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With Some Posters Expanded as Full Papers**

MEETING HOST:



Poster #40

Liquid Urea Rate Effects on Nutritive Value of 8-Week Regrowth of Guineagrass (*Panicum maximum* Jacq.) Hay

Almodóvar L. E.¹, E. Valencia¹, y A. Rodríguez². ¹Department of Agronomy and Soils University of Puerto Rico Mayagüez and ²Department of Animal Industry University of Puerto Rico Mayagüez, Box 9030, Mayagüez, PR 00681.

ABSTRACT.

Guineagrass (*Panicum maximum* Jacq.) is a valuable grass in grazing systems in Puerto Rico, but when conserved as hay, its low protein (<6.0%) concentration limits both meat and milk production. This study assessed the effect of applying liquid urea (LU) on hay harvested at 8-weeks regrowth of guineagrass cvs. 'Mombasa' and 'Tanzania' hay. Liquid urea were applied in a fine mist at baling at low (L; 0 lt/ha), medium (M; 204 lt/ha) and high rate (H; 807 lt/ha). Hays were stored for 8 week and core samples (250 g) were taken for determination of chemical composition of crude protein (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) using a completely randomized design. There were cultivar effects and LU rate effects ($P<0.05$) for CP, but there was no interaction. Crude protein averaged 13 and 17.7% for cv. Mombasa and Tanzania, respectively. There was a linear increase ($P<0.05$) in CP with an increasing rate of LU. Mean CP was 12, 15 and 20% for the L, M, and H rate, respectively. Additive LU did not affect ($P<0.05$) either NDF or ADF concentration in Mombasa and Tanzania. This study shows that adding LU at baling increases CP, but has no effect on NDF or ADF. Liquid urea at either concentration can be used to increase the nutritive value of low quality hay in Puerto Rico. Forage intake and digestibility and nitrogen balance studies, however, are needed to determine potential losses of N.

KEYWORDS: Grazing systems, crude protein, NDF, ADF

INTRODUCTION.

Guineagrass (*Panicum maximum* Jacq.) is naturalized in the Caribbean Island and Puerto Rico and used mainly for grazing and green chop. It is seldom conserved as hay because of its low protein (<6.0%) concentration and low digestibility. In hay conservation systems in Puerto Rico hay producers generally give greater importance to yield (quantity per acre) than the quality of the same. Rodríguez et al. (2004) noted that hay conserved in tropical conditions is usually of poor nutritive value because the pastures are not harvested at the appropriate vegetative stage, and it is very common to see hay from pastures after the flowering period.

Hay nutritive value can be improved by N fertilization and harvesting at early regrowth stages (60d). Chemical treatment (e.g., ammonization) has been used to improve the nutritional value of fodder preserved in the form of hay (Brown, 1993). The N concentration is usually increased by ammonization to levels considered to meet animal requirements. Amonification allows conserving starches and sugars of high energy value

in the original form, avoiding its loss by fermentation, which is then translated in forage of a high nutritive value. Ammonia hydrolysis of linkages between lignin and structural polysaccharides has been shown to increase digestibility (Conrad et al., 1990).

New guineagrass cv. Mombasa and Tanzania exhibit potential for forage conservation (hay or haylage) in Puerto Rico (E. Valencia; personal communication) but its nutritive value needs to be improved if it is to be fed to dairy cows. Liquid urea (LU) nitrogen (ULB-35; 15% of the active ingredient is Urea Low Biuret) is being promoted as N fertilizer in pastures, but limited plant response is observed. The objective of this study was to assess the effect of applying LU in a fine mist at baling at a low (L; 0 lt/ha), medium (M; 204 lt/ha) and high rate (H; 408 lt/ha) to 8-wk regrowths of Mombasa and Tanzania on its nutritive value after an 8-wk storage.

MATERIALS AND METHODS.

The experiment was conducted at the Lajas Agricultural Experimental substation of the University of Puerto Rico. Soil type was of the Fraternidad series (fine, smectitic Isohyperthermic Typic Haplusterts).

Guineagrass cvs. were planted in 8 plots of 0.22 ha each; four plots of Mombasa and four plots of Tanzania. At 120d, established plots were clipped to 15-cm height, and subdivided in three subplots. Plots at clipping were maintained with a base N fertilizer (56 kg/ha ammonium sulfate).

Experimental treatments were randomly assigned and included a low (L; 0 kg/ha), medium (M; 30kg/ha) and high (H; 60 kg/ha) LU (15% N). At 8-wks regrowth guineagrass plots were clipped at 15-cm, and air dried for 3-d. When baled, LU was applied in a fine mist using a boom sprayer. Bales were stored in a dry place for 8-wks prior to sampling. Core samples, three randomly selected bales from each LU treatment and cv. (24 bales) were taken using a master forage probe. Representative samples of each bale (500 g) were ground in a Willey mill and analyzed for crude protein (CP), acid detergent fiber (ADF) and neutral detergent fiber (NDF) using standardized laboratory procedures.

Data was analyzed using Proc. Mixed of SAS (2008). Linear and quadratic treatment effects determined.

RESULTS.

There were cultivar effects and LU rate effects ($P<0.05$) for CP, but there was no interaction. Crude protein averaged 13 and 17.7% for cv. Mombasa and Tanzania, respectively. There was a linear increase ($P<0.05$) in CP with an increasing rate of LU. Mean CP was 12, 15 and 20% for the L, M, and H rate, respectively. The fertilization only with the ammonium sulfate gave from 10 to 13% of CP for cv. Mombasa and Tanzania, respectively. Additive LU did not affect ($P>0.05$) either NDF or ADF concentration in Mombasa and Tanzania (Table 1). Merrill et al. (1961) and Rodriguez-Carrasquel et al. (1983) reported similar increases in CP with N or urea applications to mature hays.

CONCLUSION.

This study shows that adding LU at baling increases CP, but has no effect on NDF or ADF. Liquid urea at either concentration can be used to increase the nutritive value of

low quality hay in Puerto Rico. Forage intake and digestibility and nitrogen balance studies, however, are needed to determine potential losses of N.

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REFERENCES.

- Brown, W., 1993. Cane molasses and cottonseed meal supplementation of ammoniated tropical grass hay for yearling cattle. *J. Anim. Sci.* 71:3451.
- Conrad J., R. Pastrana. 1990 Amonificación usando urea para mejorar el valor nutritivo de materiales fibrosos. *Revista ICA-Infoma, Bogotá-Colombia.* v. 24(2) p. 5-11.
- Knapp, W. R., D. A. Holt and V. L. Lechtenberg. 1975. Hay preservation and Quality improvement by anhydrous ammonia treatment. *Agron. J.* 67:766-769.
- Merrill, W. G., J. K. Loosli, R. L. Mitchell and W. K. Kennedy. 1961. Effects of foliar application of urea on the yield and nutritive value of some grass hays. *J. Anim. Sci.* 20:785-791.
- Rodriguez-Carrasquel, S., C. F. Chicco, y E. Chacón. 1983. Efecto de la aspersión de urea sobre el rendimiento, composición química y digestibilidad del pasto pangola y A-24. *Agronomía Tropical* 24(3):183-192.
- Rodríguez-Romero, N., O., Araujo-Febres, y B., González., 2004. Efecto de la adición de urea sobre la composición química y digestibilidad *In vitro* de la materia seca de heno de *Brachiaria humidicola* (Rendle) Shweick cosechado a diferentes edades. *Arch. Latinoam. Prod. Anim.* Vol.12 (2): 52-58.
- Ventura, M., A. Barrios., I. Morales, C. Toro, K. Barreto, F. Noguera. 2002. Efecto de la Amonificación seca sobre el valor nutricional de la soca de sorgo (*Sorghum bicolor* L. Moench). *Revista Científica* Vol.XII-Suplemento 2, Octubre, 513-516.

Table 1. Effect of liquid urea rates (kg/ha) on crude protein (CP), acid detergent fiber (ADF) and neutral detergent fiber (NDF) % of guineagrass cv. Mombasa and Tanzania.

Liquid Urea	CP	cv. Mombasa		CP	cv. Tanzania	
		ADF	NDF		ADF	NDF
Kg/ha	%			%		
0	10.5±1.67	42.8	67.6	13.7±1.67	42.0	66.7
30	14.4±1.67	41.8	65.6	15.5±1.67	39.6	67.2
60	17.0±1.67	41.4	66.3	24.1±1.67	43.0	67.0
†L	*	NS	NS	*	NS	NS
††Q	NS	NS	NS	NS	NS	NS

†Linear

††Quadratic