Stocking Rate and Supplementation Effects on Performance of Lambs Grazing Triticale and Ryegrass Sward in Uruguay

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STOCKING RATE AND SUPPLEMENTATION EFFECTS ON PERFORMANCE OF LAMBS GRAZING TRITICALE AND RYEGRASS SWARD IN URUGUAY

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Abstract

An experiment was carried out from 9 June to 2 October 1997, using a *Lolium multiflorum Lom.* (Ryegrass) and *X Triticosecale Wittmack* (triticale) sward to evaluate the effect of stocking rate (SR; 20, 30 and 40 lambs/ha), and supplementation (S; with or without) on Corriedale lamb performance. SR had a significant effect on: liveweight gain (160, 130 and 90 g/an/d, $P<0.01$); greasy fleece weight (2.8, 2.7 and 2.3 kg, $P<0.01$); fiber diameter (28, 27, and 26 microns, $P<0.05$); rib eye depth (2.4, 2.1 and 2.0 cm, $P<0.05$); fat cover (3.2, 2.1 and 1.5 cm, $P<0.01$); hot carcass weight (17.7, 15.6 and 13.5 kg/an, $P<0.01$); GR (10.5, 6.6 and 4.2 mm, $P<0.01$) and boneless leg weight (1.56, 1.42 and 1.24 kg, $P<0.05$), for 20, 30 and 40 lambs per ha, respectively. At the highest SR, lambs increased grazing time (59 vs 52%) and biting rate (29 vs 26 bites/lamb/min). The mayor influence of S on lamb performance was found in grazing behavior variables: (grazing time (63 vs 50%, $P<0.01$); biting rate (26.8 vs 28.4 bites/lamb/min, $P<0.01$)), carcass characteristics: (hot carcass weight (15.3 vs 16.0 kg, $P<0.05$); GR (7.9 and 6.3 mm, $P<0.05$)) for with and without supplement, respectively. Over the experimental period (115 days), liveweight production and wool production ranged from 358 to 437 kg/ha for 20 and 30 lambs/ha respectively, and wool production from 55 to 93 kg/ha for 20 and 40 lambs/ha respectively. These results show

the potential use of mixed ryegrass and triticale swards to produce high quality lamb meat even at high SRs, and the convenience of using supplements only when sward conditions are not sufficient to maintain an adequate lamb performance, particularly when high lamb SRs are used.

Keywords:, Animal behavior, meat quality, live weight gain, body conditions

Introduction

Some factors during the last decade (low wool prizes and more exporting opportunities for Uruguayan lamb meat) have increased the interest of sheep farmers for new technologies to enhance lamb production in their enterprises (Montossi *et al.,* 1998).

Triticosecale Wittmack cv. INIA Caracé and *Lolium multiflorum* cv. LE 284 are two forage options very well adapted to the sandy soils of the north-east region of Uruguay. These and other grasses have been studied in mixed swards, demonstrating very important productive potential for meat production for the basaltic (Montossi et al., 1998) and the granitic (Scaglia et al., 1997) regions of Uruguay.

However, considering the productive conditions of the sandy soils, there is a lack of information about the potential benefit of using these grasses for lamb production under different stocking rates and supplementation levels.

Material and Methods

The trial was carried out at ”La Magnolia" Research Unit (latitude 31º45´05” S, 55º 49´05” W), belonging to INIA Tacuarembó Research Station, located at an extensive region of sandy soils in the north-east part of Uruguay.

The mixed sward was conventionally sown in April 1997 with 10 kg ha^{-1} of annual ryegrass (*Lolium multiflorum* cv. LE 284) and 150 kg ha^{-1} of triticale (*Triticosecale Wittmack* cv. INIA Caracé) and subdivided into 6 plots of about 0.583 ha each. All plots were also subdivided into four equal sized sub-plots to allow a rotational grazing system with 21 days of resting time. The experimental area received an initial fertilization of 130 kg ha^{-1} (18-46-46-0) with an additional 150 kg ha^{-1} (46-0-0) after the first grazing period.

One hundred and two castrated Corriedale lambs, aging from 9 to 10 months, with a mean liveweight of 22.4 ± 2.3 kg and body condition score (BCS) of 2.92 ± 0.5 grades grazed the mixed sward in a rotational grazing system from 9th June to 2nd October 1997. The lambs were divided randomly into six groups according to their initial fasted liveweight and BCS.

The experiment consisted in six treatments, resulting from combining three stocking rates (SR: 20, 30 and 40 lambs per hectare) and two supplementation levels (S: with or without). The supplement used was wheat bran at a daily allowance of 1.2 % of lamb liveweight.

Over the total experimental period, four grazing behavior studies were carried out during daylight hours (0800 to 1800 hours), in all the lambs and treatments applied, recording at 15 minute interval: grazing, ruminating and resting times, water and supplement intakes and other grazing activities (walking, standing, feeding, etc.). During each of the 4 studies it was estimated the rate of biting, using the 20-bite technique. Montossi (1995) provides more precise information about the grazing behavior techniques used in this experiment.

Animal variables (final live weight (FLW), liveweight gain (LWG), final body condition score (BCS), greasy fleece weight (GFW), fibre diameter (FD), fibre length (FL), hot carcass weight (HCW), GR, boneless leg weight (BLeg), tenderloin weight (TL) and loin weight (L)) were measured according to the procedures described by Montossi (1995) and Montossi et al.

(1998). Before slaughter, rib eye depth (RED) and fat depth (C) were determined on each lamb by ultrasound technique (Russell, 1995).

Animal data was analyzed by SAS (1990) based on a randomized complete design, arranged in a factorial structure, where the main factors were: stocking rate (SR) at three levels and supplementation (S) at two levels. Treatment means were compared by LSD test.

Results and Discussion

A summary of the animal results is presented for the whole experimental period (Table 1).

Stocking rate was the factor that showed a more important effect over the variables assessed. Most of the animal performance variables studied decreased with increasing SR. Lambs managed at the lowest SR had significant higher values for FLW, LWG, BCS, FD, FL, HCW, CY, Bleg, TL and L, than those under the highest SR, while the medium SR were much closer to those of the lowest SR (eg. FBCS, GFW, etc.). A possible explanation for the declining in lamb performance in relation with increasing SR appears to be associated with decreases forage intake due to a decreased herbage mass (San Julián et al., 2001a). The higher grazing time and biting rate observed in lambs maintained at the high SRs, in part, support the previous explanation.

Wheat bran supplementation had less effect on animal performance than SR. In general, supplementation increased the values of some animal characteristics (GFW, RED and GR), particularly in those lambs grazing under the highest SR. The efficiency of conversion (supplement to liveweight) reached a maximum value at the highest SR with 5.6 kg of wheat bran to produce an extra kg of liveweight.

Animal production per unit of area was strongly affected by SR (358, 437 and 403 kg liveweight/ha and 55, 80 and 93 kg fleece weight/ha for 20, 30 and 40 lambs/ha respectively).

Two of the animal variables (FLW and FBCS) were highly correlated with some of the post slaughtering (HCW and high quality meat cuts), being FLW more precise than FBCS to estimate carcass weight (HCW (kg) = 1.67 + 0.49 x FLW (kg); R^2 = 0.92, P<0.01), boneless leg weight (BLe (kg) = 0.066 + 0.04 x FLW (kg); R^2 = 0.79, P<0.01) and loin weight (L (kg) = 0.017 + 0.01 x FLW (kg); R^2 = 0.75, P<0.01).

This study shows that it is possible to reach high levels of production of high quality sheep meat and wool per unit of area on a mixture of *Triticosecale Wittmack* cv. INIA Caracé and *Lolium multiflorum* cv. LE 284 sward under high stocking rates. In order to achieve this productive potential other additional important aspects have to be considered, like adequate grazing management and animal health care. The inclusion of supplement is biologically and economically justified when high stocking rates are used, particularly using this tool to increase stocking the rate capacity of the fattening system.

The use of this lamb fattening technology will make it possible to increase the level of production and profit of the farmers located at the "Región de Areniscas" of Uruguay, complementing the traditional products generated in their systems (eg. wool and beef).

References

Montossi, F. (1995). Comparative studies on the implications of condensed tannins in the evaluation of *Holcus lanatus* and *Lolium spp.* swards for sheep performance. PhD Thesis. Massey University, New Zealand. 288 pp.

Montossi, F., San Julián R., Risso D.F., Berretta E.J., Ríos M., Frugoni J.C., Zamit W. and Levratto J.C. (1998). Alternativas tecnológicas para la intensificación de la producción de carne ovina en sistemas ganaderos del Basalto. II. Producción de corderos pesados. In: Seminario sobre

actualización de tecnologías para el Basalto. Editor: Berretta, E.J. Serie Técnica N° 102. INIA Tacuarembó. Tacuarembó, Uruguay, pp. 243 - 256.

Russel, A.J.F. (1995). Ultrasonography and body composition in sheep. In: Goddard, P. J. (Ed.), Veterinary Ultrasonography. pp. 315 – 323.Wallingford, UK, CAB International.

San Julián, R., Montossi F., Guarino L. and Pittaluga F. (2001a). Lamb stocking rate and supplementation effects on Triticale and Ryegrass swards performance in Uruguay. In: XIX International Grassland Congress. São Pedro, SP, Brazil. (this proceedings).

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

Scaglia, G., Terra J and San Julián R. (1997). Engorde de corderos sobre avena. In: Producción Animal. Unidad Experimental Palo a Pique. Treinta y Tres: INIA. pp 47-58. Serie Actividades de Difusión Nº 136.

Table 1 - The effect of stocking rate (SR) and supplementation (S) and their interactions on final liveweight (FLW; kg/lamb), liveweight gain (LWG; g/lamb/day), final body condition score (FBCS; grades), greasy fleece weight (GFW; kg/lamb), fibre diameter (FD; microns), fibre length (FL; cm), grazing time (GT; %), biting rate (BR; bites/lamb/min), rib eye depth (RED; cm), fat depth (C; mm), hot carcass weight (HCW; kg/lamb), GR (mm), boneless leg (BLeg; kg/half carcass), loin (L; kg/half carcass), tenderloin (TL; kg/half carcass), finished lambs (FL; %) and total wool production (TWP; kg/ha) and total liveweight production (TLWP; kg/ha).

	SR [3] (lambs/ha)				Supplementation [4]			Interaction
	20	30	40	P[1]	no	yes	P	SR*S
FLW	39.6a	35.4b	31.1c	**	35.8	34.8	NS	**
LWG	160a	130b	102c	**	120	130	NS	**
FBCS	4.40a	4.03a	3.14b	**	3.62	3.81	NS	**
GFW	2.8a	2.7a	2.3b	**	2.5b	2.7a	*	*
FD	28a	27b	26c	*	26.9	27.3	NS	**
FL	4.3a	4.1a	4.0b	*	4.13	4.15	NS	**
GT	52c	56b	59a	*	63a	50b	**	**
BR	26b	28a	29a	**	28.4a	26.8b	**	*
RED	2.4a	2.1b	2.0c	*	2.0b	2.2a	*	*
C	3.2a	2.1b	1.5c	**	2.2	2.3	NS	*
HCW	17.7a	15.6b	13.5c	**	16.0a	15.3b	*	**
GR	10.5a	6.6b	4.2c	**	6.3b	7.9a	*	*
BLeg	1.56a	1.42a	1.24b	*	1.36	1.45	NS	**
L	0.41a	0.36b	0.30c	*	0.33b	0.38a	*	**
TL	0.13a	0.13a	0.11b	*	0.12	0.13	NS	**
FL[2]	91	53	19	--	49	42	--	--
TWP	55	80	93	--	74	79	--	--
TLWP	358	437	403	--	364	420	--	--

a, b and c = columns within SR and S with different letters are different ($P<0.05$)

[1] Significance = * $P<0.05$, ** $P<0.01$ and NS = Not Significant

[2] = Range of specifications for the Uruguayan heavy lambs market on farm: LW = 35 – 45 kg/lamb and CS = 3.5 – 4.5 grades.

[3] SR: 20, 30 and 40 lambs/ha

[4] Supplementation (S): with (yes) and without (no)