Ammoniating Wheat Straw, A Potential Feed Source in Drought?

Southeast Kansas has been in a severe drought for most of this year's growing season. Poor crop and pasture yields have led to limited feed options and increased forage price tags for cattle producers.

Two thousand twelve offered very similar conditions to the Plains they could get their hands on. One option many Kansas producers found was to ammoniate wheat straw.

Wheat straw is widely considered a poor forage that is better served as bedding, but research conducted by Kansas State University shows ammoniating bales can greatly improve protein content and digestibility. Wheat straw typically tests around 3.3% crude protein and 31% in-vitro dry matter digestibility (IVDMD). Ammoniation rates of 1.5% (lbs anhydrous ammonia/dry matter lbs wheat straw) can increase crude protein content to 8.6% and IVDMD to 42%. An ammoniation rate of 3% increased crude protein to 10.8% and IVDMD to 46.2%.

The process of ammoniating wheat straw is not overly complicated. An area large enough to hold the stacks of bales will need to be cleared, with some soil pulled away to be used later. Bales should be gathered in rows and stacked in a pyramid (three bales on the base, two on the second level and one on top). The entire stack should be covered with a black plastic sheet, about 6 to 8 mm thick. A 40' x 100' sheet can cover 12 rows of pyramid-stacked bales. The edges of the plastic should hit the ground and be covered with loose soil to seal the bales inside the plastic. Any holes in the sheet will need to be patched with tape. Next, a pipe (6 - 8 ft long) should be placed on the ground and inserted into the center of the stack. Attach the pipe to the anhydrous tank and slowly empty

Once the stacks of bales are covered, it is time to let the anhydrous ammonia go to work. The ammoniation process is dependent on heat, so the straw will be ready to feed sooner with warmer temperatures. Average temperatures above 86°F will need to be sealed for one week, temperatures between 59 – 86°F need to remain sealed for two to four weeks, and temperatures below 59°F need to remain sealed for up to eight weeks. The October 2021 average daily high and low temperatures at the Kansas Mesonet Station near Uniontown, KS were 71°F and 51°F, respectively. With expectations of a warmer than average October for 2022, we could expect the ammoniation process to take around 4 weeks if started the first week of October.

Now, what is the cost?

Any producer who fertilized his pasture or crop ground this past spring knows that fertilizer prices have gone through the roof, especially compared to 2012, when producers were using this alternative feed source.

The price of anhydrous ammonia at Midwest Fertilizer in Iola, Kansas, was $1,206.67 as of Sept 28, 2022. That equates to $0.60/lb. A 40'x100' sheet of black plastic can seal a row of 12 pyramids. Assume a tightly wrapped wheat straw bale (tightly wrapped bales work better for ammoniating) weigh on average 1100lbs. 72 total bales, at 90% dry matter, means you will have roughly 35.64 dry tons of wheat straw to ammoniate.

1.5% rate will require 1,069.2 lbs anhydrous ammonia

1,069.2lbs x $0.60/lb = $641.52 = $18/dry ton wheat straw

3.0% rate will require 2,138.4 lbs anhydrous ammonia

2,138.4lbs x $0.60.lb = $1,283.04 = $36/dry ton wheat straw

Anhydrous ammonia will not be the only cost associated with this process. Let's assume another $15/dry ton wheat straw to account for fuel, the plastic sheeting, labor, and other miscellaneous costs. This will bring our cost of ammoniating wheat straw to:

1.5% rate: $33/dry ton wheat straw

3.0% rate: $51/dry ton wheat straw

Today's prices may make the decision more challenging than it was in 2012, but with prairie hay trading in southeast Kansas at $100-130/ton and wheat straw only trading at $60/ton, ammoniating wheat straw is an option for those lacking feed this fall.

For more questions regarding ammoniating wheat straw and other forage questions, contact Chad Guthrie, crop production and forage management agent, or Hunter Nickell, Livestock Production Agent at any Southwind Extension District office. Locations in Erie, Fort Scott, Iola, and Yates Center.

Disclaimer: Caution should be taken as anhydrous ammonia is a dangerous chemical. Releasing the anhydrous too quickly could cause the plastic sheeting to rupture. The plastic will also balloon out during the ammoniation process, so strong winds, hail, or wildlife could puncture the plastic. Any products or companies mentioned in this article were used for localized information and are not endorsed by the Southwind Extension District.