

**Week of June 20<sup>th</sup>-24<sup>th</sup> 2016**

**POST ROCK EXTENSION ANSWERS**

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**K-State Research and Extension**

During dry years, ammoniating wheat straw has been used as a substitute forage by many to fill the void of traditional grass hays. Even in wetter years, ammoniating wheat straw should still be considered as a valuable feed source for your cow herd. It is a great compliment to a balanced ration. Especially when mixed with silage and by-products such as distillers grains.

***What do I need to know about ammoniating straw?***

First off, let's talk about the chemical process. Treatment of wheat straw with anhydrous ammonia is a relatively simple process that enhances the digestibility of low-quality forages by 8 to 15 percent and increases forage intake by 15 to 20 percent. When the anhydrous ammonia comes in contact with roughage, it combines with the moisture in the roughage to form ammonium hydroxide. Plant cell walls are made up of complex carbohydrates consisting of three primary compounds: cellulose, hemicellulose, and lignin. Ammonium hydroxide is an alkaline compound that solubilizes hemicellulose by breaking chemical bonds holding lignin and hemicellulose together and partially breaking down the structure of cellulose by disrupting hydrogen bonds. This reaction causes a swelling of the fiber and allows cellulase (the enzyme responsible for cellulose digestion) better access to the fiber for digestion (Church, 1988).

Now that we have had a chemistry lesson, it's time to discuss some important considerations. Straw is the perfect candidate for ammoniation because of its low nutritive value. Forages above 5% crude protein and 45% TDN (total digestible nutrients) should not be used. Toxic compounds can form if higher quality forages are ammoniated. The straw should be clean and mostly free of weeds.

The site selected should be relatively flat and well drained. Anhydrous ammonia will penetrate the ground on which the stack is located, effectively sterilizing the site so be cautious of your site selection. A light tillage of the stack site is recommended prior to stacking to minimize the long-term effects. If possible pick a site somewhat protected from the wind.

Bales should be stacked in 3 x 2 orientation if they are 6ft in diameter or 3 x 2 x 1 can be done if the bales are 5ft in diameter. Making each stack 14 to 15 bales long, depending on bale size, works best for the plastic sizes available. Best results occur when there is about 3 inches left between the bales within each row to facilitate movement of the anhydrous ammonia through the stack.

In order to apply the appropriate amount of ammonia, it is important to make an accurate determination of the roughage weight. Weigh at least five large bales in order to get a good indication of average weight. Also, estimate roughage moisture content because the amount of anhydrous ammonia applied is based on a dry matter (DM) basis. For example, wheat straw with a 10% moisture content has 90% DM which equates to 1800lbs of DM per ton of straw.

Next you need to calculate the amount of anhydrous ammonia to be applied. The historical

application rate of 3% anhydrous ammonia on a DM basis of weight of the stack equates to 60lbs/ton. However research done recently across the state has indicated that effective results can be accomplished from rates as low as 1.5% per ton. Also consider how to regulate the total amount of ammonia applied. One option is to calculate the total amount of anhydrous ammonia needed per stack and order a tank that contains that exact amount. The ammonia should be applied slowly (no more than 30 lbs. of ammonia per minute).

6 mil. black polyethylene plastic is recommended to cover the stack because it is more resistant to ultraviolet light deterioration. The most common size available and recommended for use is a 40' x 100' sheet. Be careful not to tear the plastic while covering. The stack should be monitored during the process and all holes patched to minimize the escape of ammonia (duct tape will be your best friend for this). To make the stack air tight, leave at least 2 to 3 feet of plastic along the edges and pile at least 1 foot of dirt around the entire stack.

The length of time required for the stack to remain sealed depends on temperature. At temperatures around 80 degrees, the treatment will take about 2 weeks. The treatment process can be completed in approximately 1 week when temperatures average 100 degrees. Keep the straw covered until a few days prior to feeding. Ammoniated straw takes on moisture more readily and is more susceptible to spoilage than untreated straw because the fiber has been partially broken down.

Ammoniating low quality forages is a great way to increase your forage supply. Wheat straw can be converted into the nutritive quality of prairie hay through ammoniation. For a detailed instructional video of this process, I recommend searching “ammoniating low quality forages” on youtube (<http://www.youtube.com/watch?v=-JtjJb-umpk>).

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