

## A comparison of perennial ryegrass cultivars differing in heading date and grass ploidy for grazing dairy cows at two different stocking rates

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**Introduction** Animal productivity is the ultimate performance indicator of any new grass cultivar. Direct assessment is complex and expensive. Recent research has identified a number of important sward factors that influence intake and production. The most important factor appears to be green leaf mass. The objective of this two year study was to investigate the effects on milk yield, composition and grass intake of grass cultivars with contrasting heading dates (HD) and grass ploidies (PL) when grazed at different stocking rates.

**Materials and methods** The design of this study was a 2 × 2 × 2 factorial arrangement of treatments. Four cultivars consisting of two HD (intermediate - I and late - L) and two grass ploidies (diploid – D and tetraploid - T) were compared at two grazing stocking rates (HSR and LSR). The grass cultivar treatments were: (i) LT, (ii) LD, (iii) IT, (iv) ID. Prior to experiment, eighty Holstein-Friesian cows were blocked on lactation number (3.6 ± 0.7), days in milk (43.9, ± 8.6 days), previous 3-week milk yield (34.2, ± 3.3) and liveweight (546, ± 38.9). They were randomly assigned to one of the eight grazing treatments and managed as individual herds of ten. The study began in early April and finished in late September, lasting a total of 26 weeks. The high (HSR) and low (LSR) stocking rates were 4.8 and 4.3 cows/ha up to early June and 3.9 and 3.5 cows/ha thereafter. Mean concentrate input was 139kg /cow over the two years. Individual animal dry matter intake (DMI) was measured on six occasions during the experiment using n-alkanes. Milk yield was recorded daily. The concentrations of fat, protein and lactose were determined in one successive morning and evening milk sample per week. Daily milk yield, milk constituent yield, milk composition and body weight (BW) were analysed using covariate analysis in SAS.

**Results** Cows grazing the LHD cultivars had higher milk yield (+0.8kg/cow/day, P<0.01), lactose concentration (+0.61g/kg, P<0.001) and SCM (+0.5kg, P<0.09) compared to cows grazing IHD cultivars. Cows grazing at the LSR had significantly higher (P<0.001) milk yield (+1.9kg/cow per day), SCM yield (+1.44kg/cow per day), fat yield (+61.9g/cow per day), protein yield (+66.5g/cow per day), lactose yield (+59.7g/cow per day) and lactose concentration (+0.61g/kg) than cows grazing at the HSR. Heading date (P<0.06) and grass ploidy (P<0.09) approached significance for protein yield; cows grazing the LHD (+22.2g/kg DM) and T (+19.9g/kg DM) cultivars had higher milk protein yield than their comparative herds. Cows grazing at the LSR had higher BW (+13.6kg, P<0.001) than at the HSR. Cows grazing LHD cultivars had higher GDMI (+1.0kg, P< 0.001) than cows grazing IHD cultivars. Cows at the LSR had higher GDMI (+1.2kg, P<0.001) than the cows grazing at the HSR. The interaction between HD × SR for GDMI approached significance. The interaction between HD × SR was due to the difference in GDMI between cultivar groupings at their respective stocking rates. At the HSR cows on the LHD cultivars had a GDMI of 1.6 kg higher than those on the IHD cultivars, while at the LSR cows grazing the LHD cultivars had a GDMI of 0.72kg higher than the cows grazing the IHD cultivars.

**Table 1** Effect of heading date, grass ploidy and stocking rate on the milk production performance, body weight and body condition score of spring calving dairy cows

Heading date (HD)	Intermediate				Late				Rse	HD	PL	SR
	Diploid		Tetraploid		Diploid		Tetraploid					
Grass ploidy (PL)												
Stocking rate (SR)	HSR	LSR	HSR	LSR	HSR	LSR	HSR	LSR				
Milk yield (kg/d)	23.2	24.8	24.0	25.2	24.1	25.7	23.7	26.8	1.94	**	NS	***
SCM (kg/d)	17.4	18.7	18.1	19.0	17.9	19.2	17.9	20.1	1.80	+	NS	***
Fat conc (g/kg)	39.1	37.6	39.4	39.2	38.9	38.5	39.1	37.4	3.97	NS	NS	NS
Protein conc (g/kg)	33.6	33.6	33.7	34.9	33.5	34.1	33.7	33.7	1.56	NS	NS	NS
Lactose conc (g/kg)	45.7	45.9	45.6	46.1	45.7	46.3	45.3	46.4	1.03	NS	NS	***
Body weight (kg)	568	580	560	575	566	581	571	584	20.7	NS	NS	***
GDMI (kg cow/day)	16.5	18.0	16.4	18.0	17.5	17.9	18.1	19.1	1.53	***	NS	***

**Conclusions** Adopting a strategy of increasing SR to graze IHD cultivars did not increase milk production performance. This suggests that the milk production performance achieved by LHD cultivars was equally effective at high and low stocking rates.