

# Allocating concentrates based on individual performance increases milk solid yield in dairy cows grazing lucerne and supplemented with maize silage

S.C. Garcia, M. Pedernera–Romano, A. Horadagoda and W. Fulkerson

Faculty of Veterinary Science, University of Sydney, Camden NSW 2570, sgarcia@usyd.edu.au

In Australia, concentrates are usually fed at a flat rate to each dairy cow as many farmers do not have the facilities to feed cows individually. Therefore, during periods of pasture shortage and supplementation with maize silage (MS) and concentrates, higher milk producing cows are unable to compensate for their increased nutritional requirements. This situation potentially worsens if silage is offered with restricted access where behavioural dominance leads to variation in intake.

A study was conducted to test the hypothesis that allocating concentrates based on individual performance would allow higher yielding cows to compensate for their increased nutritional requirements, thus increasing milk yield. Fifty Holstein–Friesian lactating cows grazing lucerne once–a–day (morning) and supplemented with approximately 7 kg dry matter (DM) of MS either 100% after pm milking (period 1) or 75% after pm and 25% after am milking in the paddock (period 2), were used in a complete block randomised design to quantify the effects of flat (F = 5 kg pellet/day to all cows) versus individual (I = range 3 to 7 kg pellet/day) allocation of concentrate based on the group (F) or individual (I) nutrient requirements. Measurements included milk production and composition, pasture and MS DM intake, liveweight change and energy balance of dairy cows managed under typical commercial herd conditions. A combination of techniques (n–alkanes and stable isotope  $^{13}\text{C}$ ; Garcia *et al.* 2000) was used to

estimate individual DM intake of pasture and MS of grazing cows.

During period 1, cows that were allocated the concentrate based on individual production (I) significantly increased ( $P < 0.05$ ) milk production by 4.2% in comparison to the group fed cows (F; Table 1). Neither milk protein content nor milk protein yield was affected by treatment. However, milk fat yield was significantly increased ( $P < 0.01$ ) by 10 and 13% in periods 1 and 2, respectively, for the I cows, resulting in an average increase of 7% in total milk solids compared with F cows. This additional gain in milk solids production was at no additional cost, as both groups were fed the same total amount (mean = 5 kg/cow) of concentrate/day.

Group–feeding cows with about 7 kg DM/cow/day of MS resulted in individual cow intake of MS ranging from 4 to 14 kg DM/cow/day. This variation, but not that of pasture consumption, was positively associated with total daily DM intake and milk yield.

Under the specific conditions of this study, a 7% increase in milk solids/cow was obtained by allocating the concentrate on an individual cow basis.

Garcia, S.C., Holmes, C.W., Hodgson, J. and MacDonald, A. (2000). The combination of the n–alkanes and  $^{13}\text{C}$  techniques to estimate individual dry matter intakes of herbage and maize silage by grazing dairy cows. *Journal of Agricultural Science Cambridge* 135, 47–55.

**Table 1** Mean effects of group–based (F) or individually–based (I) allocation of concentrate on milk yield, milk composition and liveweight change when MS was offered 100% at night time (Period 1) or 75% at night time:25% in the paddock during the day (Period 2; n = 50).

	Period 1 (100 % MS at night)				Period 2 (75% MS night:25% day)			
	F	I	SED	P	F	I	SED	P
Concentrate allocation <sup>1</sup>								
Milk yield (L/cow/day)	23.7	24.7	0.48	0.04	24.1	24.5	0.54	0.54
Milk protein (%)	2.89	2.88	0.04	0.80	2.77	2.79	0.04	0.74
Milk fat (%)	3.93	4.24	0.14	0.02	3.65	4.04	0.15	0.01
Milk solids yield (kg/cow/day)	1.63	1.72	0.05	0.07	1.52	1.65	0.05	0.02
Liveweight change (kg/cow/day)					–0.62	–0.90	0.30	0.36

<sup>1</sup>F = flat (5 kg/cow/day); I = individually based (average = 5 kg/cow/day); SED = standard error of the difference; P = probability level