

DROUGHT AND ALTERNATIVE FEEDS: AMMONIATING LOW-QUALITY FORAGES

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Statistically, it happens every 25 years – a major drought. It has been 24 years since Illinois' last state-wide drought in 1988, so I guess we were due. Most of our pastures are dead, hay is in short supply and cow-calf producers have two choices – sell the cows or find alternative feed sources. Supplementing cows with corn grain and even traditional by-products such as DGS, CGF and SBH has gotten expensive (maybe too expensive). Currently DDGS is priced at 90% the value of shelled corn and as corn prices goes up, so does DDGS.

Producers with limited supplies of forages may be forced to use crop residues such as wheat straw, cornstalks, or other low-quality forages, for winter feed (in some cases summer feed). These forages can be fed to beef cattle or dairy heifers and dry cows. Low quality forage residues major limitations are their deficiencies in crude protein and digestible energy.

Research conducted back in the 1980's has shown that treating low quality forages with anhydrous ammonia will:

- Raise crude protein content by 6 to 8 percentage points (in some cases doubling the CP value).
- Increase digestibility (TDN) by 5 to 7 percentage points.
- Increase intake by 20%.

As a result of ammoniation, the forage is no longer deficient in crude protein. Because of improved digestibility and consumption, the animal is able to consume additional energy. Depending on the stage of production of cows, heifers or stocker cattle, the need for supplemental grain may be reduced and the need for supplemental protein may be eliminated. Any treatment that increases the digestibility, intake and crude protein of these feeds should result in improved performance.

The ammoniation treatment must be practical on a large scale and be economical. That is, the added value of the treated forage must offset the costs associated with the treatment process and the treated forage must be the least-cost means of meeting the nutritional requirements of the animals.

It is very important for producers considering ammoniation to carefully consider the economics of the process. Will feed and treatment costs be less than the purchase price of higher quality

hay and/or the addition of supplemental grain and protein to the ration? There are three costs associated with ammoniation of low-quality forages. These costs are harvest or purchase of forage, the cost of ammoniation and the cost of an enclosure.

Anhydrous ammonia (A. A.) should be applied at a rate equal to 3% of forage dry matter – about 60 lbs. per dry ton of forage. Currently A. A. is priced around \$830:ton or 41.5¢: lb. This adds \$24.90 to every ton of forage or about \$12.45 to each 1,000 lb. big round bale of wheat straw.

Ammonia must be applied within a sealed enclosure to prevent vaporization into the atmosphere. Treated forages cannot be exposed to precipitation. Plastic sheeting, bale tubes, a plastic greenhouse or a shed must be used for treatment and follow-up storage. The costs of ammoniation will vary from \$16 to \$24:ton. These costs do not include the additional labor and machinery needed to move the forage into and out of the treatment and storage sites.

GUIDELINES FOR TREATING DRY FORAGES WITH ANHYDROUS AMMONIA (A. A.)

1. A. A. can be applied to any forage package - - square or large round bales, loose stacks, etc.
2. It's best to apply soon after harvest to prevent weathering and feed loss.
 - a. Warm weather speeds up treatment.
 - b. A. A. can be applied during cool weather, but the process takes longer. Daytime temperature must reach 40 °F for the process to be effective.
3. Forage covered with plastic to seal in ammonia works best:
 - a. Group bales or stacks together for efficient plastic use.
 - 1) Select a level site with wind protection, if possible.
 - 2) If available, a bunker or pit silo is an excellent site.
 - b. Cover with 6-8 mil black or UV resistant clear plastic.
 - c. Seal well around edges with dirt, gravel, etc.
 - d. Plastic is not needed under the forage.
 - e. Example: 1 roll of 40' x 100' plastic will cover a 6 bale pyramid stack, 14-15 bales long = 84-90 bales.
4. Apply about 3% (60 lb/ton) ammonia (50 lb actual N) to forage:
 - a. Pre-weigh a few bales of forage for treatment. Estimate total weight of forage for treatment.
 - b. Apply ammonia thru hose or pipe sealed under plastic.
 - c. Place an old water tank, 50 gal barrel, etc. in the middle of the forage pile under the tarp and attach the A. A. hose to the barrel.
 - d. Use regulator or gauge for accurate application, or order a nurse tank with only the amount of ammonia needed for treatment.
 - e. Apply ammonia slowly to minimize ballooning of plastic - - 1 to 5 minutes per ton has been used successfully.
 - f. During application, some of the ammonia will turn to a cold liquid - - the container under the stack will help to contain it.
 - g. The gaseous ammonia will balloon the plastic for 1-3 + hours.
 - h. Make sure equipment is in good shape, work upwind and handle ammonia safely.

5. Keep covered for at least 15 to 45 days, depending on temperature:
 - a. Best to leave covered until fed to prevent weathering.
 - b. Uncover and aerate 3-7 days prior to feeding to allow residual ammonia to escape.
 - c. Can be tub ground before feeding without loss of treatment effect.
 - d. If forage is analyzed for crude protein, label the sample “AMMONIA TREATED” so the lab can analyze the nitrogen component correctly.

HOW DOES AMMONIA IMPROVE FORAGE FEEDING VALUE?

1. Increases digestibility of crop residues and mature grass* hays:
 - a. Apply 3% ammonia (60 lb/ton) to covered forage.
 - b. Breaks lignin-cellulose bonds in plant fiber.
 - c. Solubilizes plant carbohydrate.
 - d. Improves dry matter digestion (TDN) 8-15 percentage units.
 - e. Swells the plant tissue, allowing greater ruminal digestion.

2. Boosts feed intake 15-20% +:
 - a. Improves forage palatability.
 - b. Increases rate of passage through digestive tract.

3. Usually doubles crude protein content:
 - a. Excellent source of non-protein nitrogen (NPN).
 - b. Well utilized by brood cows.

4. Preserves forage up to 25-30% moisture:
 - a. Excellent fungicide - - kills molds and fungus.
 - b. Prevents heating - - reduces feed losses.
 - c. 1-1 ½% ammonia (20-30 lb/ton) adequate for preservation.

*DO NOT treat higher quality grass hays such as brome, fescue, small grains, forage sorghums or sudans. The high soluble carbohydrate content of such forages when treated with ammonia appears to produce imidazole compounds in some cases. These compounds can produce extreme hyperactivity, convulsions and even death, especially when treated forage makes up most or all the ration. Calves nursing cows consuming higher quality forage treated with A. A. are very susceptible to "Crazy Calf Syndrome".