

# Ammoniation Considerations

Evaluate nitrogen and straw costs before ammoniating low-quality forages.

by *Kindra Gordon*

**A**s the livestock industry adjusts to higher feed costs, alternatives such as ammoniating low-quality forages may be worth considering this fall.

Treating wheat; barley and oat straws; cornstalks; or very mature, low-quality grass hay with anhydrous ammonia can boost crude protein (CP) levels to 8%-9%, increase digestibility 10%-30%, and improve livestock intake of those feeds by 15%-20%.

The caveat in deciding whether to ammoniate low-quality forages this year hinges on anhydrous ammonia prices.

"The dramatic run-up in prices for anhydrous ammonia over the past year makes the economics of ammoniation more challenging," North Dakota State University (NDSU) Extension beef specialist Greg Lardy says. "I think producers will really have to look at this on a case-by-case basis."

But, given the high cost of most feeds this fall, Twig Marston, district director of the University of Nebraska's Northeast Research and Extension Center at Norfolk, believes there are opportunities where ammoniating may be economical — even with the increased cost of anhydrous. However, like Lardy, he says producers need to set up a budget to help determine if ammoniating forages pencils out this year.

Lardy gives this example for calculating costs: Estimated costs to treat one ton of forage are \$25.50 to \$30.00 for anhydrous ammonia (based on \$850 to \$1,000 per ton

of ammonia) and \$5.43 to \$9.05 for plastic used as a covering [\$181 for 6-mil. black and white plastic, 40×100 feet (ft.)], for a total of \$30.93 to \$39.05 per ton. If wheat straw costs \$45 to \$50 per ton, total cost of ammoniated wheat straw would be \$75.93 to \$89.05 per ton.

One tip Marston suggests to help make ammoniating more cost-effective is to reduce the amount of anhydrous applied. For instance, the process normally takes 3% of anhydrous ammonia per ton of dry forage [about 60 pounds (lb.)] to get the full chemical reaction on feed intake and digestibility. Instead, Marston says producers might consider applying only 2%-2.5% anhydrous to cut costs and still get 80%-90% of the desired results on the forage.

## Other considerations

In addition to the cost of anhydrous ammonia, Lardy and Marston say producers should also consider:

**1. Straw costs.** "You need to have a cost-effective source of straw or crop residue to make this work," Lardy says. "If you are not in an area where these are available, it probably isn't going to make sense to pay somebody to truck in straw and anhydrous from a long distance in order to ammoniate it. In that situation, it may be better to look at other alternatives such as transporting higher-quality feeds, having somebody custom-feed your cows or haul your cows to cornstalks."

**2. Safety.** "Safety has to come first with this chemical," Lardy says. "It is extremely hazardous. Having the right

## Ammoniating steps

- ▶ Select area with protection from strong winds and good drainage. Before stacking the bales, disk area to loosen soil for anchoring the plastic.
- ▶ Stack bales in a 3-2-1 pyramid and cover with plastic to make an airtight environment; 6- to 8-millimeter (mil.) black plastic is recommended.
- ▶ Once the pile is covered, leave a small space to insert a pipe for adding anhydrous at the midpoint of the stack.
- ▶ Insert a pipe 6- to 10-ft.-long on the ground and seal plastic with loose soil around the pipe. Connect the pipe to the anhydrous tank hose with an adapter. Use a shut-off valve on the pipe to eliminate back flow of anhydrous when disconnecting.
- ▶ To start, turn on anhydrous valve slowly until the plastic balloons slightly, then shut off. Check stack for tears in the plastic or leaks around the edge. Seal tears with duct tape. Slowly add the remainder of the anhydrous; do not balloon the plastic. Wear goggles, rubber gloves, a respirator, and protective clothing when working with anhydrous.
- ▶ Add 60 pounds (lb.) of anhydrous ammonia per ton of dry forage (3% dry-matter content) — or to cut costs reduce the amount to 2% or 2.5%, as University of Nebraska's Twig Marston suggests.

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▶ Total time for addition of the anhydrous will be eight-10 minutes per ton of residue; a 30-ton stack requires about five hours.

▶ After treatment is complete, turn off the valve, remove the pipe and seal the area where the pipe was removed. The forage will need to be sealed for one to eight weeks depending on temperature (see Table 1).

▶ Open one end of the stack three to five days prior to feeding to let the excess ammonia dissipate.



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safety equipment and taking the proper precautions will prevent accidents.”

Marston adds, “If you cannot handle the bale stacking, plastic covering, and/or the anhydrous ammonia application and storage, then consider some other alternative to improve forage quality.”

### 3. How you'll feed it.

Lardy and Marston agree that ammoniated forage works best for wintering gestating cows up to 50 days prior to calving. But, Marston says, “If you start a winter feeding program with ammoniated

forage and switch midseason, cattle do not seem to want to go back to the ammoniated forages.”

Marston has also found that young cattle can be finicky and may not eat ammoniated

forages. Mixing it with other forages can improve acceptance.

As a final tip, ammoniated feeds should be analyzed prior to feeding to determine actual nutrient content. And, phosphorus (P), trace minerals and vitamin A should be added to the diet whenever ammoniated residues are fed.

North Dakota State University has an updated Extension bulletin detailing the process of ammoniating low-quality forages and calculating the economics. View it at [www.ag.ndsu.edu/disaster/drought/ammoniationoflowquality.html](http://www.ag.ndsu.edu/disaster/drought/ammoniationoflowquality.html).



**Table 1: Length of time forage needs to be sealed before feeding**

Ambient air temperature	Minimum time to seal stack
Above 86° F	1 week
59° F to 85° F	1 to 4 weeks
Below 59° F	4 to 8 weeks

**Source:** North Dakota State University.