrogen fixation in mind, producers sometimes use legumes as cover crops or components of cover crop mixes. For cover crops used as forage, however, there are some risks associated with legumes.

Bloat

Many common legumes can cause frothy bloat when consumed in large enough quantities. Alfalfa, alsike clover, red clovers, and white clovers can all cause frothy bloat. These high protein forages are rapidly digested to form a stable foam that accumulates in the rumen, increasing intraruminal pressure. Bloat risk is greatest for animals grazing stands dominated by legumes, especially lush plants in the early growth stages, but high quality legume hay can cause frothy bloat as well. Beyond clovers, other legumes including various peas and beans can also cause bloat.

Beyond bloat risk, there are a few specific toxicity issues associated with specific legumes. Because of the following potential issues, sweet clover and hairy vetch would not be recommended as cover crops to be used as forage.

Alfalfa field

Hemorrhage

Sweet clover contains coumarin, which can be converted to dicoumarol, particularly in spoiled hay or silage. Dicoumarol is a vitamin K antagonist and anticoagulant that may cause hemorrhage in affected livestock.

Hypersensitivity

Hairy vetch is poisonous to livestock, particularly cattle, horses, and poultry. Ingestion of hairy vetch causes an intense inflammatory reaction, affecting multiple tissues and organs. Thought to be a hypersensitivity reaction, the condition may include subcutaneous swelling, skin lesions, hair loss, diarrhea, conjunctivitis, red-tinged urine, weight loss, neurologic signs, and death.

Tips for grazing legumes

- Legumes are best used for grazing when mixed with grasses. Forage mixes with less than 50 percent legume are relatively safe to graze without great concern for bloat. When grazing pure stands or fields dominated by bloating legumes, cattle must be monitored for bloat and management strategies must be used to mitigate risk.
- "Bloat blocks" containing anti-foaming agents like poloxalene can be used in legume fields.
- Supplementation with other feeds and forages can be offered to dilute the amount of legume consumed.
- Bloat risk seems to be greater in the morning hours when plants are still wet with dew, so turning them out to graze after the dew is gone can be helpful.
- Producers should allow cattle to eat well and become full before initial exposure to grazing forage dominated by legumes.
- There are a few legumes such as birdsfoot trefoil that do not pose a bloat risk and one must weigh cost, ease of establishment, and other factors against bloat risk when deciding which plants to use.

Cattle grazing on cereal rye at the ISU McNay Memorial Research and Demonstration Farm

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