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## **Corn Stalks and Drought-Damaged Corn Hay as Emergency Feeds for Beef Cattle**

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This year has been one of the driest on record all across the state of North Carolina and the Southeastern U.S. in general. This widespread drought has led to very poor pasture conditions and a critical shortage of hay. In order to make it through the winter with their herds intact, producers need to plan now. A good plan will include selective culling to ease the demand for feed, and then finding alternative feeds for the coming winter season. Due to the short hay supply in the entire state and surrounding states, producers should seek out alternative feeds that are close to home.

One feed alternative present throughout the state is corn stalks and drought damaged corn. Corn acreage was much higher this year than is typical, and much of that corn received enough timely rain such that once the combines run there will be a significant amount of residue that could be baled. If the corn has suffered extensively from the drought and is not worth picking, the crop should still be considered as a hay crop. These materials can make acceptable feeds for cattle assuming rations are balanced appropriately, and that good management practices are followed.

This article is intended to get the attention of corn growers that could bale corn stalks giving them another product to sell. It is also aimed at beef producers that should aggressively look for opportunities to purchase baled corn stalks out of the field, or to bale or chop the corn stalks themselves if they have hay or silage equipment.

### **Composition of drought damaged corn, and corn stalks**

Corn stalks are in general a low quality feed. The nutrient levels vary, but will average about 50% TDN and 5% crude protein with a normal range of about 46 to 54% TDN and 4 to 6% crude protein. Damaged corn that is not combined will have a somewhat higher

nutrient value than the stalks. However, quality will be extremely variable; they may be as low in quality as the stalks, but may also be as high as 56% TDN and 8% crude protein.

Ensiling these materials will result in higher quality feeds than baling, so if silage equipment is available consider chopping for silage. This is especially true for the drought damaged corn that will not be combined. Another advantage of ensiling is that nitrate levels will be reduced by the fermentation. For proper fermentation make sure that moisture level is high enough. It needs to be at least 50% moisture to ferment, and 65% moisture is most desirable. If the crop is dry then adding water at the time it is put in the silo is recommended.

However, be aware that it takes a lot of water to increase moisture. For example, if the crop is 47% moisture it would take 75 gallons of water per ton of silage to bring it up to 60% moisture, and adding that much may not be practical. In general, if the crop has less than 50% moisture it may be more practical to dry it down for a dry crop rather than making it into a silage.

Testing these feeds for quality before starting the feeding program is critical. Nitrate level should always be known before you start feeding these materials to prevent losses associated with nitrate poisoning. In order to get good nutritional information, you will have to take a good sample of the material. To sample bales, take core samples from at least 20 bales coming from an individual field, or at least 20% of the bales if there are over 100 coming off a field. Composite the core samples, mix and submit the sample to the forage analysis lab.

Make sure you get the report on nitrate levels before feeding. If the crop yielded a low level of dry matter you may want to test for nitrate before harvesting. To do this, cut 20 stalks during a random walk of the field, chop them with a hatchet or meat cleaver into 2 inch pieces, and then mix and subsample them for submission to the forage lab.

### **Harvesting drought damaged corn and corn stalks**

It is more difficult to bale corn stalks than more familiar grass hays. The stalks are big and tough and many balers have difficulty picking them up. Also, when corn is combined most of the stalk is left standing and this material can damage the hay equipment. Drought damaged corn that is very short (less than head high) will be easier to bale, but will still pose a challenge.

Several tips that have been gleaned from producers in our area experienced with harvesting corn stalks are as follows:

- 1) The coarse crop is tough on hay equipment. Cutting the material close to the ground with a rotary mower or disc mower greatly improves the way the crop handles.

2) Make sure the crop is completely dry before baling. Moisture should be less than 20% and preferably 15% at baling. The pith holds moisture and is very slow to dry if the crop is not shredded with a rotary mower.

3) It is difficult to make good tight bales that will shed rain and that are easy to transport. Chopping the material with the rotary mower helps with this, but tightening tension down on the baler also helps a lot. You will have to work with the tension adjustment to get it right. Do a test and make sure your baler will handle the shredded material before shredding a lot of acreage. Some balers have difficulty picking up fine material.

4) Net wrap is recommended because the crop is coarse if not shredded, and rather fine in particle size if shredded. If using a string tie baler, use extra string on perhaps a 3-inch spacing, and put a few extra wraps on the ends.

5) Making round bale silage out of drought-damaged corn is possible. Make sure moisture is greater than 50% and put on extra plastic wrap for best results.

### **Storing baled corn stalks**

Corn stalks and other coarse crops are less weather resistant than grass hay. This is because they do not form the same kind of thatch over the top of the bale, allowing water penetration during hard rain events. Because of this, it is strongly recommended that this material be protected from rain by stacking in a barn or covering with 6-mil black plastic or a tarp.

The quality and size of the bales will have an influence on how weather resistant they are. In general, tighter and larger bales stand up to outside storage better than looser or smaller bales. The type of binding material also influences water penetration. Twine tied bales will take up moisture more readily than net wrapped bales. If using twine it should be plastic (so that it does not rot), and extra wraps (3 inch twine spacing) should be used to keep the surface of the bale tightly packed. Chopping the material up into a smaller particle size before baling will help it shed water more readily regardless of binding type and bale size.

If at all possible this material should be moved to a storage shed, or stacked three high in a pyramid arrangement (3, 2, 1) and covered as soon after baling as possible. Each rain will result in increasing moisture in the outer layer of the bale and it will gradually penetrate deeper with each rain event, eventually resulting in a high level of spoilage. If this material has to be stored outside it is recommended that it be chopped before baling with a rotary mower or disk mower, baled in as big and as tight a bales as possible, and bound with net wrap. Bales should not touch in outside storage but should have about 6 inches between to allow air circulation. Elevating bales on tires or pallets will reduce spoilage in poorly drained soils, but will not make much difference on sandy or other well drained soils.

Any forage baled at an excessive moisture level (> 20% moisture or < 80% dry matter) has the potential to heat and spontaneously combust, and will experience excessive sweating when stored under plastic. Make sure the material is very dry before baling! Good dry bales should feel fairly light when you push on them. If the bales feel pretty heavy, you should suspect that they have excessive moisture in them. If the material is baled with an excessive moisture level, it is not recommended that it be stored in a barn or shed due to the potential for a barn fire.

### Feeding corn stalks

Corn stalks are low quality feed, and therefore will need supplementation in almost all situations. Table 1 shows the nutrient requirements for a dry 1200 lb cow, the same cow at peak lactation, and a developing replacement heifer gaining 1.5 lb/d.

Table 1. Nutrient requirement of a 1200 lb cow.

Animal	<sup>a</sup> DMI, lb	TDN %	CP %	Ca %	P %
Dry Cow, 1200 lbs	24	52	8	0.25	0.16
Lactating Cow, 1200 lbs	28	60	11	0.31	0.21
Heifer, 600 to 800 lbs gaining 1.5 lb/d	17	63	11	0.38	0.20

<sup>a</sup> DMI = dry matter intake, TDN = total digestible nutrients, CP = Crude Protein, Ca = calcium, P = phosphorus

Example rations were balanced using two scenarios. In the first situation there are abundant corn stalks so they are fed free-choice to the cows. In the second situation corn stalks or other forage is limited, so they are fed at 10 lbs/cow daily for the cows and 5 lbs/heifer daily. Concentrate supplement is either corn gluten feed, or corn/soybean meal. Other concentrates may be more economical so they should be considered. Also, it is critical that before a producer starts feeding that a nutrient analysis on the corn stalks is done to develop a balanced ration.

Example rations:

#### Free-Choice Corn Stalks Supplemented with Corn Gluten Feed:

Animal	Corn Stalks, lb	Corn Gluten Feed, lb	Limestone, lb
Dry Cow	26	5	-
Lactating Cow	22	12	0.5
Growing heifer	13	8	0.3

#### Limited Corn Stalks Supplemented with Corn Gluten Feed:

Animal	Corn Stalks, lb	Corn Gluten Feed, lb	Limestone, lb
Dry Cow	10	10	-
Lactating Cow	10	16	0.5
Growing heifer	5	11	0.3

Free-Choice Corn Stalks Supplemented with Corn and Soybean meal

Animal	Corn Stalks, lb	Ground Corn, lb	Soybean meal, lb
Dry Cow	31	-	2
Lactating Cow	27	5	3.5
Growing heifer	15	5	2

Limited Corn Stalks Supplemented with Corn and Soybean meal

Animal	Corn Stalks, lb	Ground Corn, lb	Soybean meal, lb
Dry Cow	10	9	1.5
Lactating Cow	10	12.5	3.5
Growing heifer	5	9	2.5

Note that for the rations with corn gluten feed, additional calcium needs to be fed in the form of limestone topdressed on the corn gluten feed. This is because corn gluten feed has a very high level of phosphorus and calcium is needed to balance for that. In addition the cow needs a high quality free-choice mineral supplement. When corn and soybean meal are used as the concentrate, not additional calcium is needed, but cows should still be fed a high quality free-choice mineral supplement. Also, 15% waste was assumed for the free-choice feeding scenario and is included in the amount of corn stalks indicated.

**Value of corn stalks**

An important question is “how much are the baled corn stalks worth?” The answer is that it depends on the cost of other feeds. Relative to corn and soybean meal (corn at \$4/bushel and soybean meal at \$250/ton), corn stalks are worth about \$85/ton and medium quality grass hay is worth about \$100/ton. However, other ingredients such as corn gluten feed are good feed values relative to corn and soybean meal, and if you value the corn stalks relative to that feed (valued at \$130/ton) then the value is closer to \$65/ton. Given an expected weight of about 600 to 800 lbs, a 4 x 5 foot round bale should be worth about \$20 to 25/bale.

There are other considerations you should think of when trying to price this material. To properly feed cows, you must have some roughage to maintain health of their digestive tract, so that should be kept in mind. Also, many producers will have to use expensive labor to feed concentrates whereas feeding round bales of corn stalks would utilize the feeding system they normally use, and that is another consideration. To pay or charge a fair price for the material a sampling of bales should be weighed and the price based on the ton rather than the bale.

### **Monitor body condition**

Producers should always monitor body condition as they manage their cattle, and it is even more important to pay attention to body condition during drought and winter feeding situations. Initially balancing a ration is important, but producers need to be sure that cows are maintaining adequate body condition.

### **Summary**

Corn stalks and drought damaged corn are viable alternative feeds for cattle this winter in our area. Due to the poor pasture conditions and short hay supply producers will need to seek this kind of feed alternative to make it through the winter. The example rations given in this document are examples only for planning purposes. There are many optional concentrates and feeding approaches that could be employed, so make sure you contact your Cooperative Extension Livestock Agent for help in developing balanced rations and an effective drought management plan.

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