Effect of Winter Grazing Management of Stockpiled Native Pastures of Basaltic Soils of Uruguay on Daily Gains of Heifers

G. Pigurina
INIA, Uruguay

R. Castells
INIA, Uruguay

G. Reyes
INIA, Uruguay

E. J. Berretta
INIA, Uruguay

The XIX International Grassland Congress took place in São Pedro, São Paulo, Brazil from February 11 through February 21, 2001.

Proceedings published by Fundacao de Estudos Agrarios Luiz de Queiroz

ID # 22 - 51

EFFECT OF WINTER GRAZING MANAGEMENT OF STOCKPILED NATIVE PASTURES OF BASALTIC SOILS OF URUGUAY ON DAILY GAINS OF HEIFERS

G. Pigurina[1], R. Castells, G. Reyes[1] and E.J. Berretta [1]

[1]Estación Experimental del Norte, Instituto Nacional de Investigación Agropecuaria (INIA), Ruta 5, km 386, Tacuarembó, Uruguay. gpigu@tb.inia.org.uy

Abstract

The effect of three grazing systems of fall stockpiled native pastures on the winter gains of 66 Hereford heifers (135 kg) was studied. Treatments were: continuos grazing (CG); (C7) the plot was divided in 12 and each was grazed for 7 days and (C28), the plot was divided in 3 and each were grazed for 28 days. Heifers were weighed every 14 days and grazing behaviour was recorded. Stockpiled HM was greater ($P<0.05$) in C7 and C28 than in CG (988, 912, and 604 kg DM/ha, respectively). Herbage allowance (HA) was greater ($P<0.01$) in CG followed by C28 and C7 (11.7, 6.6 and 5.9 kg DM/100 kg LW, respectively). Post-grazing HM was greater ($P<0.01$) in C28 compared to CG and C7 (745, 561 and 552 kg DM/ha, respectively). Nutritive value was similar ($P>0.05$) in all pastures (CP 10.2%, NDF 71.2%, ADF 41.3% and ash 14.4%). Final LW of heifers were similar ($P>0.05$) (167, 162 and 160 kg for CG, C7 and C28, respectively). A very mild winter favoured exceptional gains which tended to be higher in CG (0.353 kg/day) than in C7 (0.305 kg/day) and C28 (0.278 kg/day). Grazing time was greater ($P<0.05$) in CG and bite rate was lower in C28 than in C7 and CG heifers. Grazing management did not affect daily gains. Nevertheless, total remaining HM in C28 and more so in C7 more than doubled that in CG, where more animals could have grazed with increasing total productivity.

Keywords: native pastures, cattle, heifers, grazing systems, grazing behaviour

Introduction

Beef and sheep production in basaltic soils of Uruguay depends greatly on productivity and quality of native pastures. Extensive low input production systems in this region rely on the ability of the farmer to manage a seasonal production with a high peak in spring and almost nill production in winter.

Stockpiling forage in fall to be utilised in winter has shown to be an advisable strategy for winter scarcity (Pigurina et al., 1998). Besides, nutritive value of fall stockpiled basaltic native pastures has been reported to be relatively adequate for backgrounding young stock in winter (Montossi et al., 2000).

Adequate utilisation of winter forage is a key element in proper management of these extensive systems with traditional continuous grazing. Should a more intensive and cost and/or labour demanding grazing system benefit either animal gain or productivity (animal product /ha), farmers would adopt it rapidly.

The objective of this study was to determine the effectiveness of intermittent grazing systems to improve gains of young stock under continuous winter grazing of stockpiled native forages.

Material and Methods

The following experiment was conducted during winter of 1998 at "Glencoe" Research Unit (latitude 32^0 01' 32" S, 57^0 00' 39" W) of INIA Tacuarembó Research Station, in an extensive region of basaltic soils in NW Uruguay, South America.

An area of 52 ha of native pastures growing on shallow, medium and deep basaltic soils was closed during 90 days in fall (1/4/98 to 1/7/98) to stockpile forage. Typical species composition, productive potential, nutritive value and seasonal patterns of growth of native pastures utilised in the experimental area have been documented by Berretta and Bemhaja (1998).

A completely randomised design was used to study the effect of three grazing systems during 84 days of winter (1/7/98 to 23/9/98) on the growth rate of 66 Hereford heifers. Eleven heifers were used in each of two replicates of three experimental plots of 8.5 ha. The following treatments were allocated: continuous grazing, no subdivisions (CG); seven day change (C7), where the experimental plot was divided in 12 subplots of 0.71 ha each and each subplot was grazed for 7 days at 7 SU/ha and 28 day change (C28), where the plot was divided in 3 subplots

of 2.8 ha each and heifers grazed for 28 days at an instant stocking rate of 1.75 SU/ha. Water and mineralised salts were available throughout the experimental period.

Herbage mass (HM) and nutritive value (NV) were estimated pre and post-grazing by randomly clipping 10 lines (5 m x 0.07 m) at ground level using an electric shearing device. Sward surface height (SSH) readings were recorded in each line using a common ruler (Montossi et al., 1999). Samples were collected in plastic containers, dried in a forced draft oven at 60º C, ground in a Wiley mill with 1 mm sieve and analysed to determine: crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and ash.

Heifers were weighed every 14 days and grazing behaviour was studied five times during the experimental period. Grazing time (GT), rumination time (RUT) and resting time (RET) as well as bite rate (BR) were recorded every 15 minutes during day time in 6 heifers (adequately identified with paint) of each replicate.

Sward data and animal weight data were analysed using the statistical package SAS (1990) based on a randomised complete design, evaluating the effect of the grazing systems on sward characteristics and animal gain during the experiment. Treatment means were compared by LSD test.

Results and Discussion

Herbage mass obtained by stockpiling fall growth of native pastures was relatively low due a short drought, and was greater ($P<0.05$) in C7 and C28 than in CG. SSH was sensible to detect HM differences (R^2 0.51). HA was greater ($P<0.01$) in CG due to the greater area/animal. Post-grazing HM was greater ($P<0.01$) in C28 and post-grazing SSH was not able to detect such differences. Nutritive value was similar ($P>0.05$) in all pastures for all constituents (CP, NDF, ADF and ash) and in accordance with results of previous work (Montossi et al., 1999; Pigurina et al., 1998).

Similar ($P>0.05$) gains of approximately 25 kg were recorded regardless of treatments in the experimental period. A very mild winter without frosts favoured the exceptional daily gains which tended to be higher in CG than in C28 and C7. The greater HA and apparent dry matter intake (AIA) in CG could have been responsible for this trend, although estimated feed efficiency did not favour CG. CG heifers gained more at the beginning of the experimental period due to higher HA and probably to selective grazing. Later in the period, when HA diminished in CG, C7 and C28 had greater gains than CG and compensated. CG heifers spent

more ($P<0.05$) time grazing, C7 spent more ($P<0.01$) time ruminating and C28 spent more ($P<0.05$) time resting. Bite rate was smaller in C28 than in C7 and CG heifers.

Grazing management did not affect daily gains of heifers. Nevertheless, in C28 and more so in C7, total remaining HM was more than double that in CG. Undoubtedly more animals could have grazed in both treatments, with increasing total productivity.

Acknowledgements

Special thanks are addressed to Fabio Montossi, Daniel de Mattos and Iber Santamarina who helped in this project.

References

Berretta, E. J. and M. Bemhaja. (1998). Producción estacional de comunidades naturales sobre suelos de Basalto de la Unidad Queguay Chico. In: (Ed) Berretta, E.J. Seminario de Actualizacion en Tecnologias para Basalto. Serie Técnica N° 102. INIA Tacuarembó, Tacuarembó, Uruguay, pp. 33-42.

Montossi, F., G. Pigurina, I. Santamarina and E. J. Berretta. (2000). Selectividad animal y valor nutritivo de la dieta de ovinos y vacunos en sistemas ganaderos. Teoría y Práctica, Serie Técnica Nº 113, INIA Tacuarembó, Uruguay, 80 pp.

Montossi, F., G. Pigurina, I. Santamarina, E.J. Berretta, R. San Julián, D.F., Risso, J. Mieres and M. Bemhaja. (1999). Estudios de estimación de digestibilidad y selectividad animal en campo natural, campo natural fertilizado, y mejoramientos de campo en ovinos y vacunos para la región de Basalto. INIA Tacuarembó, Tacuarembó, Uruguay. 155 pp.

Pigurina, G., J.M. Soares de Lima, and E.J. Berretta. (1998).Tecnologías para la cría en el Basalto. In: (Ed) E.J. Berretta, Seminario de Actualización en Tecnologías para Basalto. Serie Técnica N° 102. INIA Tacuarembó, Tacuarembó, Uruguay, pp. 125-136.

SAS. (1990). SAS User's Guide: Statistics, Versions 5 and 6 Edition. SAS Inc, Cary, North Carolina, USA.

Table 1 - Sward characteristics and herbage chemical composition.

	Treatments			
	C7	C28	CG	P[1]
Herbage mass (HM), kg DM/ha)	988 a	912 a	604 b	*
Postgrazing herbage mass (PGHM), kg DM/ha	552 b	745 a	561 b	**
Sward surface height (SSH), cm	5.6 a	5.8 a	4.1 b	**
Postgrazing sward surface height (PGSSH), cm	3.1 a	3.2 a	3.5 a	NS
Herbage allowance (HA), kg DM/100 kg LW/day)	5.9 b	6.6 b	11.7 a	**
Crude protein (CP), %	10.2 a	10.2 a	10.2 a	NS
Neutral detergent fibber (NDF), %	70.5 a	71.3 a	71.8 a	NS
Acid detergent fibber (ADF), %	41.0 a	41.8 a	41.8 a	NS
Ash, %	15 a	14.1 a	14.1 a	NS

[1] Level of significance: * $P<0.05$, ** $P<0.01$ and NS non significant

Table 2 - The effect of grazing system on animal performance and grazing behaviour

	Treatments			
	C7	C28	CG	P[1]
Initial liveweight (ILW), kg	135 a	135 a	135 a	NS
Final liveweight (FLW), kg	162 a	160 a	167 a	NS
Daily gain (DG), kg/animal/day	0.305 a	0.278 a	0.353 a	NS
Apparent intake (AIA), kg DM/animal/day	6.8	6.1	12.4	
Apparent intake (AILW), kg DM/100 kg LW/day	4.6	4.3	8.3	
Feed efficiency (FE), kg DM:kg product	22	22	35	
Grazing time (GT), min	435 b	444 b	474 a	*
Rumination time (RUT), min	174 a	145 b	142 b	**
Resting time (RET), min	64 b	87 a	59 b	*
Bite rate (BR), bite/min	59 a	54 b	57 a	*

[1] Level of significance: * P<0.05, ** P<0.01 and NS non significant