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## **Urea Treatment: A New Hay Ammoniation Method**

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Over the past several years we have observed an increased number of ranchers using anhydrous ammonia treated hay in their winter feeding programs. The Ona Reports article on page 87 of the August 1994 edition of the *Florida Cattleman and Livestock Journal* summarizes producer comments and results from several ranches that used ammoniated hay during 1993-94. A company near Lakeland now delivers anhydrous ammonia to ranches, and this should increase interest among producers who were hesitant to try hay ammoniation due to the unavailability of anhydrous ammonia.

Feed-grade urea has also been used for hay ammoniation. Urea is widely available, and is composed of two chemically bonded ammonia compounds. In the presence of the enzyme urease, urea is broken down to ammonia, and the ammonia treats the hay to improve its feeding value. Urease is produced by bacteria naturally occurring on plant material, but water must be present for urease to break down urea to ammonia. For this reason, most research evaluating urea treatment has been conducted with silage or crop residues reconstituted with water to produce forage with a moisture concentration of 40 to 50 percent. Urea solutions have been used to treat hay, however limited information is available for urea treatment of large round bales.

We have evaluated urea treatment of large round bales on a small-scale, and have found improvements in forage feeding value to be similar to those obtained with anhydrous ammonia. For data shown in the table, large round bales were turned on their side so that the cut edges were facing up. A 20 percent urea solution was sprayed onto the cut surface to provide urea at four percent of the hay dry matter (DM) weight. Bales were sealed in plastic for 30 days similar to that used for anhydrous ammonia treatment. For example, a 1000 lb bale of 88 percent DM hay (880 lbs DM) requires 35.2 lb of urea ( $880 \times 0.04$ ). Therefore, 176 lb or 22 gallons (8 lb/gallon) of urea solution are required ( $35.2/0.20 = 176$ ). To prepare 100lb of a 20 percent urea solution, mix 20 lb urea with 80 lb (10 gallons) water. For large hay stacks, hay can be stacked in a 4x3 configuration with the

cut edges facing up, and the urea solution sprayed over the stack. Good even coverage of the urea solution over the entire stack is important so that the urea solution becomes in contact with all of the hay.

The increase in crude protein concentration of urea treated hay is due to nitrogen addition from urea, and is similar to the contribution of urea in a molasses-urea liquid feed (table). Similar to anhydrous ammonia treatment, urea treatment increases total digestible nutrients of the hay. In a growth trial, sheep ate more urea treated hay and gained more weight than sheep fed untreated hay.

It should be stressed that we have conducted limited research with urea treatment of large round bales, however results are promising. We plan to conduct additional trials this winter with growing calves. If anyone would like to try this new technology, we would be interested in assisting.

	Untreated hay	Urea Treated hay
Crude protein, %	5.3	10.5
Total digestible nutrients, %	43	50
Intake by sheep, grams DM/day	1330	1610
Gain by sheep, grams/day	17	51
Feed/gain by sheep	78	32