Intake Characteristics of Diploid and Tetraploid Perennial Ryegrass Varieties when Grazed by Simmental x Holstein Yearling Heifers Under Rotational Stocking Management

R. J. Orr
Institute of Grassland and Environmental Research, UK

J. E. Cook
Institute of Grassland and Environmental Research, UK

K. L. Young
Institute of Grassland and Environmental Research, UK

R. A. Champion
Institute of Grassland and Environmental Research, UK

A. J. Rook
Institute of Grassland and Environmental Research, UK

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R.J. Orr, J.E. Cook, K.L. Young, R.A. Champion and A.J. Rook
IGER North Wyke, Okehampton, Devon EX20 2SB U.K., Email: robert.orr@bbsrc.ac.uk

Keywords: perennial ryegrass, varieties, intake rate, rotational stocking, cattle

Introduction Orr *et al*. (2003) measured large differences in dry matter (DM) intake rate between 15 intermediate-heading perennial ryegrass varieties when they were continuously stocked with sheep and subsequently explored the extent to which, for 5 of these varieties, these differences could be explained by chemical and morphological traits (Orr *et al*., 2004a) which could be targeted in grass breeding programmes. Here, four of the 15 varieties, which within ploidy had low or high intake characteristics when grazed by sheep, were rotationally stocked with cattle and intake and sward factors were measured.

Materials and methods Four intermediate-heading perennial ryegrass varieties (see Table 1) were rotationally stocked with yearling Simmental x Holstein beef heifers (195 ± 3.0 kg) from April to September in 2002 and 2003. The 4 varieties were each sown in 3 replicate blocks to create 12 (0.6 ha) areas and each area was further subdivided into 30 paddocks. Twelve groups of 4 heifers grazed 1-day paddocks and moved to a new paddock at approximately 15.00 h. Herbage intake rate was measured in September 2002 and July and August 2003, using a weighing technique described by Orr *et al*. (2004b), during the first hour on the paddocks. Herbage samples were collected from the grazed horizon for assessment of DM, N, WSC and DOMD content. Eating times were recorded over 24 h using IGER behaviour recorders and compressed sward height was measured at the start (CSH_{IN}) and end (CSH_{OUT}) using an Ashgrove platemeter. The partition of herbage mass and the number of tillers per m^2 were measured within circular quadrats, with the same diameter as the platemeter, in which the grass was cut to ground level using scissors.

Results Mean CSH_{IN} was 10 cm and CSH_{OUT} was 6 cm. Intake rate was significantly higher in August 2003 for heifers grazing Glen than those grazing Belramo (27.5 vs. 20.6 g DM/min; *F* prob. = 0.019), but there were no significant differences between varieties in the two other measurement periods. For sward factors (Table 1), N concentration was significantly higher for AberExcel than Rosalin and there were significant differences in leaf mass within the diploid and tetraploid varieties. Mean daily liveweight gains over the two grazing seasons by the heifers were not significantly different.

Table 1	Belramo (*diploid*)	Glen (*diploid*)	Rosalin (*tetraploid*)	AberExcel (*tetraploid hybrid*)	s.e.d	*F* prob.	
						Belramo v Glen	*Rosalin v AberExcel*
Intake rate (g DM min^{-1})	23.8	27.0	26.7	26.9	2.13	0.190	0.933
Eating time (min $24h^{-1}$)	526	538	513	531	23.6	0.627	0.469
DOMD (g DOM kg^{-1} DM)	694	714	695	703	1.28	0.177	0.573
N (g kg^{-1} DM)	35	37	34	38	1.6	0.309	0.047
WSC (g kg^{-1} DM)	138	141	140	135	4.5	0.548	0.283
Leaf mass (kg DM ha^{-1})	1053	1381	1266	945	113.2	0.027	0.030
Tillers (m^{-2})	9,431	10,640	8,496	6,615	776.7	0.171	0.052
Daily liveweight gain (kg)	0.98	1.07	1.00	0.94	0.050	0.103	0.232

Conclusions Mean intake rates, eating times and daily liveweight gains were not significantly different between the varieties when rotationally-stocked with cattle. It is evident from these and previous results with sheep (Orr *et al*., 2003), when intake rates were significantly higher for Glen than Belramo and for AberExcel than Rosalin, that not only does the grass plant display considerable plasticity under different management but that there are interactions with genotype. In order to understand further these interactions grass variety evaluations using continuously stocked cattle swards are required in order to separate the effects of defoliation interval from those of grazing style of the different animal species. Then it will be possible to develop new varieties for grazing use that are matched with appropriate grazing management recommendations.

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Yield components in a Signal grass-Clitoria mixture grazed at different herbage allowance

R. Jiménez-Guillen[1], S. Rojas-Hernández, J. Olivares-Pérez, A. Martínez-Hernández and J. Pérez-Pérez
[1]*Campo Experimental Chilpancingo, Col. Burócratas s/n, Chilpancingo, Guerrero, México,*
rjguillen@hotmail.com

Keywords: mixed pasture, grazing intensity, leaf and stem yield

Introduction A Signal grass-Clitoria mixture provides good quality forage in the dry tropic of southern Mexico. However, its response in leaf and stem yields to grazing at different daily herbage allowances is not well documented. The objective of this study was to determine available and residual leaf and stem yields in a Signal grass (*Brachiaria decumbens*)-Clitoria (*Clitoria ternatea*) mixture grazed at different daily herbage allowance**.**

Materials and methods Field work was undertaken at the Coastal Experimental Station of the University of Guerrero (17º 20'N, 100º02'W). The experimental design was a randomized complete-block with four replications in an experimental unit of 400 m^2 of pasture. Grazing was rotational consisting of 1 and 35 days of occupation and rest, respectively. Four grazing cycles were completed within the rainy season. Seeding was carried out the previous year consisting of three rows of Signal grass (SG) and two of Clitoria (C). At the onset of the rainy season a cut was taken and grazing commenced 35 days later. Heifers were used as grazers and daily herbage allowances were: 2.5, 4.0, 5.5 and 7.0 kg dry matter (DM) /100 kg living weight (LW). For available and residual herbage 8 sampling units (0.5X3 m) on a transect were located at fixed intervals and perpendicular to rows allowing for two rows of each species to be inside the sampling unit and cuts were taken to ground level. Weights of leaf and stem DM for both SG and C were measured.

Results Covariate, herbage allowance x grazing cycle interaction and grazing cycle were not significant (P>0.05) so main effects of herbage allowance were compared averaged over grazing cycles (Tables 1 and 2). Herbage allowance determined (P<0.05) on-offer leaf and stem yields in SG but not (P>0.05) in C, the 2.5 kg DM/100 kg LW allowance gave the lowest on-offer yields in SG. In both species, the 2.5 kg DM/100 kg LW allowance had the lowest residual yields; however, in C, residual leaf yield was different only between 2.5 and 7 kg DM/100 kg LW allowance, and in SG the 2.5 kg DM/100 kg LW allowance had lower yields than the 5.5 kg DM/100 kg LW allowance. Favorable moisture, temperature and photoperiod conditions prevented an effect of grazing cycle. The higher sensitivity of SG to herbage allowance in both on-offer and residual leaf and stem yields compared to C could be explained on the higher biomass of the former.

Table 1 Available leaf and stem yields in a Signal grass-Clitoria pasture grazed at four herbage allowances

Herbage allowance	Signal grass		Clitoria	
(%)	leaf +	stem	leaf	stem
	Kg ha^{-1}			
2.5	514 $^{b\ \delta}$	477 ^{b}	295	383
4.0	750 ^{ab}	940 ^{a}	401	546
5.5	860 ^{a}	1192 ^{a}	447	616
7.0	867 ^{a}	1230 ^{a}	455	685

\+ Mean of three grazing cycles
δ Means within columns with one letter in common different (α = 0.05; Tukey)

Table 2 Residual leaf and stem yields in a Signal grass-Clitoria pasture grazed at four herbage allowances

Herbage allowance	Signal grass		Clitoria	
(%)	leaf +	stem	leaf	stem
	Kg ha^{-1}			
2.5	111 $^{b\ \delta}$	260 ^{b}	43 ^{b}	314
4.0	198 ^{ab}	549 ^{ab}	87 ^{ab}	392
5.5	275 ^{a}	756 ^{a}	94 ^{ab}	446
7.0	294 ^{a}	766 ^{a}	144 ^{a}	523

\+ Mean of three grazing cycles
δ Means within columns with one letter in common are not are not different (α = 0.05; Tukey)

Conclusions Available leaf and stem yields decreased when grazing at 2.5 kg DM/100 kg LW allowance because of the lower amount of residual leaf as the grazing intensity increased. SG was more sensitive to herbage allowance than C.

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