



## Department of Animal Science

201 Animal Science  
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# Drought Damage Corn Plants for Cattle

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This year is proving to be one of the hottest and driest on record across Oklahoma and the Southern Central Region of the U.S. This widespread drought has led to very poor pasture conditions and is creating a shortage of hay. Given the forage shortage, many producers have chosen to reduce cattle numbers or grazing pressure through selective culling, early weaning, and marketing calves. Still others are trying to find a way to utilize a failed corn crop to replace forage needs.

Drought damaged corn plants may be useful as a feed resource for cattle operations. Corn plants can be utilized as hay, silage, or grazed forage. However, a few considerations are necessary due primarily to the stress that drought damaged plants have undergone. These include nitrate concentration, aflatoxin concentration, moisture for ensiling, or proper drying for baling.

### Nitrates

Drought damaged plants have the potential to be high in nitrates and should be tested before feeding or grazing to prevent losses associated with nitrate poisoning. While any corn plant can accumulate nitrates, if no ear is formed or if ears cannot be pollinated, these plants will be particularly susceptible to accumulate nitrates. Nitrate ( $\text{NO}_3$ ) levels below 3,000 ppm are considered safe for all cattle, levels up to 5,000 ppm are generally safe for non-pregnant beef cows, levels up to 10,000 ppm provide risk that may reduce growth and milk production or cause mid to late term abortions and weak newborn calves, levels above 10,000 ppm are potentially toxic for all cattle. For forages that are high in nitrates, proper ensiling has reduced levels 20 to 50%. Cattle can adapt to some nitrate over time. Therefore, by providing alternative feed of some type and gradually increasing the nitrate-containing forage portion of the diet, risk of nitrate toxicity can be reduced substantially. Information from sorghums indicates that the highest nitrate concentrations are in the first 6 inches of the stem, so cutting above that height may help reduce nitrates. A diphenylamine test can be conducted to determine if nitrates are present, but proper sampling and testing are required to determine the actual concentration in the feed. Oklahoma State University offers fee based nitrate testing of forage through the Soils Testing Lab (<http://www.soiltesting.okstate.edu/>, 405-744-6630) and Oklahoma Animal Disease and Diagnostic Lab ([http://www.cvhs.okstate.edu/files/OADDDL/OADDDL\\_submittal\\_savable.pdf](http://www.cvhs.okstate.edu/files/OADDDL/OADDDL_submittal_savable.pdf)) or a number of commercial labs also offer this service.

The symptoms of acute nitrate poisoning in livestock include staggering gaits, muscle tremors, rapid pulse and urination, labored breathing and bluing of the mucous membranes (cyanosis due to lack of oxygen), and abortion (which may occur when acute nitrate poisoning kills the fetus but not the cow). The blood on post mortem examination will be chocolate-brown in color. Death occurs from asphyxiation.



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### Aflatoxin

Aflatoxins occur in feed through the growth of molds that may or may not be visible. It is often associated with broken or light weight kernels. If mold is present, aflatoxin screening should be conducted on the grain. Use of a blacklight in a dark room can create fluorescence of a compound that is not directly related to aflatoxin production, so this is not a definitive test. Aflatoxin toxicity symptoms are difficult to detect and may include: reduced weight gain, reduced feed consumption, intermittent diarrhea, reduced feed intake, unthriftiness, rough hair coat, reduced reproductive performance including irregular estrus cycles, embryonic mortalities, pregnant cows showing estrus, and decreased conception rates.

Suggested limits of aflatoxin in corn fed to cattle are 20 ppb for immature livestock, 100 parts per billion (ppb) for breeding cattle, and 300 ppb for finishing cattle. If the whole plant is fed as hay or silage the concentrations of aflatoxin is diluted, so the above suggested levels for grain could be multiplied by 3. Aflatoxin contamination is often highly variable within a field or load of feed. Sampling of a standing crop is extremely difficult and requires collection of corn grain from a large number of ears throughout the field to make at least a 10 pound sample. A combine can be used to make one or more passes through the entire length of the field. As the hopper is being emptied, pass a cup through the moving stream at 30 second intervals until the collected volume totals 10 pounds. Mix this well and save it for testing. Fee based analyses are conducted by the Oklahoma Animal Disease and Diagnostic Lab ([http://www.cvhs.okstate.edu/files/OADDL/OADDL\\_submittal\\_savable.pdf](http://www.cvhs.okstate.edu/files/OADDL/OADDL_submittal_savable.pdf)) or a number of commercial labs.

### Nutritive values

The nutritive value of hay from corn that was not harvested will vary considerably similar to the range frequently found in low quality to high quality prairie hay. More mature, dried whole corn plants will be in the range of 50% TDN and 5% crude protein, and would require both energy and protein supplementation for maintenance of mid-gestation beef cows. Less mature (more green plant material) whole corn plants or plants with more grain will be at the higher end of the nutritive value range at around 56% TDN and 8% crude protein and should be adequate for cows in mid to late gestation with minimal to no supplementation. Proper ensiling will result in higher quality feed than baling. Studies have indicated that drought stressed corn can surprisingly have 80 to 100% the value of normal corn silage. The nutritional value for grazing will depend on plant maturity, the degree of drought stress, the amount of grain that has developed and the grazing pressure. More cattle grazing longer will result in forced grazing of the lower stalk material which is very low quality forage. Ears with corn grain should have the greatest nutritive value, followed by leaf material, then the upper stalk with the lower stalk representing the lowest quality part of the plant.



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### Ensiling

Corn that has already dried too much does not ensile well as the lack of moisture does not allow a proper fermentation to occur and create proper storage conditions for silage. The minimum recommended moisture for ensiling corn is 50%, but 65% is more desirable. The tendency will be to harvest too soon, resulting in silage with excess moisture, poor fermentation and reduced feed value. Stalks of plants with many or most leaves turning brown will contain considerable moisture. Also, stalks with small ears and little or no grain content will be higher in moisture. Normal harvest indicators such as kernel milk line and black layer may not apply in stressed corn. If the crop is dryer, you can add water at the time it is put into the silo to bring it to proper moisture. Large changes in moisture may not be practical through water addition as each 1 percentage unit increase in moisture requires approximately 5.75 gallons of water per ton of silage. Consequently, if a corn crop is already below 50% moisture, it may be more practical to dry it for hay. A method for determining the moisture content of forages with a kitchen scale and microwave can be found at: <http://www.agry.purdue.edu/ext/forages/publications/ID-172.htm>. Normally, whole plant corn silage (65%) moisture per ton is valued at 9-10 times the price of a bushel of corn, including harvest and storage costs (i.e. \$6.00/bu = \$54.00 to \$60.00/ton of silage). Standing corn should be discounted \$5.00 to \$7.00/ton to account for harvesting costs. Discounts due to lower feed value should range from 0 to no more than \$4.00 per ton.

### Baling

Baling corn is more difficult and harder on equipment than grass hay and many balers have difficulties picking up either long stems or shredded material. Assuming corn plants test low in nitrates, cut the material close to the ground with a rotary or disc mower. This will facilitate baler pickup and raking if raking is necessary. However, this is not advisable if the plants have a moderate to high concentration of nitrates because the nitrate is concentrated in the lower stalk. Make sure the crop is completely dry before baling with moisture less than 20% (to prevent spoilage and spontaneous combustion) and preferably less than 15% at harvest. Tightening tension on the baler aids in producing bales that shed rain and are easy to transport. Use net wrap or use extra string with approximate 3 inch spacing.

Baled corn and other coarsely processed crops are less weather resistant than grass hay as they allow water to penetrate the bale during hard rain events; therefore, it is recommended that these types of hay be stored in a barn or in a pyramid arrangement (3, 2, and 1 bale high) and covered with 6-mil plastic or a tarp after stacking. Additional information about round bale storage can be found at: <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Rendition-6342/BAE-1716web.pdf>

### Grazing

When considering grazing as an alternative use of a failed corn crop, the first consideration should be the existence of nitrates and (or) aflatoxin. Even if moderate to low concentrations of nitrate or aflatoxin is present, grazing the crop can still be a successful harvesting alternative with careful management. One acre of corn should provide roughly 100 grazing days for beef



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cows and about 200 grazing days for stocker cattle. Cows can be stocked at about 2 cows per acre and 500 to 700 lb stocker cattle at 3 to 4 head per acre. Strip grazing will greatly reduce the amount of waste from trampling and reduce overconsumption of corn grain, and therefore aflatoxin (if present). Lower grazing pressure (larger paddocks, fewer cattle per paddock, or less time spent grazing each paddock) will reduce the risk of nitrate toxicity in low to moderate nitrate fields. Lower grazing pressure means less consumption of the stalk where nitrates are concentrated. A protein supplement may be advisable in situations where grazing pressure is higher (more consumption of low quality stalks) or corn is more mature and completely cured or brown. Be sure to provide a mineral supplement containing salt and vitamins A and E.