EFFECT OF GRAZING PRESSURE AND SUPPLEMENTAL LEVEL ON WEIGHT GAIN IN DAIRY HEIFERS

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ABSTRACT
An experiment designed to assess the effect of two grazing pressures (GP, expressed as kg MS/100 kg LW) and four levels of supplement (0, 0.25, 0.50 and 0.75 expressed as kg/100 kg LW) fed to yearling heifers (212 kg) on live weight gain, was carried out at the Dairy Unit of INIA La Estanzuela (Uruguay). The experiment consisted of 8 treatments. Forty animals were used in the experiment, 5 per treatment, each animal being a replication of the treatment. The animals were blocked by weight in 5 blocks of 8 animals each, and then randomly assigned to the different treatments. Field work was carried out in fall of 1993, starting on April 12 and finishing by July 15. Heifers were placed on a four year pasture composed originally of Tall Fescue (*Festuca arundinacea* L), White Clover (*Trifolium repens* L) and Lotus (*Lotus corniculatus* L). Wheat bran (16.2 % CP) was used as a supplement. No significant interaction was found between GP and supplement level. Nevertheless, supplement responses were only obtained at GP 2.5. The effect of GP on live weight gain was found as positive and very significant. As the amount of pasture offered was increased, the response in animal performance improved at a rate of 113 g/a/d of live weight gain per each unit of increment in GP (expressed as percentage of LW). A significant effect of the supplement on live weight gain was found, independently of the GP level. A linear response of 216 g/a/d of live weight gain per each unit of increment in supplement level (expressed as a percentage of LW) was obtained.

KEYWORDS
Heifers, grazing, supplement, gain, intake

INTRODUCTION
Dairy production in Uruguay is mainly based on grazing systems, due to a historically high ratio between the price of the supplements and the products (milk, meat, wool, etc.). This relationship used to be very similar to New Zealand's, but the fact that the land price, as well as milk price is increasing, higher levels of supplementation are justified, not only for milk production but also for raising replacements. Average age at first calving is about 40 months (Uruguay 1990), due mainly to under-nutrition in terms of quantity and quality. This fact results in a higher amount of feed being used for animal maintenance because the number of replacements that are necessary becomes higher, and time between birth and calving rises too.

MATERIALS AND METHODS
During winter of 1994, forty Holstein heifers weighing an average of 212 kg. were blocked by weight and randomly assigned to 8 treatments, consisting of two grazing pressures (2.5 and 3.5 % of body weight) and four supplementation levels (0, 0.25, 0.5 and 0.75 % of body weight). Heifers were placed on a four year pasture composed originally of Tall Fescue, White Clover and Lotus. Wheat bran (16.2 % CP) was fed as supplement. Every Wednesday at 0800 h animals were weighed. Forage allowance and refusal were determined weekly, and new areas were assigned to the different treatments. Forage samples were botanically separated and oven dried at 60°C for 24 hours. Forage and supplement, were analyzed for DOM (Tilley and Terry, 1963), ash, DM, CP, (A.O.A.C., 1990), and ADF, NDF (Goering and Van Soest, 1970). Estimations of quantity and quality of the disappearance were estimated for each treatment. Experimental design was a randomized complete block design in a factorial arrangement of 2 by 4 with 5 replications in each treatment. Least square means were run for all variables. Linear regression models were used to predict supplementation responses. SAS GLM procedure, was used for all statistical analysis (SAS, 1985).

RESULTS AND DISCUSSION
The quality of offered forage and wheat bran were relatively similar for NDF (69.1 vs. 43%). This high value of NDF of the bran and a higher amount of CP of the bran compared to that of the forage (16.2 vs. 10%), could be an explanation of the low substitution rate, that was found at high GP; another explanation could be that the amount of pasture that was offered was not enough to satisfy the animals' requirements, therefore the effect was additive. On the other hand, at lower GP (3.5% LW) the substitution rates was 0.77, similar to that reported by Sanson and Clanton (1989). In the trial, heifers selected forage of higher quality, being higher in average CP and DOM intake (20 and 6.7% respectively) than the one that was offered, ADF and NDF averaged 8.4 and 2.2% lower in average respectively. This also happened in treatment 1 (2.5% LW and no supplement, Table 1), when forage intake was 1.75 k and CP is 191g (10.91%). No differences were found in forage intake (FI), digestible forage intake (DFI) and total intake (TI), but there were differences between some treatments for total digestible intake (TDI) and crude protein forage intake (CPFI). As no significant interaction was found for any of the variables, means are compared within grazing pressure and by supplement level. When we compare FI and TI for 2.5% and 3.5% of LW, we only find a tendency to differ, but crude protein intake (CPI), TDI and DFI were higher for 3.5% LW (Table 1); the increment in these parameters is reflected in a increment in weight gain of 23%. A linear response of 113 g/a/d of live weight gain per each unit of increment in GP ($r = 0.79$) was found. No differences were found in TI for the four different supplement levels, but TDI was higher for 0.75% compared with no supplement. CPI also increased, while neutral digestible fiber intake (NDFI) and acid digestible fiber intake (ADFI) decreased as level of supplementation increased (Table 2). Nevertheless, supplement responses were only obtained at 2.5% GP, where a weight gain 234 grams for each increment in supplement level ($R2 = 0.62$) was observed. This significant effect of the supplement on live weight gain was found, independently of the GP level, where a weight gain of 216 g/a/d for each unit of increment in supplement level (expressed as percentage of LW) was observed. High GP combined with high supplement levels (T3 and T4), had similar LWG to those of low supplement levels and alleviated GP (T5 and T6), supporting in average a 40% higher stocking rate. The experiment shows that supplementation could be used to achieve better individual performance and can be used to increase stocking rates at some time of the year without affecting individual performances.

REFERENCES
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Table 1
Live weight gain and some parameters of intake for the eight treatments and the two grazing pressures.

VAR	T1	T2	T3	T4	T5	T6	T7	T8	P>F	2.5% LW	3.5% LW	P>F
LWG	396a	482ab	481ab	592bc	561bc	498ab	680c	665c	0.00	488a	601b	0.003
FI	1.75	1.72	1.75	1.74	2.16	2.27	1.82	1.76	0.48	1.74a	2.00a	0.056
DFI	1.06	1.12	1.06	1.11	1.35	1.44	1.19	1.12	0.43	1.08a	1.27b	0.023
TI	1.75	1.94	2.19	2.39	2.16	2.49	2.26	2.41	0.12	2.07a	2.33a	0.056
TDI	1.06a	1.27ab	1.35ab	1.55b	1.35ab	1.59b	1.48b	1.56b	0.03	1.30a	1.49b	0.023
CPFI	191a	201a	196a	191a	274b	257b	227ab	216a	0.02	——	——	——
CPI	——	——	——	——	——	——	——	——	——	249	297	0.000

[a,b,c] Values in the same line with different superscripts are different, P<0.05.

Table 2
Effect of level of supplementation over various variables

	LEVEL OF SUPPLEMENTATION			
VAR	0.00	0.25	0.50	0.75
LWG	479a	490ab	581bc	628c
TI	2.0a	2.2a	2.2a	2.4a
TDI	1.20a	1.43ab	1.41ab	1.55b
CPI	232a	266b	283bc	310c
NDFI	71a	68a	59b	60b
ADFI	36a	34ab	30bc	29c

[a,b,c] Values in the same line with different superscripts are different, P<0.05.