Grazing behaviour and diet composition of sheep grazing dual-purpose canola

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Abstract
Grazing behaviour observations and estimates of diet composition were made with Merino hoggets grazing dual-purpose canola near Canberra. Within a few days of allocation to the canola crop, animals were observed mostly to be grazing the canola. Diet composition data confirmed that they consumed canola as their main dietary component (>87% of DM intake); their diet also had a very high digestibility (>88%). These results indicate that dual-purpose, long-season canola is consumed readily and could be a valuable component in mixed grain/grazing systems.

Key words
Canola, grazing behaviour, diet composition, alkanes.

Introduction

Kirkegaard *et al*. (2006) have recently demonstrated that longer-season canola varieties can be grazed in winter by livestock in a manner analogous to the utilization of dual-purpose cereals such as winter wheats. Following grazing, the canola can recover and go on to produce a seed crop, with minimal effects of grazing on seed yield and oil content (Kirkegaard *et al*. 2006). This approach could provide a new 'plant' (i.e. canola) for grazing in mixed farming systems involving pasture, cereal and canola.

To date, such studies have involved the 'crash grazing' of the canola by sheep at a very high grazing pressure (equivalent to >100 sheep/ha) in very small plots for brief periods of time (24-72 hours). In larger areas, more akin to the areas used on-farm, sheep would have much more opportunity to graze selectively and thus may not utilise the canola to the same extent as in the high-intensity grazing in small plots. However, there are no data about the grazing behaviour or diet composition of sheep grazing canola. Such data are required to evaluate whether dual-purpose canola can be used in mixed-farming systems in a manner similar to (and as a break crop for) dual-purpose wheat.

Methods

Crop management and herbage sampling

Our work was conducted at Ginninderra Experiment Station, near Canberra. In autumn 2006, an area of 0.275 ha was cultivated then sown to canola (cv. Maxol) at a seeding rate of 5 kg/ha. Germination and initial growth of the canola were good, but dry conditions in late autumn/winter constrained crop growth rate. Despite good rains in late winter/early spring, it was not possible to graze the crop until early September. Pre-grazing herbage mass (3.5±0.62 t DM/ha) was assessed by cutting randomly placed quadrats to ground level. In order to obtain samples for the estimation of diet composition, 10 random cuts were made within the plot and after bulking the cut material, were hand-sorted into canola leaf/petiole, canola inflorescence, subterranean clover, grass species and broadleaf weeds. These samples were collected at the midpoint of the period of animal sampling (see below) and were frozen prior to analysis.

Animals and their management

Nine Merino ewe hoggets (mean weight 32.6 kg) were treated for internal parasites and allocated to the plot on 4 September. The nominal stocking rate was thus 32.7 hoggets/ha. In the week prior to allocation, they had grazed hybrid forage brassica (cv. Hunter) to acclimatise them to brassica consumption. The grazing behaviour of the hoggets was observed twice-daily (0900h, 1500h) for the first 2 days after allocation and then between 8-12 days after allocation. During these observations, animals were recorded as either not grazing or grazing canola or the plot perimeter (the main area of grass species). Following each set of grazing behaviour observations on days 8-12, animals were mustered to a small yard within the plot and rectal faecal samples were taken to esimate diet composition. These samples were bulked across days, within sheep and frozen prior to analysis.

Analyses and calculations

Herbage and faeces samples were freeze-dried and ground. The hydrocarbons (alkanes) of the plant wax in the samples were extracted and quantified as described elsewhere (Mayes and Dove 2006) and estimates of diet composition were made by relating faecal alkane patterns to those of the plant fractions on offer, using the software package EatWhat (Dove and Moore, 1995). As well as an estimate of diet composition, the software also provides an estimate of the digestibility of the diet.

Results and discussion

In the 48h period following the allocation of the animals to the plots, most animals (7 of the 9) were observed to graze species other than the canola. In general, only 1-2 animals were ever observed to be grazing the canola over this time. However, this 'reluctance' to consume canola was only transient and between days 8-12, animals were grazing canola on 75% of the total observations (Table 1). As a proportion of the observations of animals actually grazing (i.e., excluding animals not grazing), canola was being grazed on 86% of the observations.

Estimated diet composition closely reflected the grazing behaviour results. Almost 88% of the total DM intake consisted of canola, mostly as canola leaf/petiole. Behavioural observations indicated sheep spent 12-14% of their time grazing headland and inter-row areas in which grass species formed a significant component of the total biomass. In confirmation of this, grass species accounted for almost 10% of the diet composition.

The diet composition software also provided an estimate of the digestibility of the consumed diet and over the sampling period, the diet shown in Table 1 had a digestibility of 88.5±0.72%. This very high nutritive value is similar to the digestibilities estimated for the forage of other brassicas, such as forage rape (*e.g.*, Dove and Milne 2006).

Conclusion

Our results indicate that within a few days of being introduced to a canola crop, grazing sheep will consume canola as the bulk of their diet. They also indicate that the nutritive value of the consumed diet is very high. In turn, these findings, plus the small effect of grazing on canola seed yield and oil content (Kirkegaard *et al*. 2006) indicate that dual-purpose canola could be a valuable component of mixed grazing/grain systems.

References

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Table 1. Grazing behaviour (% of total animals, and % of those animals grazing) and botanical composition of the diet consumed by Merino hoggets grazing canola, in the period 8-12 days after allocation to the crop.

Grazing area/activity	Grazing (% total)	Grazing (% those grazing)	Botanical component	Diet composition (% DM ± s.e.)
Canola	75.3	86.0	Canola leaf/petiole	81.2±2.81
Grassy areas	12.3	14.0	Canola inflorescence	6.5±1.52
Not grazing	12.4	-	Subterranean clover	1.7±1.66
			Grass species	9.7±2.48
			Broadleaf weeds	0.9±0.46