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# Animal production over rice–pasture rotation system: animal performance

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## Introduction

Fluctuations in commodity prices, determine the need to find strategies to stabilize production in farming systems. The rice - pastures rotation systems are a good example of this, where animal production takes place in the moments where rice is rotated with pastures (3 years rice and 2 years pastures). In this context, INIA has developed a technology adjusted to the east of the country, with the use of "summer tillage" to intensify livestock production through the incorporation of lambs fattening. These technologies, commercially validated with sheep-rice farming systems, can move the process of cattle backgrounding (males and females), but requires technological adjustments related to planting winter annuals species and the strategic use of the supplementation and subsequent evaluation of the impact of these proposed intensifications of the livestock production phase and subsequent rice production. There are now new tools to study the feasibility of these alternatives (productive and economic) through modelling, but the validity of their results will be based on the certainty of technical coefficients. These coefficients must be generated in real situations where all the factors interact (Deambrosi 2009).

The objective of the present experiments, was to compare liveweight (LW) per hectare, daily gain (DG) and weight gain (WG) per animal on an annual ryegrass ('LE 284') sown over rice stubble, used for calf backgrounding, under the effect of two stocking rate, in the north of Uruguay.

## Methods

Two experiments were developed during the years 2008 and 2009 on – clay loam soil having a pH (water) = 6.4; organic matter 6.7%; P available = 1.1 mg/kg (Bray 1 method) and 9.3 mg/kg (citric acid method). Ryegrass 'LE

Table 1. LE 284 was planted, broadcast seeding, without fertilization. Hereford calves were used. Two stocking rates were evaluated: 6 low rate (LR) and 9 high rate (HR) animal head per hectare (an/ha) during 2007 and 6 (LR) and 8 (HR) an/ha in 2008. A rotational grazing system was utilized in four paddocks, with 7 days of grazing and 21 without grazing. Utilization period of the pasture was on average 50 days. Treatments were arranged complete randomized block with two replicates. Pasture dry matter (kg DM/ha) was estimated cutting at ground level before and after grazing. Sward height was measured by common ruler, and botanic composition (ryegrass, weeds, and other fractions) were estimated as percentage on dry basis. Animals were weighed at the beginning and every 21 days, to estimate daily gains (DG) and life weight production. Animal variables were analyzed as repeated measures, using the MIXED procedure of SAS (SAS 2008). Means were compared with the LS means test ( $P < 0.05$ ).

## Results

The stocking factor evaluated in the experiment developed in 2007 (6 and 9 calves per hectare) had a significant effect on animal performance. Calves managed to LR had significantly higher average WG than the HR (Table 1). The difference in WG was 300 g/an/d for the animals of the LR. This mean that the liveweight gain (LWG)/ha for LR was similar to the HR. These results highlight the high levels of productivity achievable per hectare (over 300 kg of LW/ha) in a short period of grazing (51 days).

In 2008, the stocking rate showed a significant effect on the animal performance. In this case, the HR had an average WG significantly lower (32%) compared to LR. These significant higher daily LWG for LR explains the results for the similar production per hectare between the two treatments (Table 1).

**Table 1. Result of animal production.**

Trial	Variable	Stocking rate	
		LR	HR
2007	Initial Liveweight (kg)	164.5 a	163.8 a
	Final Liveweight (kg)	219.6 a	203.6 b
	Average daily gain (g/an/d)	1081 a	780 b
	Liveweight production (kg/ha)	321 a	348 a
2008	Initial Liveweight (kg)	199.7 a	199.7 a
	Final Liveweight (kg)	241.4 a	228.2 b
	Average daily gain (g/an/d)	851 a	582 b
	Liveweight production (kg/ha)	249 a	227 a

Means with different letters between columns are significantly different ( $P < 0.05$ ).

Stocking rate evaluations generally show that forage intake and individual animal performance decrease progressively with increasing stocking rate. This effect associated with the increase of stocking rate reduces pasture availability as well as selective grazing (Hodgson 1990). At low stocking rates, individual production levels increase due to a greater availability of forage per animal and a greater chance of selection (Hodgson 1990). Mott (1960) suggests that there is an optimum stocking rate above which the daily LWG dramatically decreases. Our results strongly support this.

### Conclusion

Planting annual ryegrass in rice-pastures rotation systems for being used with high stocking rate of calves is an alternative to increase intensification of the backgrounding calves. More intensive systems would include supplementation, with the objective of improve the productivity per hectare, without affecting the individual performance.

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