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ID-186

Managing Legume-Induced Bloat in Cattle

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In the Southeast, incorporating legumes into pastures to reduce the impact of fescue toxicosis, provide nitrogen for forages, and improve pasture quality leading to increased animal performance is still sound management even though legume bloat is a risk to livestock.

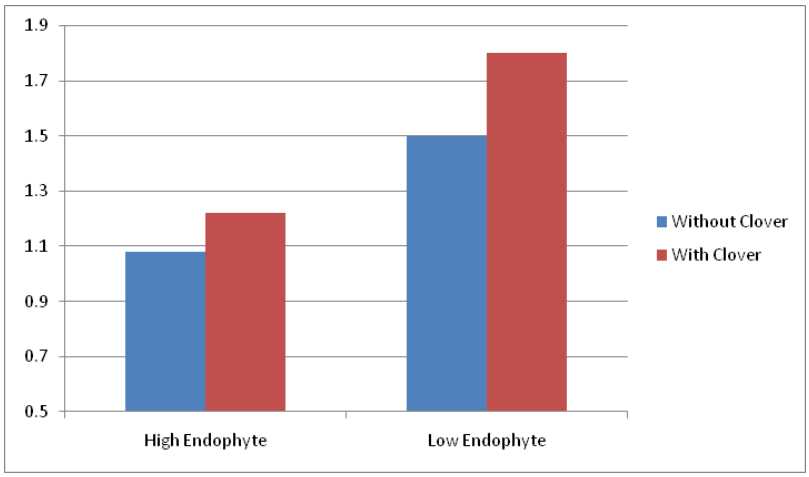
Individual animal performance is greater on grass/legume pastures compared to performance on similar monoculture grass stands.

Daily gains for steers grazing clover-fescue swards is improved compared to straight tall fescue pastures (Figure 1). Improved performance is partially due to greater forage intakes. Dairy cows grazing ryegrass with access to white clover had 15% higher forage intake than those grazing ryegrass alone.

When clovers have been interseeded into pastures containing endophyte infected fescue, reproduction has been shown to be improved as well.

If one considers the number of cattle grazing pastures containing legumes worldwide, the fear of bloat leading to low incorporation of legumes into grazed swards will give rise to greater economic losses compared to establishing a mixed sward of grasses and legumes.

Figure 1. Daily gain of steers grazing high-endophyte-infected tall fescue vs. those grazing non-infected tall fescue or clover.



Note: Based on comparison of swards.

What is Bloat?

Ruminal tympany, or bloat, can result in lost animal performance and in severe cases, death. It occurs as a result of a buildup of fermentation gases in the rumen. Bloat may be categorized as frothy bloat, which is caused by the formation of a stable foam in the rumen, or free gas bloat, which is due to excessive production of gaseous compounds from fermentation or as a result of an obstruction preventing the escape of gas compounds. Legume bloat is a frothy bloat condition.

In normal situations, these gases are eructated (belched) out of the animal. When this gas is prevented from escaping the rumen, it builds up, and the rumen becomes distended or stretched. As the pressure in the rumen increases, breathing is affected, because the diaphragm cannot expand and create the negative air pressure in the lungs necessary to inhale. In severe cases, this inability to inhale may cause death from suffocation.

Bloat potential is greatest during rapid growth periods in spring and declines during summer. Most incidences in Kentucky are usually from mid-March through May.

Cause

Legumes and succulent cereal grain forages such as rye and wheat, which are high in soluble protein, low in lignin, and have a highly digestible cell wall are considered high risk for promoting frothy bloat. Digestion of legumes high in soluble protein can cause the formation of a slime that traps the fermentation gasses and rumen contents, resulting in the frothy appearance and preventing the gas from being expelled.

Saliva contains mucin, which functions as an antifoaming agent, and has been shown to suppress the formation of rumen foam in laboratory benchwork or when using an *in vitro* system. It would be plausible that saliva production may be lower in bloating animals, perhaps as a result of selective grazing of higher quality forages followed by less rumination and/or a genetic difference in saliva and mucin production among animals.

Symptoms

Frothy bloat can cause death in as little as one hour after grazing begins on a bloat-producing pasture. It may occur on the first day of turnout but is more commonly seen on the second or third day. The main symptom is a swelling of the left region of the abdomen (Figure 1). Other early symptoms include repetitive standing up and lying down, kicking at the belly, frequent defecation and urination, grunting, and extension of the neck and head. The animal will have difficulty breathing because of the extreme pressure exerted on the diaphragm by the gas-filled rumen. If the bloat worsens, rumen contractions will stop completely and a distinct drumlike sound will be heard when the rumen is tapped or flicked. This sound is why bloat is sometimes referred to as "ruminal tympany." Without treatment, the animal will collapse and die, generally three to four hours after clinical signs begin. The death rate in a herd may be as high as 20%.

Management for Prevention

A sward's legume proportion is a key factor in assessing the risk of legume bloat. As this proportion exceeds 50% of the stand, the risk greatly increases. With proper management, however, stands with more than 50% legumes can be grazed with little to no bloat. No single factor, however, will eliminate the risk.

Moisture plays a role in a forage's bloat potential. Hungry cattle graze more aggressively when moved to a new pasture, so they should not be moved to new pastures with high legume content until midday—after the dew has dried and after they have grazed in the morning.

The use of feed additives, primarily surfactants and antibiotics, has been shown to be effective at reducing bloat in high-risk situations. The most common antifoaming surfactant and the only one currently approved for use in the United States is poloxalene, which is incorporated into a small block (i.e., 33.3 lb) form. Most blocks are labeled to be fed at a rate of one block to every five head of grazing cattle. To encourage intake of bloat blocks, other sources of salt and salt containing mineral supplements should be removed from pastures when using them.

Poloxalene also comes in a loose granular form that can be mixed in with salt, mineral supplement, or some other feedstuff. When bloat risk is high, the recommended intake level is 2 grams per 100 lb of body weight. When the risk is low, the feeding rate can be lowered to 1 gram per 100 lb of body weight. Daily hand feeding a supplement such as ground corn containing granular poloxalene is preferred over using a free-choice mineral, as more consistent intake is expected. A concentrated form of poloxalene in liquid form is also available and is used as a drench to treat frothy bloat rapidly.

Antibiotics have also been investigated for bloat reduction, including, in the 1960s, a thorough investigation of use of penicillin and other antibiotics as a prevention strategy. Later, the use of ionophores, a class of feed additives that inhibit growth of certain microbial species in the rumen, was proven effective. Ionophores include monensin, lasalocid, and laidlomycin propionate. Monensin is more effective than lasalocid in preventing legume bloat and often is the recommended ionophore for bloat control, but poloxalene has been reported to be more effective than either of those ionophores.

As with all feed additives, management is necessary to promote intake near the targeted level for maximum efficacy. If using blocks containing bloat-control feed additives, provide them at or above the manufacturers recommended rate. If a free-choice mineral is to be used, ensure the mineral remains fresh and dry, and encourage intake by placing multiple feeders in the pasture. Placing products containing feed additives near watering and loafing areas will also encourage intake.

A liquid product containing both pluronic detergents and ethoxylate alcohol has been marketed in New Zealand for several years. Pluronic detergents act as a surfactant and reduce the stability of foam produced in the rumen, allowing the gas to escape. Interestingly, ethoxylate alcohol is a primary ingredient in laundry detergents for high-efficiency washing machines to reduce the foaming of the soap. The use of such a laundry product is not approved for use in the United States. Even if it were, the level of detergent that would be needed in cattle drinking water and current retail prices eliminate this product as a cost-effective strategy for reducing bloat.

Hay feeding can also help reduce bloat. Research published in 1958 demonstrated that feeding 12 lb of oat hay to dry dairy cows overnight reduced the incidence and severity of acute legume bloat. Recently, controlled research has shown that feeding orchardgrass hay prior to feeding green, chopped alfalfa reduced the frequency of bloat by more than 90% in confinement-fed animals. High-quality grass hays that are palatable should be provided to entice hay intake.

Forage Management for Prevention

Pasture bloat is usually associated with cattle grazing white (ladino) clover or alfalfa, although other plants such as small grains and ryegrass also can cause bloat. Cases have been reported from grazing of red clover, but its risk of causing bloat is much lower than that of white clover. Other legumes, including lespedeza, crown vetch, and birdsfoot trefoil, rarely cause bloat, in part due to a tannin content that lowers the digestion rate and yield of the soluble protein fraction.

When cattle graze lush plants capable of causing legume bloat, no management practices will ensure bloat doesn't occur. The following management strategies can, however, reduce its incidence:

- Grow grass-legume mixtures instead of pure legumes.
- Avoid grazing very immature white clover or alfalfa. Research shows alfalfa grazed less than 10 inches tall had two times more bloat than when it is grazed at 19 inches.
- Put animals on lush legume pastures only when plants are free of surface moisture (dew or rain).
- Provide a full feeding of hay before turning animals into lush legume stands for the first time.
- Although bloat is associated with certain plants, some animals have a genetic predisposition to bloat, so you should cull chronic bloaters.
- Do not remove animals from pasture during first signs of bloat. Continuous grazing results in less incidence of bloat than removal and return.
- Provide access to water and minerals.
- Observe animals closely following any abrupt change in the weather.
- Feed bloat-reducing compounds.

Mowing and wilting legumes prior to grazing has shown some potential to reduce the incidence of bloat in alfalfa, based on research in the upper Midwest. Currently, the potential of this practice to reduce bloat when grazing white clover is uncertain.

During years of high incidence of bloat, some producers have resorted to "spraying out" clovers from their pastures to reduce clover proportions and eliminate risk. With the effective herbicides that are on the market today, this practice will certainly work, but it will also eliminate the improvement in forage quality and nitrogen benefits that clovers provide. Some have even suggested using low rates of herbicides to reduce white clover percentage, but it is very difficult to find a product and rate that dependably reduces clover. More often, the effect is temporary or kills the clover.

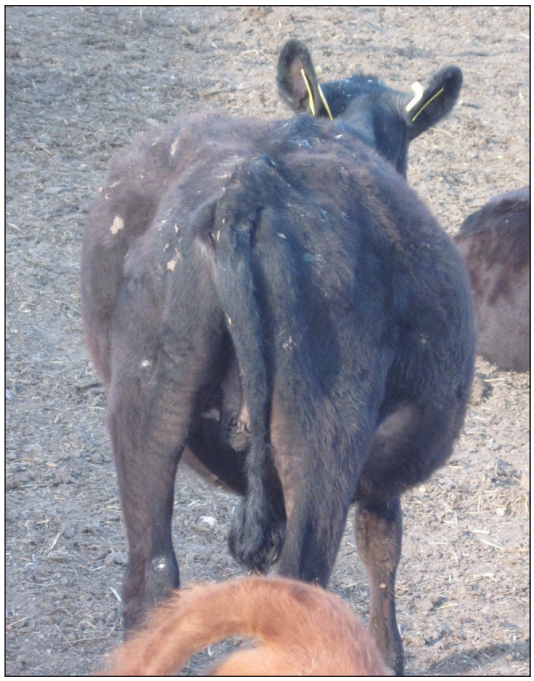


Figure 2. Animal displaying severe ruminal tympany or bloat with distension noted in the upper right region of the abdomen.

The best recommendation is to survey pastures that have major weed problems and spray those fields only, using recommended herbicides at the recommended rate. Weeds will be controlled and clovers will be killed as well. However, grazing can continue on these fields during periods when bloat is a concern, and the fields can be reseeded with clovers the following late winter. Using nitrogen to stimulate grass growth has sometimes been recommended to allow pasture grasses to out-compete clover. While this practice has merit, it can be difficult to determine the N rate and best application timing, so sometimes the clover may be stimulated as much as the grass.

Treatment

To properly treat animals, the severity of the condition has to be accurately assessed. If the animal's life is not immediately in danger, passing a stomach tube with the largest diameter possible is recommended. This practice alone usually does not decrease the pressure in a case of frothy bloat, but an antifoaming agent can be given while the tube is in place.

Antifoaming agents include vegetable oils (peanut, corn, soybean), mineral oil, and "non-ionic surfactants" that will break up the stable foam and allow the gas to escape. Vegetable and mineral oils work equally well in the rumen. The most common non-ionic surfactant treatment is the poloxalene drench concentrate (Therabloat®).

Dosages vary, depending on the product. The recommended dosage of Therabloat® is 1 to 2 fluid ounces, depending on the animal's weight. The recommended dosage for oils and fats is between 80 and 250 ml/head.

The animal must be observed carefully for an hour after treatment to determine if the treatment was successful or if an alternate remedy is needed. A second, alternative treatment would be puncturing the rumen with a trocar and cannula, which can purchased from a local veterinarian or farm supply store. Ideally, this procedure should be performed after acquiring proper training from a qualified individual, such as a veterinarian. To use a trocar to relief bloat pressure, a small (1 centimeter) incision is made in the middle of the animal's left flank. The trocar, which fits inside the cannula, can then be inserted through the abdominal wall and into the rumen. Once inside the rumen, the trocar is removed, leaving the cannula behind. Gas and foam can then escape through the cannula opening. If necessary, the cannula can be left in place until the condition has subsided. An antifoaming agent can be poured directly into the rumen via the cannula as well. If the condition is severe, pressure inside the rumen must be alleviated immediately. In life-threatening cases, an emergency rumenotomy can be performed, in which a large hole is cut through the skin into the rumen, resulting in an explosion of the rumen contents to the outside and sudden release of pressure. Relief is immediate, and cows typically recover.

Conclusion

For livestock managers, legume-induced bloat should be a concern, but it should not feared, because it can be managed to minimize losses while at the same time improving animal performance. The key is monitoring pastures and assessing the amount of legumes in the sward to determine risk level. To reduce the incidence of bloat with grazing cattle, preventive management should be used when legume concentrations are high.

Issued 3-2011