Ridin' Herd

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Using ammoniated low-quality forage

It seems like drought is more normal than years with "normal" moisture. At least in Nebraska, producers are usually managing livestock through a drought or utilizing post-drought management strategies to recover after a drought.

Limited feed resources

The commonality of drought is that there is a limited forage supply, and forages are expensive. The drought in the southwest last year was intense and in a localized area. This year's drought has a similar intensity, but it is more widespread than last year. A presentation from a climatologist suggested that the percentage of the U.S. cow herd involved in this year's drought was at least 60% or more, compared to 28%-30% of the nation's cow herd in last year's drought. This has made it very difficult to source winter feed and crop residue.

Twenty or more years ago producers used ammoniated low-quality forages to feed cows when drought conditions occurred. Anhydrous got expensive, and it became less cost-effective to use this management strategy.

When corn was cheap, producers used corn and protein supplement in diets with low-quality forages and could limit-feed cows a diet combination and still meet their nutrient needs. More recently, distillers' grains were cheap and abundant in the summer, and producers designed combinations of distillers' grains and low-quality forages to successfully manage and feed cows through the drought.

Each drought poses its own unique challenges. The drought of 2012 is no different. High corn prices and an expensive and short supply of distillers' grains have posed a challenge for producers. What is interesting is that we have come almost full circle. Even with high-priced anhydrous, there were a number of producers who ammoniated wheat straw or low-quality forages because it was the most economical feed they could secure for the cows for the winter.

Ammoniating low-quality forages

Ammoniating low-quality forages is a management technique that can be used to treat forages like wheat and oat straw and baled cornstalks to make them more digestible. It is not recommended for use on grass hay, summer annuals or alfalfa.

Toxicity can occur in cows and their calves when medium-quality forages are ammoniated and fed to the cows. The toxic compound is transferred through the milk to the calf. Affected calves walk in circles, thus the condition is commonly referred to as circling disease.

If toxicity occurs in the calves or the cows, avoid working or moving the cattle and remove the forage. To my knowledge, circling disease has not occurred in cattle as a result of consuming ammoniated straws or crop residues.

The ammoniation process is temperature-dependent and occurs faster at higher environmental temperatures. It is important to keep the package sealed and to not let the ammonia escape. If the temperature is 86° F, the ammoniated residue needs to be kept sealed for one week. If the temperature is between 59° and 86°, it needs to remain sealed for two to four weeks. If the temperature is below 59°, the ammoniated forage needs to be sealed for four to eight weeks.

It's difficult to keep the package sealed for a long period of time because of wind and curious pets and wild animals. For residues like wheat straw, bale the straw soon after grain harvest, preferably with some moisture on it, or bale early in the morning when there is some dew present.

Impact of ammoniation

Table 1 illustrates the effect of ammoniating wheat straw, baled corn and milo stalks, and soybean stubble on digestibility, intake and percent crude protein content.

Treating wheat straw with anhydrous ammonia can make straw almost as digestible as average-quality prairie hay. Ammoniating will increase digestibility of low-quality forages and, therefore, increase intake. Cattle don't quit eating straw because they don't like it. Because of its low digestibility and slow rate of passage through the digestive tract, they can't stuff any more into their rumen.

The treated material had an increase in digestibility of 10% compared to the untreated material. This suggests that the ammoniation process causes a breakdown of the cell wall structure of the low-quality forage, exposing the fiber components so the rumen microbes can more easily attach and digest this forage.

Compared to the nonammoniated forage, the ammoniated forage spends less time in the rumen to be digested, and the nutrients are released before it is excreted. Because it is more easily digested, cows can consume more of the ammoniated material compared to the nonammoniated material. For ammoniated wheat straw and cornstalk bales, the increase in intake is on average 20%. What this means is that a cow can eat more of the ammoniated material and therefore get more of her daily nutrient needs as a result of consuming this low-quality forage.

Table 1 also illustrates an increase in percent crude protein when comparing treated low-quality forage compared to the untreated forage. Remember, to measure

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Table 1: Changes in forage digestibility, intake and crude protein after ammonia treatment

	Digestibility %		Crude protein %,		Increase in intake, %
Forage	Untreated	Treated	Untreated	Treated	
Wheat straw	39	48	3.7	9.7	18
Corn stover	48	56	6.2	11.0	22
Milo stover	46	61	5.4	12	NA
Soybean straw	41	47	4.9	14	16

Table 2: Effect of treatment of straw on intake and performance of gestating beef cows

Treatment	Daily intake, lb.	Daily wt. change, lb.
Straw + 7 lb. alfalfa	14.8-19.4	-0.27-0.26
Treated straw + 7 lb. alfalfa	19.7-23.1	0.40-0.88
Treated straw	26.1	0.1

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protein content of a feed/forage, the analysis measures the NH_3 (ammonia) groups present in the sample. Because NH_3 groups were added through the ammoniating process, it stands to reason that the crude protein content of the treated material would be greater. Bacteria in the rumen will use some of the NH_3 in the treated material to make their own protein.

Remember, the primary use of these forages in a ration is to provide energy. So the "real" benefit of the ammoniation process is the increase in digestibility of 10% and the increase in intake of 20%, which allows the animal to meet a greater portion of its nutrient needs by consuming the treated forage.

Table 2 illustrates the performance and intake of gestating cows fed straw plus alfalfa, ammoniated straw plus alfalfa, and ammoniated straw alone. Intake of the ammoniated straw was greater than the other two treatments, and gestating cows were able to maintain weight when fed only ammoniated wheat straw.

These data also suggest the best place to use ammonia-treated forage is prior to calving. Table 2 indicates that nonlactating pregnant cows will lose weight when offered untreated straw plus alfalfa compared to treated straw alone. The low intake of the straw plus alfalfa is probably due to the low digestibility of the straw causing a slow passage rate. Treated straw plus alfalfa seems to provide a nice combination, and cows experience weight gain.

Final thought

With all the ethanol plants we have making byproducts, who would have ever thought we would ever again have a discussion on use of ammoniated low-quality forages as a drought management strategy? High corn prices changed production strategies of ethanol plants at a time when cow-calf producers could have really used the byproduct they produce. The cow-calf industry will survive another drought and yet another challenge.

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Editor's Note: *"Ridin' Herd" is a monthly column written by Rick Rasby, beef specialist at the University of Nebraska.*