Intake Estimation of Rams under Grazing Condition in a Deferred Pastures of *Panicum coloratum* by Two Techniques

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INTAKE ESTIMATION OF RAMS UNDER GRAZING CONDITION IN A DEFERRED PASTURES OF *PANICUM COLORATUM* BY TWO TECHNIQUES

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Abstract

The goal of this study was to quantify the organic matter intake (OMI) of Pampinta rams grazing in a *Panicum coloratum* cv Verde differed pasture. The OMI was compared by two methods: a) the difference between the forage measured in pre and post-grazing condition, and b) the faecal production:digestibility ratio of the diet, estimated by total faecal gathering, and from the quantity of total faecal N in g per 100 g^{-1} of OMI and the concentration of total faecal N, respectively. The OMI estimated by difference between the forage measured in pre and post-grazing was 9 % higher (P<0,05) than the one estimated from total faecal gathering and OMD. Interaction was not detected (P>0,10) between treatments (length of the deferment period) and estimation method. The use of the faecal N can be utilized, considering the time of the year, to estimate the OMD and OMI in grazing condition in *P. coloratum* deferred pastures.

Keywords: Faecal N, digestibility, intake, rams, grazing

Introduction

The quantification of the intake under grazing condition is a very complex task; however, several methods have been developed. The daily intake of the flock can be considered through the difference between the biomass at pre- and post-grazing condition (Meijs *et al.* 1982). On the other hand, the determination of the individual intake can be established through the estimation of the faecal production and the digestibility of the diet. To obtain a representative diet samples is the main factor limiting the accuracy of estimation of the digestibility (Burns *et al.* 1994). The faecal index technique would eliminate that limitation since it doesn't require diet samplings and it only involves routine chemical determinations.

During the 90's, several trials have been carried out with *Panicum coloratum* L. to evaluate its potential as a winter deferred forage resource in the semi-arid Pampean Region (Stritzler *et al*., 1996, Ferri *et al*., 1998ab). The objective of this study was to compare the intake by grazing rams in *P. coloratum* deferred pastures using two different approaches: a) the difference between the forage measured in pre- and post-grazing, and b) the faecal production:digestibility ratio of the diet.

Material and Methods

The study was carried out in 1997 and 1998 in the Facultad de Agronomía (UNLPam) at Santa Rosa (36°46´S; 64°16´W) using a pasture of *Panicum coloratum* cv Verde. The measurements were made using 60 Pampinta rams with an initial live weight of 49,6±5,1 and 45,4±5,2 kg in July of each year, respectively. The organic matter intake (OMI) was determined considering paddocks with different dates of beginning of the deferment processes. During the first growing season (1996/97), the treatments were generated by

forage deferment: during the whole season (T1.1), after a harvest by middle of January (T2.1), and of a harvest by the middle of February (T3.1). In the second growing season (1997/98), the treatments were generated by forage deferment produced after harvests carried out: in the middle of December (T4.2), early in January (T5.2), and early in February (T6.2). In each season, the treatments were assigned at random with two replications. Grazing was conducted with daily strip changes, five rams per paddocks, and an allowance of 40 g DM kg LW^{-1}, which was determined by three harvest of the availabable forage at the beginning of the grazing (pre-G). To determine the residual forage (post-grazing: post-G) it was made three measurements paired to the previous ones. In the pre-G samples it was determined the chemical composition (ash, crude protein, neutral detergent fiber, acid detergent fiber, and acid detergent lignin) and the *in vitro* dry matter digestibility (IVDMD). The 8-day experimental period was preceded by a period of adaptation of 15 days.

The OMI was estimated by two techniques: from the difference between the forage biomass measured in pre-G and post-G (Meijs *et al.* 1982), and from the faecal out put / undigestibility ratio: OMI = H / (1 - OMD), where H = daily production of OM of faeces and OMD = digestibility of the OM. The quantity of H was obtained by two daily gathering, by means of harness and collector bags on three animals for treatment. The OMD was determined according to the equation proposed by Lancaster (1949): OMD= 100 (1-C/FN), where C = the quantity of total N excreted in g per 100 g^{-1} of OMI, and FN = the concentration of total N in faeces (g N 100^{-1} g OM).

The estimation with each technique of the mean daily intake of the flock was analyzed using the following model: $Y_{ijk} = \mu+\alpha_i+\beta_j+(\alpha\beta)_{ij}+\delta_k+(\beta\delta)_{jk}+\varepsilon_{ijk}$; where α_i = the repetition (i = 1..2), β_j = the effect of the deferment period (j =1..6), δ_k = the effect of the technique of intake estimation (k = 1..2) and ε = the residual error.

Results and Discussion

The means, standard deviations and ranges of values of the chemical composition and the IVDMD of forage, and those of the faecal production and daily N excretion are presented in Table 1. The estimates of mean daily OMI are shown in Table 2.

Treatment x estimating method interaction was not significant (P>0,10). The non significant interaction indicates that length of the deferment period does not modify the excretion of faecal N in g 100^{-1} per g of OMI (C). According to these results, the time of the year has an important effect and should be taken into account to establish the value of C. The OMI estimated from biomass difference between pre- and post-grazing was 9 % higher (P=0,042) than that estimated from the faecal output / undigestibility. The two methods of intake estimation showed to be sensitive to treatment effects. However, the technique of the total collection of faeces and the OMD allow to make estimations on individual animals. The use of the faecal N to estimate the OMD and OMI in grazing can be applicable when it is not feasible to get an accurate sample from the animal diet (Corbett 1978). In monoespecífic pastures it could be useful to improve the knowledge to design pasture utilization systems and to help predicting animal performance.

References

Burns, J.C., Pond K.R. and Fisher D.S. (1994). Measurement of forage intake. p. 494-531. In: G.C. Fahey, Jr. (ed.). Forage quality, evaluation, and utilization. American Society of Agronomy. Madison, WI., USA.

Corbett, J.L. (1978). Measuring animal performance. p. 163-231. In: t'Mannetje (ed.) Measurement of grassland vegetation and animal production. CAB, UK.

Ferri, C.M., Jouve V.V., Stritzler N.P. and Petruzzi H.J. (1998a). Estimation of intake and apparent digestibility of kleingrass from *in situ* parameters measured in sheep. Animal Science **97**:535-540.

Ferri, C.M., Petruzzi H.J., Stritzler N.P. and Jouve V.V. (1998b). Consumo voluntario, digestibilidad *in vivo* y proteína bruta dietaria en distintas épocas de utilización de *Panicum coloratum* diferido. Revista Argentina de Producción Animal **18**:163-170.

Lancaster, R.J. (1949). Estimation of digestibility of grazed pasture from faeces nitrogen. Nature **163**:330-331.

Meijs, J.A.C., Walters R.J.K. and Keen A. (1982). Sward methods. p. 11-36. In*:* J.D.. Leaver (ed.) Herbage Intake Handbook. British Grassland Society. Hurley, Maidenhead, England.

Stritzler, N.P., Pagella J.H., Jouve V.V. and Ferri C.M. (1996). Semi-arid warm-season grass yield and nutritive value in Argentina. Journal of Range Management **49**:121-125.

Table 1 - Mean, standard deviation (s.d.) and range of values of (a) chemical composition and *in vitro* dry matter digestibility (g kg^{-1} DM) of deferred *Panicum coloratum*; and (b) total daily faecal production and daily N excretion by grazing rams

.Variable[†]	Mean	s.d.	Range
(a) Chemical composition and dry matter digestibility			
ASH	88	18	72-135
CP	26	5	20-35
NDF	702	22	656-738
ADF	450	9	434-466
ADL	61	8	49-74
IVDMD	369	23	342-423
(b) Total daily faecal production and daily N excretion			
OM faecal			
(g kg^{-1} LW d^{-1})	9.41	1.39	6.17-11,90
Total faecal N			
(g 100 g^{-1} OM)	1.180	0.117	1.020-1,451
(g kg LW^{-1} d^{-1})	0.111	0.020	0.074-0,154

[†] CP: crude protein, NDF: neutral detergent fiber, ADF: acid detergent fiber, ADL: acid detergent lignin, IVDMD: *in vitro* dry matter digestibility.

Table 2 - Means daily organic matter intake (OMI; g kg LW^{-1}) of *Panicum coloratum* under different treatments as estimated by two techniques: A – agronomic difference and B – indirect technique based on faecal output and organic matter undigestibility

	Treatments						
Techniques	$T_{1.1}$	$T_{2.1}$	$T_{3.1}$	$T_{4.2}$	$T_{5.2}$	$T_{6.2}$	Means
A	18.2	18.4	21.8	14.2	15.9	17.9	17.9^{a}
B	15.2	15.5	18.3	14.8	16.8	19.1	16.4^{b}
Means:	$16,7^{bc}$	$16,9^{bc}$	$20,0^{a}$	$14,5^{c}$	$16,4^{bc}$	$18,5^{ab}$	

[a, b, c] Means with different superscripts are significantly different (P<0.05).

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