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SHORT COMMUNICATION

HERBAGE DRY MATTER YIELD, NUTRIENT COMPOSITION AND *IN VITRO* GAS PRODUCTION OF MULATO II AND MOMBASA GRASSES AT 30- AND 45- DAY CUTTING INTERVALS

Thalia J. Bacorro[1], Patricia May B. Reyes[1], Menandro M. Loresco[1] and Amado A. Angeles[1]

ABSTRACT

The dry matter (DM) yield and nutrient composition of Mulato II and Mombasa grasses were determined at 30- and 45-day cutting intervals (CI). DM yields and plant height of both grasses were greater at 45 d. Crude protein and calcium decreased ($P<0.05$) with age while phosphorus was lower at 45 d in Mombasa. Fiber fractions increased ($P<0.05$). Gas production increased over time but started to plateau between 24-48h incubation. Increased yields were achieved but with decreased nutritive value. Harvesting at 30 d is recommended for feeding high producing herds. Whereas, delayed harvesting would be suitable for animals requiring less nutrient density.

Key words: dairy, herbage yield, Mulato II and Mombasa grasses, nutrient composition

Poor nutrition due to shortage of good quality forage limits productivity of ruminants in the country. Dependence on the year-round availability of forages have always been a huge concern to dairy farmers. Thus, properly evaluating high quality forages such as Mulato II and Mombasa which were recently introduced in the country for production is desirable and timely. These grasses are known to produce more DM per unit area compared to the commonly used roughage, Napier grass.

Mulato II and Mombasa were claimed to be drought resistant and have excellent nutritive value adapted into sub-tropical regions (Tropical Seeds, 2013). Local data on herbage production and persistence of these grasses under Philippine setting can provide useful information that can help farmers efficiently utilize these newly introduced forages. Further, one way to assess the feeding value of forages is through *in vitro* studies with specific focus on their gas production potential and fermentation characteristics. Hence, the objective of this study was to determine the herbage DM yield, nutritive composition as well as to

[1]Dairy Training and Research Institute, College of Agriculture and Food Science, University of the Philippines Los Baños (e-mail: aaangeles8@up.edu.ph).

describe the *in vitro* gas production patterns of Mulato II and Mombasa grasses at 30- and 45- d cutting intervals (CI).

Rootstocks of Mulato II and Mombasa were transplanted at 0.25m x 0.50m spacing into six 5m x 2m plots laid out in split plot in randomized complete block design with three replicates per grass. The soil is slightly acidic (pH 5.5) containing 3.71% organic matter and 0.22% N with available P and K at 4.2ppm and 0.94 me/100g soil, respectively. Fertilizers were applied on split basis, during transplanting (basal) and a month after. Weeds were hand cleared and watering was conducted when needed. Standardization cut was done at 65 d from transplanting and the cutting intervals of 30 and 45 d were carried out thereafter.

At harvest, five representative height for both grasses was measured and averaged per plot. A 0.25 m^2 (0.5m x 0.5m) quadrat was randomly placed at two locations per plot, cutting uniformly at 15cm and 8cm above soil for Mombasa and Mulato II, respectively. The cut herbage samples were weighed and oven-dried at 70°C to constant weight for the determination of herbage DM yield. Analyses for proximate composition, Ca and P were done following standard methods (AOAC, 1993) and neutral and acid detergent fiber were also determined (Van Soest *et al*., 1970).

Approximately 200 ml of rumen fluid were collected from dairy cows using a gastric pump. Rumen fluid samples were homogenized and filtered in three (3) layers of cheese cloth. Approximately 200mg DM of Mulato II or Mombasa samples (n=24) were incubated at 39 to 40°C in a syringe with rumen fluid, MgSO4 and phosphate buffer (pH 6.9). Gas production at 0, 3, 6, 12, 24 and 48 hours in the syringes were observed. Gas production of grasses were estimated (Ørskov and McDonald, 1979).

As shown in Table 1, Mombasa has higher DM yields compared to Mulato II at both 30-day and 45-day CI. Percent DM ranges from 21.04 to 18.54% and 18.83 to 21.08% for Mulato II and Mombasa, respectively. Crude protein (CP) decreased at 45 d CI for both grasses. Ca levels decreased significantly for both grasses while only Mombasa recorded a significant decrease ($P = 0.0012$) at 45 d CI in phosphorus. Ca: P falls between the optimum range of 1:1 and 1:2. Nutritive components decreased as grasses mature. Increased DM yields on longer CI are consequences of greater plant height, additional tiller, leaf formation, leaf elongation and stem development (Kairuki, 1989). Mulato II at 30 d produced 3-4% higher CP than at 45 d CI (Hare *et al*., 2013).

Neutral and acid detergent fiber increased with longer CI. NDF increased from 53.37 to 63.73% in Mulato II and 63.27 to 69.88% in Mombasa. Likewise, ADF also increased at 45 d. Lower fiber fractions is preferable because increase in NDF and ADF with age may cause reduction in voluntary feed intake and digestibility (Table 1).

As shown in Figure 1, gas production increased steadily with time up to 24 hours. Grasses cut at 30-day CI had higher gas production. High gas production at the 30-day CI indicates high nutrient availability from Mulato II and Mombasa in ruminants. High gas production indicates an efficient rumen microbial fermentation.

Considering the rapid decline in nutrients as well as the decreasing digestibility associated with grass maturity, it is recommended that Mulato II and Mombasa should be harvested at 30 d when feeding herds such as the milking cows and calves which require high forage quality. Grasses at 45 d CI can be fed to animals such as dry cows and growing animals that can accept feed of lower nutritive value.

Table 1. Herbage DM yield, plant height and nutritive composition[1] of Mulato II and Mombasa at 30- and 45- d cutting intervals.

	Mulato II			Mombasa		
	30 d CI	**45 d CI**	***P*-value**	**30 d CI**	**45 d CI**	***P*-value**
Some agronomic traits						
DM yield (tons/ha)	3.20 ± 0.08	5.87 ± 0.59	0.0119	3.97 ± 0.25	9.80 ± 2.33	0.0480
Plant height (cm)	54.31 ± 5.29	85.82 ± 6.21	0.0026	108.27 ± 9.21	142.3 ± 6.56	0.0065
Chemical Analyses, %						
Dry matter	21.04 ± 1.44	18.54 ± 1.30	0.0897[ns]	18.83± 1.05	21.08 ± 2.85	0.2694[ns]
Crude protein	12.86 ± 0.68	8.08 ± 0.22	0.0005	13.38 ± 0.19	6.49 ± 0.17	<0.0001
Calcium	0.37 ± 0.02	0.21 ± 0.02	0.0009	0.40 ± 0.05	0.26 ± 0.03	0.0141
Phosphorus	0.30 ± 0.04	0.23 ± 0.07	0.0582[ns]	0.27 ± 0.02	0.16 ± 0.02	0.0012
Neutral detergent fiber	53.37 ± 1.52	63.73 ± 0.67	0.0004	63.27 ± 1.12	69. 88 ± 3.33	0.0311
Acid detergent fiber	30.25 ± 1.83	38.93 ± 1.79	0.0042	39.81 ± 1.03	46.96 ± 0.64	0.0005

[1]Analyzed at the Animal Nutrition Analytical Service Laboratory, IAS-UPLB, College, Laguna

[ns] not significant at $P<0.05$

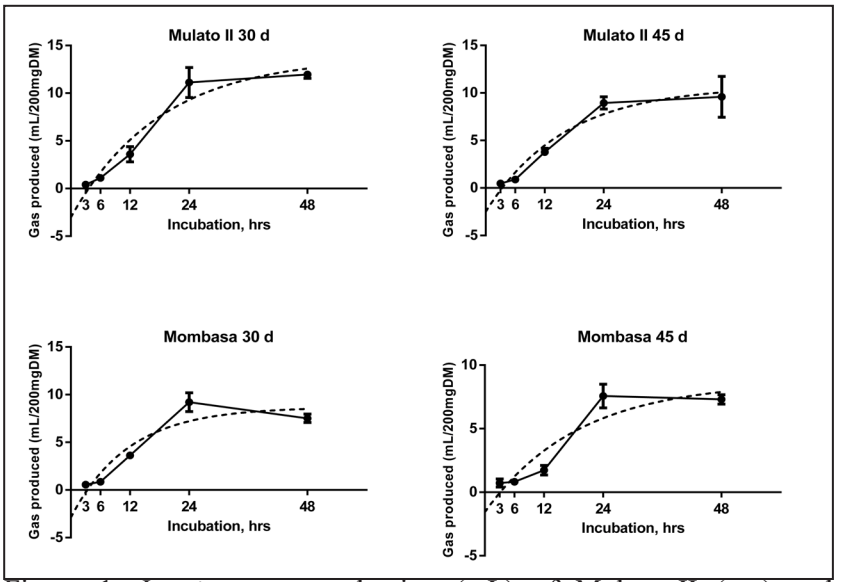

Figure 1. *In vitro* gas production (mL) of Mulato II (top) and Mombasa (bottom) at 30- and 45- d cutting intervals.

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