

Grazing Standing Corn – Reducing the Risk of Acidosis

Introduction

The practice of grazing standing corn during late fall and winter was first tried in Western Canada in the early 1990s. There are many advantages to grazing standing corn including the potential to reduce labour and machinery costs during winter feeding and reduced manure handling. However, there is risk for cattle to experience rumen **acidosis** or **grain overload**. Since this practice began there have been cases where significant problems have occurred. This document discusses management strategies to reduce the acidosis risk when grazing standing corn.

What is Acidosis (Grain Overload)

Acidosis occurs when ruminant animals have a sudden and significantly large change in diet from high fibre roughage (hay, greenfeed) to low fibre, high carbohydrate, grain (barley, wheat, corn). Less well known, acidosis can also be induced when there are significant changes in dry matter intake from an empty to full stomach - even on a forage diet.

Within four to 10 hours after ingesting a large amount of grain, there is a change in the microbial population in the rumen. The roughage-digesting bacteria are quickly replaced by carbohydrate-digesting bacteria which produce lactic acid and cause digestive upset. There are various degrees of severity of acidosis, determined by both the acid level (measured as pH) and the duration of reduced pH. Generally, cases are divided into categories of acute and subacute acidosis. If the rumen environment is acidic (low pH) for an extended period of time, the damage will be greater than if the rumen is only slightly acidic for a short period of time.

Acute Acidosis

Acute acidosis occurs when the rumen pH drops from the normal range of pH 6.5-7.0 to a low of pH 5.0 or less. The lactic acid will damage the rumen lining and cause severe inflammation of the abomasum and intestinal linings. In severe cases (pH less than 5.0) animals will die suddenly. In less severe cases (pH 5.0-5.5) the damage to the lining of the digestive tract will result in poor absorption of nutrients, resulting in low gains and poor feed efficiency. Foundered cattle are an indication that acute acidosis may have occurred 40-60 days previously. Cattle that appear to have fully recovered may still experience long-term damage to rumen lining and other negative effects.

Subacute Acidosis

Subacute acidosis occurs at pH 5.5-5.8 for four hours or longer. Some damage to the rumen is likely, but this can potentially be healed. Subacute cases may not be recognized by the manager. In mild cases animals may only reduce feed intake slightly for a short period of time. As the degree and duration of acidosis increases, reduced feed intake and ability to digest fibre may affect animal performance and gain. Animal signs may include panting, excessive salivation, diarrhea, kicking at their belly, aimless wandering, falling or eating soil. Animals affected by subacute acidosis may suffer permanent damage.

Beef Cattle Grazing Behavior

When cattle are first introduced to corn grazing, they quickly learn the cobs contain the grain and the grain is the most palatable portion of the plant. Each time they are allowed access into a new area of corn, they select the cobs first. They learn to roll the cobs in their mouth and if the kernels can be dislodged, they will consume the grain first. If the kernels cannot be dislodged, they will consume the whole cob. This is followed by consumption of husks and leaves. Last to be consumed are the stalks.

When a herd is given a relatively large allotment of crop at a time, individuals will initially be able to select and fill up on a high percentage grain diet for days in a row. Near the end of the allotment, they may consume less than expected for a few days when only the stalks remain.

Some research has shown that livestock have a “feedback mechanism” when ingesting feeds. When intake of a feed causes stomach pain (acidosis), some cows **may** learn to voluntarily limit their intake of that feed. To gain and apply that experience, animals have to survive their first experience. In some situations, experienced cows may be reducing their risk of acidosis by limiting intake. However, this cannot be relied upon as a management strategy. There are instances where herds experienced in grazing standing corn have had cases of acute acidosis. Furthermore, conflicting research shows that livestock do not acquire the knowledge to limit feeds causing acidosis.

Managing Corn Grazing

The following is a list of management practices that will reduce the risk of acidosis when grazing standing corn:

1. Be aware of the plant and kernel maturity

Since a more mature crop will increase the risk for acidosis, producers should choose a variety of corn adapted to their area that will reach mature to half kernel milk line at the time of first killing frost. If the field of corn advances beyond this stage, closer to full maturity, then producers should consider harvesting the crop as grain or silage.

As corn matures, the milk line advances from the top of the kernel towards the bottom (pointed end) of the kernel. Above the milk line, the starch is fully developed within the kernel. The more advanced the milk line, the greater the amount of starch there is in each kernel and cob. As the amount of starch in each kernel increases so does the potential for acidosis. A milk line of 10 per cent would be significantly lower risk than a milk line of 50 per cent.

Furthermore, more mature and/or dry kernels will make it easier for cows to dislodge kernels from the cob by rolling in their mouth. If the cows are able to do this, they have the opportunity to fill up on grain alone. Monitor the herd closely to determine if kernels are being ‘threshed.’ Empty cobs on the ground will be a sign.

2. Feed Test

Whole plant corn may be sufficient to meet a cow's nutrient requirements. However, without quality testing it is impossible to know what nutrients may be deficient and what may be in excess. Standing whole plant corn allows for the cows to easily select different components of the plant (cob, leaves, or stalk) and each of these components differ in their nutritional characteristics. The concentration of starch and sugar in the whole plant (not just the cobs) puts the cows at risk for acidosis. Representative samples should be tested for: dry matter (DM), crude protein (CP), ash, neutral detergent fibre (NDF), acid detergent fibre (ADF), ether extracts (fat), calcium and phosphorus. This information is important to ensure that you are providing cattle with appropriate feed, mineral and vitamins to meet their nutritional requirements. Livestock and Feed Extension Specialists can help in interpreting these feed tests.

3. Observation

Often grazing standing corn is viewed as a low management style of feeding. However, with the high risk for digestive upset and acidosis, cows should be monitored daily or more even frequently in order to spot problems before they get out of hand. In some cases, cows with subacute acidosis will not show signs of a problem. They may go off feed and show some of the other symptoms listed above (wandering, panting, excessive salivation, diarrhea, falling, kicking at belly, etc.). If these cases are caught early, management can be changed to prevent a greater problem.

4. Days of Grazing Allotments

In order to maintain pH at a more consistent level, cattle should have a relatively constant diet of whole plant corn every day. Given the ability and preference for cattle to select cobs and grain, and the need to encourage consumption of stalks, short rotations are the best option. A rotation of three days is optimal to minimize switching between paddocks and maximize whole plant consumption. Grazing duration must be adjusted if cows are not cleaning up the crop or if there is not enough forage available at the end of the time period. Cows should be allowed to back graze paddocks.

Unpublished research at Western Beef Development Centre (Jose, Penner, McKinnon, Larson, Lardner) measured pH changes during three day cycles when grazing standing corn. During days one and two, pH was less than 5.8 for approximately 200 minutes each day. Below 5.8 is when rumen function begins to be compromised.

When a herd is allowed seven days allotment at a time, they may have a greater potential to overload on grain during the first two to three days. They will then need to be "pushed" for three to four days to consume low quality stalks, resulting in a lower rumen fill and an increase in the risk of acidosis when they fill again on a fresh allotment. Seven days is considered too long a time frame as it results in a significant diet change within the seven-day period. This adverse effect may be partially offset by supplemental feeding of hay during grazing of the stalks.

To determine paddock size producers can estimate their dry matter yield of standing corn at approximately five tons of dry matter per acre (individual yields will vary). Then allow cows enough feed for 2.5 – 3.0 per cent of their body weight per day. For example, if a field of corn yields five tons of dry matter per acre and there are 150 cows in the herd that weigh approximately 1400 pounds, two acres of corn would provide them with a sufficient amount of feed for three days.

1400 lb cow x 3% = 42 lbs of dry matter required per head per day

42 lbs x 150 cows = 6,300 lbs of dry matter per day for the herd

6300 x 3 days = 18,900 lbs of dry matter required for the herd for three days

5 tons/ acre x 2000 lbs = 10,000 lbs of dry matter per acre

10,000 lbs/ acre x 2 acre paddock = 20,000 lbs dry matter per paddock

These calculations contain several assumptions and must be adjusted for each situation (cow size, yield, intake, waste, etc.). A good practice is to plan paddocks before seeding time so that there is a place to set up the electric line. Another good idea is to have a second paddock set up in the event that cows break through to the next paddock before they are moved.

5. Feed Hay

Feeding hay accomplishes three things:

- Reduces the potential for subacute acidosis: Feeding hay increases the probability of greater rumen fill when grazing the last of the stalks prior to allowing livestock into a new allocation of corn. **It is critical their rumens are full when allowed into a new allotment to reduce the initial intake of corn grain.**
- Nutrition: Whole plant corn is usually adequate for energy, but may be low on protein. Feeding alfalfa or alfalfa/grass hay will help balance the diet.
- Crop Utilization: Feeding hay as a portion of the diet encourages more complete grazing of the stalks which results in more cow days per acre for the crop.

6. Monitor the Weather

Extreme cold and wind chill (below -20 C) requires extra energy. Cows will consume more feed and may be at higher risk if turned into new corn allotments when there is extreme cold. Also extreme weather like winter blizzards may interrupt grazing, resulting in empty rumens and gorge feeding once they resume eating.

7. Late Gestation and Lactating Cows

Cows in late gestation have higher energy requirements than cows in early and mid-gestation, so they may be at greater risk. Cows producing milk require higher energy diets and consume more feed than non-lactating cows. Cows with calves may be at higher risk due to higher energy needs and greater appetite.

8. Stalk Size and Maturity

Demonstrations with different corn varieties appear to show corn varieties with larger stalk diameter are less palatable. Also, stalks that are more mature prior to freezing have lower palatability. Large stalk diameter and greater plant maturity may contribute to lowered intakes in a current paddock, and then gorging of cobs in a new allotment.

9. Cow Body Condition Score

Cows with a lower body condition score will have a greater appetite and may be at higher risk for gorging and ingesting excessive grain when turned into new allotments of corn. Cows should be managed to maintain a body condition score of 2.5 - 3.0 while grazing whole plant standing corn.

Conclusion

Grazing whole-plant corn can be a good source of feed for beef cattle, but if improperly managed the practice has the potential to induce acute acidosis. In many cases, producers have not experienced any problems with grazing corn. However, there are instances where acute cases of acidosis have developed with severe outcomes.

Limiting corn paddock size to allow animals enough for three days of feed, and providing good quality hay free choice are two of the more important management practices that can significantly reduce the risk of acidosis when grazing standing corn.

For more information, contact your nearest Livestock and Feed Extension Specialist or phone the Agriculture Knowledge Centre at 1-866-457-2377.