EFFECT OF THE AMMONIATION ON BRACHIARIA DECUMBENS HAYS

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ABSTRACT
The effect of the ammoniation on *B. decumbens* hay obtained during the phase of seed maturation were studied as follows: hay not treated and hay treated with 2 or 3% of NH_3, or 3.6 or 5.4% of urea. Ammoniation reduced the contents (g/kg DM) of NDF, hemicellulose, ADF, and lignin and increased the contents of total N, and ADIN; the IVDMD; the IVOMD; the "in situ" degradability of DM and OM and the apparent digestibility (g/kg nutrient) of DM, OM, and CP, as well increased the daily voluntary intake (g/kg$^{0.75}$) of DM, the digestible DM, OM, the digestible OM, the digestible protein, and the digestible energy. Ammoniation with NH_3 or urea increased the nutritive values of the hay.

KEYWORDS
Anhydrous ammonia, chemical composition, degradability, digestibility, goats, urea

INTRODUCTION
In general, the hay of *B. decumbens* is of poor quality independent of the cutting age of the plant or the season of the year in which it is produced (Reis et al., 1990).

A viable alternative to change the nutritive value (NV) of this roughage is the treatment with chemical products, changing the chemical composition of the forages and increasing the digestibility and voluntary intake (VI) of the animals (Sundstol and Coxworth, 1984; Brown and Adjei, 1995).

The objective of this work was to evaluate the effects of the ammoniation with NH_3 or urea on the NV of *B. decumbens* cv. Basilisk hay harvested during the phase of seed maturation.

MATERIALS AND METHODS
The grass with 84 days of regrowth was cut and baled in January 17, 1994. A randomized block design was used, with four replications, to evaluate the chemical composition, the IVDMD and the IVOMD. To study the "in situ" degradability a split-plot design was used, being the effects of the animals controlled by blocks (3 animals); the periods of incubation (6, 24, and 96 h) were studied in the plots and the treatments as split-plots.

The apparent digestibility and the VI were determined with male goats of the Saanen bred, using a 5 (periods) x 5 (treatments) Latin Square design.

The hays were treated after baling with anhydous ammonia, or at baling with urea. The following treatments were studied: T_1 = hay not treated; $T_2 = T_1 + 2.0\%$ of NH_3; $T_3 = T_1 + 3.0\%$ of NH_3; $T_4 = T_1 + 3.6\%$ of urea; and $T_5 = T_1 + 5.4\%$ of urea. Chemicals were applied on a DM basis according to Sundstol and Coxworth (1984). After the treatment period (45 days), the piles were opened and after three days of aeration samples were taken to determine the chemical composition (AOAC, 1984), the IVDMD and the IVOMD (Tilley and Terry, 1963), and the "in situ" degradability of the hay (Orskov and McDonald, 1979).

RESULTS AND DISCUSSION
Ammoniation reduced the content of NDF and hemicellulose and increased the content of total N and ADIN in the hay. The addition of urea reduced the content of ADF and lignin (Table 1). Similar results were observed by Sundstol and Coxworth (1984) and Reis et al. (1990).

Table 2 shows that the IVDMD, the IVOMD, the "in situ" degradability of DM and OM after 96 hours, and the apparent digestibility of DM and OM, and CP, determined with goats, increased due to the ammoniation. These results are in agreement with the data reported by Reis et al. (1990) and Brown and Adjei (1995). The voluntary intake of DM, DDM, OM, OMD, DP, and DE also increased with the ammoniation. The application of urea (5.4%) resulted in a higher intake of DP when compared to the other treatments.

The increase in the NV of the hay treated with NH_3 or urea may be due to the effects of the ammoniation on the N contents, and the solubilization of the complex lignin-hemicellulose or a increase in the digestion of cellulose and hemicellulose. The ammoniation increased the nutritive values of the hay.

REFERENCES
AOAC. Association of Official Analytical Chemists.1984: Official methods of analysis. Arlington, Virginia: AOAC, 14 ed., 1141 p.

Brown, W., Adjei, M. 1995. Urea treatment to improve the nutritional value of tropical forages. In: International Conference on Livestock in the Tropics. Proceedings... Gainsville: University of Florida, p. 71-77.

Orskov, E.R., McDonald, I. 1979. The estimation of protein degradability in the rumen from incubation measurement weighted according to rate of passage. J. of Agric. Sci., **92**: 499-503.

Reis, R.A., Garcia, R., Silva, D.Jl, Queiroz, A. C., Ferreira, J.Q. 1990. Efeitos da aplicação de amonia anidra sobre a digestibilidade do feno do capim-braquiária (*Brachiaria decumbens* Stapf). Rev. Soc. Bras. Zoot., **19**: 201-208.

Sundstol, F., Coxworth, E.M. 1984. Ammonia treatment. In: Straw and other fibrous by products as feed. Sundstol, F., Owen, E. (ed.). Elsevier, Amsterdam. p. 196-247.

Tilley, J.M.A., Terry, R.A. 1963. A two-stage technique for the "in vitro" digestion of forage crops. J. Brit. Grassl. Soc., **18**: 104-111.

Table 1
Nutritive value of the hay not treated (NT) or treated with anhydrous ammonia (NH_3) or urea.

Variables (g/Kg)	Treatments NT	NH_3 (2.0% DM)	NH_3 (3.0% DM)	Urea (3.6%DM)	Urea (5.4%DM)
NDF	822.3 a	797.7 b	784.6 c	787.2 b	778.4 c
ADF	461.9 ab	466.6 ab	467.7 a	445.8 c	452.4 bc
Hemicellulose	360.4 a	331.1 bc	315.2 c	341.4 b	323.0 c
Lignin	79.7 a	82.1 a	79.4 a	58.6 b	64.9 b
N total	7.0 c	17.2 b	19.5 a	16.6 b	20.3 a
ADIN	2.4 c	2.9 ab	3.1 a	2.9 ab	2.8 b
Digestibility (g/kg)					
“In Vitro” DMD	529.3 c	641.3 a	646.2 a	600.0 b	605.6 b
“In Vitro” OMD	529.6 c	646.2 ab	652.0 a	605.6 b	617.4 ab
“In Situ” DM Degradability	662.0 c	787.0 a	781.0 a	751.0 ab	760.0 ab
“In Situ” OM Degradability	664.0 b	790.0 a	785.0 a	757.0 a	768.0 a
Effective Degradability DM	437.0 b	531.0 a	560.0 a	530.0 a	544.0 a
Effective Degradability OM	432.0 b	528.0 a	554.0 a	519.0 a	546.0 a
Digestibility, DM	552.8 b	627.2 a	607.4 a	605.0 a	610.4 a
Digestibility, CP	451.4 c	518.4 bc	550.6 b	595.8 ab	680.6 a
Digestibility, GE (%)	54.3 b	60.7 a	57.0 a	58.8 ab	57.7 ab

Means followed by the same letter, in the line, did not differ by the test of Tukey ($P > 0.05$).

Table 2
Voluntary intake of the hay not treated (NT) and treated with NH_3 or urea.

Voluntary Intake (g/ $Kg^{0,75}$)	Treatments NT	NH_3 (2.0% DM)	NH_3 (3.0% DM)	Urea (3.6% DM)	Urea (5.4% DM)
DM	31.1 b	37.2 a	38.4 a	37.3 a	40.3 a
Digestible DM	16.9 b	22.9 a	23.5 a	22.2 a	24.1 a
OM	29.8 b	35.7 a	36.7 a	35.6 a	38.5 a
Digestible OM	16.5 b	22.6 a	22.4 a	21.6 a	23.5 a
Digestible Protein	0.8 c	1.8 b	2.2 b	1.9 b	3.3 a
Digestible Energy (Kcal/$Kg^{0.75}$)	76.0 b	101.8 a	95.8 a	105.2 a	102.4 a

Means followed by the same letter, in the line, did not differ by the test of Tukey ($P > 0.05$).