Research Note

EFFECT OF ROTATION LENGTH IN PANGOLA PASTURES UPON THE LIVEWEIGHT GAIN IN GROWING HOLSTEIN HEIFERS[1]

A study comparing a 14-day (3 d grazing, 11 d rest) versus a 28-day (6 d grazing, 22 d rest) rotation cycle in Pangola (*Digitaria decumbens*) pastures was conducted from April 1972 to April 1973 using liveweight gain of growing Holstein heifers as a comparison criterion. Each of five replications of both treatments consisted in grazing two growing animals in a 1-acre plot located on a north central slope of Puerto Rico at the Corozal Substation, 200 m above sea level, with mean yearly rainfall of 1660 mm and temperature of 25° C (varying less than 4° C throughout the year). The typical Corozal soil, an Ultisol (deep red clay) on a 20% slope, was limed to pH 5.5 and fertilized with 560 kg/ha of 15-5-10 analysis every 3 mo. Six forage samples simulating grazing were taken at random in each plot by plucking (cutting) only the upper portion[2]. They were collected the morning on which the animals entered the plot, composited and promptly prepared for dry matter and crude protein determination.

Table 1 shows experimental data. The highest gains were obtained during winter and the lowest during summer. There were no overall differences in mean annual gain between the two rotational cycles; an overall trend that was recently verified when 14–, 21–, and 28-day cycles were compared by another research group.[3] Nevertheless, a marked difference occurred between seasons; a similar trend in both groups. These tendencies and overall results are similar to those recently reported by the author[4] in a study where five tropical grasses were compared under a 28-d rotational cycle. The growth responses, as in the previous work,[4] were low for such heavily fertilized grasses when compared to results obtained in other studies (0.7 kg/animal/day),[5] where more and

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[2] Soldevila, M., Vélez-Santiago, J., Méndez, A. V. y Jiménez, D., 1979, Manejo y Utilización de los forrajes en Puerto Rico, Agr. Expt. Sta. Pub. 125 GT.

[3] Vicente-Chandler, J., 1978, Personal communication.

[4] Soldevila, M., Green J., Sotomayor, A., Arroyo, J. y Vélez, J., 1979, Alimentación de novillas Holstein en crecimiento a base exclusiva de pastos Tanner, Pangolas común y milanjiana, Guinea y Signal, cultivadas adecuadamente durante las cuatro estaciones del año Agr. Expt. Sta. Pub. 127.

[5] Caro-Costas, R., Vicente-Chandler, J., and Abruña, F., 1976. 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.

TABLE 1.—*Liveweight gain of the animals and chemical content of the grass samples taken in different seasons of the year*

Season	Rotational length	Total rainfall	Weeks below 38 mm	Composition simulating grazing		Net average liveweight grain, kg[1]	
				Dry Matter	Total Protein	Daily/ animal	Yearly/ha
		mm	%	%	%		
Spring	14-day	210	80	21.8	12.4	0.37	675
	28-day			21.0	11.8	0.35	639
Summer	14-day	470	31	25.6	9.4	0.31	566
	28-day			24.4	10.8	0.36	657
Fall	14-day	750	23	16.6	17.7	0.47	858
	28-day			15.6	17.3	0.40	730
Winter	14-day	340	77	16.5	18.7	0.54	986
	28-day			17.4	19.5	0.54	986
Mean	14-day	1770	51	20.1	14.6	0.42	766
Annual value	28-day			19.6	14.9	0.42	766
Previously reported value[2]	28-day	1770[3]	51	18.8	15.6	0.45	821

[1] Includes only adjusted weight gain data based on the 2 constant animals while omitting gains from animals used sporadically as put and take to consume excess forage in some seasons of the year.

[2] Data for 28 d rotation published by Soldevila et al. (See footnote 4).

[3] Data for 48 consecutive weeks. The present study lasted 49 weeks: 10 in spring, and 13 each in summer, fall and winter.

TABLE 2.—*Dry matter (DM) and total protein (TP) percentage content of the grass samples taken in the different seasons of the year*

Rotational length[1]	Winter			Spring			Summer			Fall			Mean annual value		
	No.	DM	TP	No.	DM	TP	No.	DM	TP	No.	DM	TP	No.	DM	TP
14-day rotation	5	16.5	18.7	5	21.8	12.4	5	25.6	9.4	5	16.6	17.7	20	20.1	14.6
28-day rotation	5	17.4	19.5	5	21.0	11.8	5	24.4	10.8	5	15.6	17.3	20	19.6	14.9
Previously reported values[2]	8	14.8	20.1	11	24.6	12.0	14	19.3	14.2	11	15.2	17.7	44	18.8	15.6

[1] This is a breakdown by seasons of the year of data presented in table 1.

[2] Data for 28-d rotation published by Soldevila et al. (See footnote 4).

better distributed rainfall was available, and the grazing period was terminated in each cycle when the succulent portions of the grass were consumed—even if prior to the pre-established theoretical length. In this study the Pangola plots were moderately invaded with the less nutritive "horquetilla" (*Paspalum conjugatum*). The presence of this mixture may partially explain the poor animal response in contrast to that expected, given the heavy fertilization used.

Table 2 shows the chemical composition of the grass samples by seasons of the year. These data follow a similar trend to that recently reported by the author and coworkers,[4] where more samples were used to calculate mean values. The great variability (standard deviations surpassing 25%) encountered in the composition of different tropical grasses, even within a season and when managed uniformly, confirms other recent findings of the author and coworkers.[4] On the basis of the limitations encountered in this work, the author suggests that when future experiments are conducted to establish optimal yields of tropical grasses under different rotational cycles, the following variables need to be minimized or eliminated:

1. Lack of water. Rain has to be supplemented, when necessary, to supply no less than 38 mm of water per week if optimal utilization of the large amounts of fertilizer applied is to be achieved.

2. Analysis of average data representing different seasons of the year. Data have to be analyzed by season of the year, since a rotation that is optimal during winter is not necessarily the best during summer. Offering yearly or combined data is misleading, because differential tendencies in different seasons, or differential effects by a combination of known and unknown factors, could mask each other and not permit an objective differentiation of cause and effect.

3. Using a fixed number of animals throughout the year does not permit evaluating the true potential of a given grass. The use of extra animals is necessary to insure the consumption of all the good quality forage available (true maximal yield potential) during seasons of rapid pasture growth. The temporary outputs should be added to be fixed ones, and data should be reported as yield per season for a given area. Accordingly, gain per animal per day data are a reliable index only when the animals are consuming enough nutritionally optimal forage throughout the evaluation.

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