

Forage and Feeding Considerations

What to do With Drought Stressed Corn



Salvage Corn for Feed

Drought-stressed corn grain crops that are to be salvaged for feed can be harvested in a number of ways. It is recommended that you first ask the grower what chemicals were used on the crop and have them check the labels. You need to ensure that the crop is cleared for forage use and that the minimum pre-harvest interval has been met.

Pricing a standing crop

The [Standing Corn Decision Calculator](#) was developed by Manitoba Agriculture and Resource Development's Farm Management specialists. It calculates the price of corn silage standing in the field. This price should be calculated by each individual producer because each producer has different input costs. Details about that calculation can be found in the [silage cost of production](#) worksheet. The calculation includes:

- seed
- fertilizer
- pesticide
- land taxes
- crop insurance
- 40 per cent of fuel
- 20 per cent of labour
- machinery lease
- machinery operating
- 50 per cent of other costs
- land costs

For example, in 2021, the standing cost of corn that is 65 per cent moisture is \$0.011 per pound on an as is basis. On a dry matter basis, that converts to \$0.034 per pound standing.

Strip Grazing Corn

If the corn fields are fenced and livestock water can be accessed, the corn crop can be offered for grazing. To graze standing corn, introduce cattle slowly by feeding them hay before putting them into the corn field. This will reduce the risk of digestive problems. Cross-fencing is needed to limit how much corn is offered to the cattle. Provide only enough area for the cattle to graze for a couple of days, otherwise grain overload could occur; that is if there was good cob development. In drought stricken corn, the cobs may not be as well developed.

Another issue to be aware of is **nitrate accumulation**. Corn grain growers will usually apply the recommended rates of fertilizer to get maximum corn yields. Plants under drought stress draw up nitrates, but growth is impeded and nitrates accumulate in the plant. If the animal eats a high nitrate feed, nitrates can accumulate in the body and be absorbed into the bloodstream. They binds to hemoglobin, reducing the oxygen-carrying capacity of the blood.

Symptoms of nitrate poisoning include:

- labored breathing
- frothing at the mouth
- rapid pulse
- weakness
- diarrhea
- frequent urination
- incoordination
- convulsions

Death may occur three to four hours after an acute lethal dose. Post-mortem examination reveals dark, chocolate-colored blood. Sub-lethal doses may result in loss of appetite, lowered milk production, slow growth and abortions. For a more detailed discussion on nitrates, please refer to [Managing Nitrate Contaminated Feeds](#).

Additional management information can be found at [Grazing Cattle on Corn](#).

When fencing is not available, other options include making chopped corn silage, round bale silage (RBS) and use of corn stover, if the grain was harvested. These options are further outlined below.

Chopped Corn Silage

Making corn silage helps lessen nitrate concentrations. Silage can also be mixed with other low nitrate feeds and help extend feed supplies. You can expect high nitrate levels in the bottom portion of the plant. To avoid the nitrates, the chopper head can be set higher to leave a six-inch stubble. The ensiling process can reduce nitrate levels by 30 to 60 per cent.

When should you harvest?

Drought affects the whole plant moisture content. When drought slows plant growth and delays maturity, the moisture content will be higher than is suggested by the appearance of the crop.

Many producers want to start chopping when the corn looks dry, however you should never judge dry matter (DM) by just looking at a plant. DM is often lower than what it appears, therefore a whole plant dry matter test is the best indicator for establishing plant maturity and planning the harvest date.

Independent of the drought conditions, always use 32 to 35 per cent DM (68 to 65 per cent moisture) as the basis for when to harvest corn for silage that will be put up in bags, pits, piles or upright silos. An easy method to determine forage dry matter can be found in this article [Province of Manitoba | agriculture - Harvesting and Storage of Quality Hay and Silage](#).

What is the quality of drought-stressed corn silage?

Drought-stressed corn silage is about 85 per cent to 100 per cent of the energy value of regular corn silage, depending on the number of ears on the stalk. The protein content can be slightly greater than regular corn silage. Research has shown that the concentration of starch decreases in the drought-stricken corn, but the concentration of soluble sugars increases.

Soluble sugars are essential for the fermentation process to occur in silage making, and lactic acid production is enhanced with a good supply of soluble sugars. Additionally, when corn is harvested earlier for silage, lower yields are expected with increased digestibility. Increased digestibility results in a greater portion of energy that is captured by the animal.

Before feeding, take a representative sample and have the silage sample tested for moisture, pH, energy (Total Digestible Nutrients, TDN percentage), crude protein (CP percentage) and nitrates. Test results can be used to identify what you need to feed and any supplements that need to be provided. Corn silage can be very good quality and can extend feed supply when feeding it with other average to lower quality feeds.

Silage Type	% Dry Matter, (percentage of moisture)	TDN %	CP %
Well-eared Corn Silage ¹	35 (65)	70	8.0
Drought –stressed Corn Silage ¹	35 (65)	65	11.1
Corn Silage ²	35 (65)	64	10
Barley Silage ²	37 (63)	63	11.1
Alfalfa- Grass Silage ²	43 (57)	60	14.6

¹ Adapted from AS 1182 Alternative Feeds for Ruminants and nutrient analysis conducted at NDSU [Corn silage: How much can you feed to a calf? — Livestock Extension \(ndsu.edu\)](#)

²Cowbytes V5.31 AAFRD

Corn Round Bale Silage

If you have never made chopped silage or do not have the means to feed chopped silage, round bale silage (RBS) may be the way to go. It is important to check that your bale handling equipment can handle the heavier bales; RBS bales can weigh as much as 2,800 pounds for a six-foot bale.

The best amount of moisture content for RBS is 55 per cent moisture. As with chopped silage, moisture test the crop before you decide to start baling. Do not cut more in one day than you can bale, stack or wrap individually in a day. Bale at 40 to 60 per cent moisture. Baling too wet results in butyric acid (sour silage) production and increases the likelihood of frozen bales. Baling too dry results in greater quantities of air in the bale and mouldy silage. Seal the bales in plastic as soon as possible, and always on the same day. Storage options include using sheet plastic over a pyramid stack, a single-row tube and tube wrapping, or individual bale wrap. More layers of plastic wrapping may be required because the coarse corn stems will easily poke through the wrapping. Monitor the silage wrap for holes and tape holes shut with duct or construction tape. Be careful when moving the bales so you don't puncture the plastic.

In general, it takes about four weeks (or more depending on temperature and internal bale conditions) for the ensiling process to finish for RBS. Feed test before you feed the silage so you can adjust to what your animals need and supplement with minerals and vitamins accordingly. When you're having a silage sample tested, make sure you get a pH value. It indicates how well the forage ensiled. Good acid production with a pH lower than 4.5 will stabilize the forage. If the pH is over 5, the forage will not be as stable and should be fed out before the next spring.

As with chopped silage, if the crop contains higher levels of nitrates, the ensiling process can reduce the nitrate level, however, the reduction of nitrates is less for RBS than it is for chopped silage. It is recommended that you send a representative silage sample into a lab for testing. Have them analyze the sample for feed quality and for the amount of nitrate in the finished ensiled feed. For more information on RBS, visit the following link: [Baled Silage Production](#).

Baling Corn Stover

The valuable components of corn stover, in terms of feed, are the leaf and husk because they are the most digestible, but they only make up about 40 per cent of the residue produced. Research has shown that the husk is 60 per cent digestible, the leaf is 46 per cent digestible and the cob and stalk are only 35 per cent digestible. A bale of corn stover with more leaf and husk and less stalk and cob would have greater energy content. As such, corn harvesting and baling technologies that alter the proportions of plant parts in the baled residue can potentially improve the feeding value of corn residue. It does this by increasing the proportion of more digestible parts, compared with less digestible parts.

The key challenge with fall harvest is the stover moisture content. Dry stover can be harvested with good quality product up to 25 per cent moisture. Above that amount of moisture, spoilage can occur. Nitrates still exist in the corn stover and do not decline as they do in the ensiling process, so use caution when feeding.

Harvesting wet corn stover is an option to increase feed quality and palatability, but this does come with additional cost. Moisture levels can be 30 to 50 per cent and bales should be tightly wrapped in plastic to allow for fermentation to occur, over four to eight weeks. Fermentation will be slowed as ambient temperatures decline into the fall. For information on the costs of wrapping bales, see Manitoba Agriculture and Resource Development's Hay: Round Bale and Silage Production Costs ([XLS](#) 255 KB or [PDF](#) 1 MB) [Province of Manitoba | agriculture - Cost of Production](https://www.gov.mb.ca/agriculture/cost-of-production/).

Ammoniation of Corn Stover

Ammoniation of low-quality forages, like cereal straw and corn stover, results in more digestible forage. It does this by exposing more structural carbohydrates for the rumen microbes to breakdown, which will increase the ruminal passage rate and dry matter intake (DMI). In some cases, because increased nitrogen from the ammonia leads to increased rumen degradable protein (RDP), there is an improvement in microbial efficiency.

Research out of Nebraska (Conway et al. 2019) compared a conventional rake-and-bale system to using a Cornrower attachment chopping only two rows of stem, but it had no impact on intake of non-ammoniated residue. A much greater increase in dry matter digestibility (10 per cent units) and an increase in intake were observed with ammoniation of the corn residue. The study demonstrated the continued utility of ammoniation as a practical and effective method of improving digestibility of corn residue for use in ruminant diets. Most importantly, this study showed that ammoniation and selective harvest effects are additive, resulting in significant improvements in both digestibility (16 per cent units) and intake of corn residue.

A random selection of 12 bales (90 per cent DM) from each of the harvest methods was stacked in a pyramid arrangement, on top of six-millimetre black plastic, with treatments randomly distributed throughout the stack. Bales were covered using six-mm black plastic, and composted soil was piled around the base of the stack to seal the edges. Anhydrous ammonia was applied via one injection point at 5.5 per cent of DM in July of 2015, and the cover remained in place for 33 days.

For more information on ammoniation of low-quality forages, see [Province of Manitoba | agriculture - Ammoniation of Forages](https://www.gov.mb.ca/agriculture/ammoniation-of-forages/).

Main take away points

Drought-stressed corn crops can be harvested for cattle feed in a number of ways

- If you're grazing higher nitrate containing corn, never put them out hungry. Allow access to other forages such as grass hay, and monitor your animals closely.
- **Feed test** to determine your feed quality, nitrate levels and pH for silage.
- High levels of nitrates can be managed by either ensiling or mixing with low nitrate feeds.
- Depending on the feed quality of your salvaged corn crop or corn stover, supplemental energy, protein, vitamins and minerals may be required.
- If the feed quality of the salvaged forage is good, it could be used to mix with lower to average quality forage to extend your feed supply.
- Ammoniation is an option to improve low quality forage such as corn stover.

For more information, contact the Agriculture and Resource Development and Manitoba Agriculture Services Corporation Service Centre at 1-844-769-6224 or email: ARD@gov.mb.ca (MASC) programming, and amounts due and owing by the applicant under other Manitoba Agriculture and Resource Development or MASC programming.