

Weight Gains of Cows Fed on Five Grass Pastures Intensively Managed in the Humid Hill Region of Puerto Rico^{1, 2}

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ABSTRACT

There is no significant difference in the productivity of intensively managed pastures of Guinea, Tanner, Pangola, *D. milanjana* and Signal grasses growing on an Ultisol. Grazing cattle gained an average of 815 kg/ha/yr and 0.47 kg/head/day. Tanner can on occasion be toxic to cattle; Signal and Guinea grasses were not easily established, and *D. milanjana* was frequently uprooted by the grazing cattle. Pangola proved to be the most desirable because it is easy to establish and cultivate; it has a good root system, and it contains no toxic substances.

INTRODUCTION

Several experiments have been conducted to determine the productivity of intensively managed pastures of different tropical grasses under conditions typical of the humid mountain region of Puerto Rico. Caro-Costas et al.⁴ determined the productivity of intensively managed Guinea, Pangola, Napier, Para and Molasses grass pastures on steep Humatas clay (Ultisol) in a 4-year grazing experiment conducted at Orocovis. Para (*Brachiaria mutica Stapf*) and Molasses (*Melinis minutiflora Beauv*) grasses produced much lower weight gains (an average of 712 kg/ha/yr) and had a lower carrying capacity (an average of four-273 kg/steers/ha) than did Pangola (*Digitaria decumbens Stent*), Guinea (*Panicum maximum* Jacq) and Napier (*Pennisetum purpureum Schum*) grasses, which produced similar yields averaging 1,181 kg of weight gain/ha/yr with an average carrying capacity of 6.1 273-kg steers/ha. Caro-Costas et al.⁵ found that Star (*Cynodon nlemfuensis*) grass pastures growing on Humatas clay at Orocovis outyielded those of Pangola, producing 1,514 kg of weight gain/ha/yr as compared with 1,062 kg/ha/yr for Pangola grass.

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⁴ Caro-Costas, R. Vicente-Chandler, J., and Abruña, F., Productivity of Intensively Managed Pastures of 5 Grasses on Steep Slopes in the Humid Mountains of Puerto Rico, *J. Agri. Univ. P. R.* 49 (1) 99-11, 1965.

⁵ Caro-Costas, R., Abruña, F., and Vicente-Chandler, J., Comparison of Heavily Fertilized Pangola grass and Star grass Pastures Under Humid Tropical Conditions, *Agron. J.* 65: 132-33, 1973.

The Star grass pastures had a carrying capacity of 7.4 273-kg steers/ha compared with 6.5 for Pangola grass. Caro-Costas et al.⁶ compared the productivity of intensively managed Congo (*Brachiaria ruziziensis*), Star and Pangola grass pastures also on a Humatas clay near Orocovis. Star grass produced higher weight gains (1,427 kg/ha/yr) than did Congo or Pangola grasses, which averaged 989 kg/ha/yr. Star grass also had a higher carrying capacity (7.3 273-kg steer/ha) than did Congo or Pangola, which had an average 5.2 273-kg steer/ha.

The experiment described in this paper was carried out to gather additional data on the production of intensively managed pastures of various grasses under conditions typical of the humid hills of Puerto Rico.

MATERIALS AND METHODS

The experiment was conducted over a 1-year period starting in October 1975 at the Corozal Substation at an elevation of about 200 m. The average annual temperature is about 25° C and the seasonal variation less than 4° C. The soil is Corozal clay (Utiisol) with an average slope of 20%. A partially balanced randomized block design was used with treatments (grass species) replicated four times. Individual pastures were 0.4 ha in size and were provided with water and salt. The soil was limed to about pH 6, and 560 kg/ha of 15-5-10 fertilizer were applied to each pasture every 3 mo.

The pastures were grazed by young Holstein heifers weighing initially about 160 kg. A different group of animals grazed the pastures of each grass species in rotation. The pastures were grazed for about 1 week and then rested for 3 weeks. The heifers were treated periodically for parasites and received no feed other than the pasture grasses. Five heifers were maintained per hectare throughout the year. Additional heifers were added as required to consume excess forage produced during seasons of fast growth, using the "put and take" system.

The heifers were weighed each time they were moved from one pasture to another and a record was kept of the grazing days and weight gains in each pasture.

RESULTS AND DISCUSSIONS

The following tabulation shows monthly rainfall during the year:

Month	Rainfall mm
January	97
February	119
March	130

⁶ Caro-Costas, R., Vicente-Chandler, J., and Abruña, F., Comparison of Heavily Fertilized Congo, Star and Pangola Grass Pastures in the Humid Mountain Region of Puerto Rico, J. Agri. Univ. P. R. 60 (2): 179-85, 1976.

April	145
May	78
June	35
July	35
August	96
September	132
October	377
November	248
December	255
Total	1,747

There was a very severe 4-mo dry period from May to August, with monthly rainfall averaging only 61 mm. This explains the overall lower yields produced by the grasses as compared to results obtained at Orocovis.

Table 1 shows that although average weight gains produced by the

TABLE 1.—Productivity of intensively managed pastures of five grasses over a 1-year period at Corozal

Grass	Weight gains	Daily gain/head	Head carried per ha
	Kg/ha/yr	Kg	
Signal (<i>Brachiaria brizantha</i>)	979 a ¹	.64 a	5
Guinea (<i>Panicum maximum</i>)	844 a	.47 a	5
Pangola (<i>Digitaria decumbens</i>)	807 a	.45 a	5
<i>Digitaria milanjiana</i>	766 a	.41 a	5
Tanner (<i>Brachiaria radicans</i>)	682 a	.41 a	5

¹ Values followed by the same letter do not differ significantly at the 5% probability level.

pastures ranged from 979 kg/ha/yr for Signal grass to 682 kg/ha/yr for Tanner grass, the differences were not statistically significant. Also, the apparent differences in average daily gains per head for the different grasses were not statistically significant.

Establishing Signal grass was slow and expensive. Establishing Guinea grass was expensive because it is propagated by clump sections. *D. milanjiana* was observed to be shallow-rooted in this soil and frequently it was uprooted by the grazing cattle. Tanner grass was quickly established and competed well with weeds. However, Soldevila et al.⁷ have presented data showing Tanner grass toxic to cattle under certain conditions.

⁷ Soldevila, M., Green Ortiz, J., Sotomayor Ríos, A., Arroyo-Aguilú, J. A. y Vélez Santiago, J., Alimentación de novillas Holstein en crecimiento con alimento exclusivamente en pastos Tanner, Pangola Común y Milanjiana, Guinea y Signal, cultivados adecuadamente durante las cuatro estaciones del año, Publ. 127 Esta. Exp. Agri. Univ. P. R., 1979.

Soldevila et al.⁷ have presented detailed data on the dry matter and crude protein content of these grasses under grazing management as affected by season of the year.

It can be concluded that although there was no difference in the productivity of these five grasses, Pangola grass is to be preferred because it is easy to establish and manage; it produces fairly high yields, is well rooted, withstands grazing well, and contains no toxic substances.

RESUMEN

Se estudió la productividad de pastos bien cultivados y abonados de Guinea, Pangola, Tanner, Signal y *D. milanjiana* en Corozal durante el transcurso de un año durante el cual hubo una sequía de 4 meses.

No se encontraron diferencias significativas en la productividad de estas cinco yerbas que produjeron un promedio de 815 kg en aumento de peso por ha y año.

El pasto Signal es tardío en establecerse y el Guinea costoso de sembrar pues se propaga por secciones de la cepa. El *D. milanjiana* tuvo un sistema radical poco profundo y se arrancó fácilmente al pastar. El pasto Tanner contiene en ocasiones niveles tóxicos de sustancias que afectan al ganado. El Pangola es por lo tanto el más deseable de los cinco probados, ya que es fácil de establecer y de cultivar, tiene un buen sistema radical y no contiene sustancias tóxicas.