Application of a Remote Drafting System for Regulating Supplement Intake by Sheep

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New remote drafting technology being developed through the Australian Sheep Industry Cooperative Research Centre makes possible targeted supplementation of individual sheep within a grazing flock. An advantage of this approach is the potential to make supplementation under grazing conditions more economical and efficient. An earlier series of pen experiments by our group demonstrated proof of concept for a supplementation system based on the remote drafter (e.g., Bowen *et al.* 2007). The objective of this experiment was to evaluate the approach using automatic drafting under grazing conditions.

Merino wethers (initially 28 months, 56.1 (s.d. 2.10) kg liveweight (LW), *n* 68) with half duplex radio frequency identification (RFID) tags grazed dry season Mitchell grass pasture in a 71 ha paddock in north-west Queensland for 8 weeks. Treatments consisted of: no access to supplement (Control; *n* 16), or access to lupins 1, 2, 4 or 7 d/week (Lup1-7; *n* 13 per group). The sole paddock watering point was separately fenced and access was via a 1-way flow gate. Sheep exited the watering point through a remote drafter (CAWD Engineering, Orange, NSW) operated by solar power. Sheep were drafted, according to treatment, either back into the paddock or into a common supplement yard where lupins were provided *ad libitum* in a self-feeder. Sheep were drafted into the supplement yard only on their first time through the drafter during the prescribed 24-h period. Sheep exited the supplement yard via 1-way flow gates in their own time. Group supplement intake was estimated for the entire experimental period and LW was measured weekly. A portal reader and data logger on each exit recorded when individual sheep passed through the drafter and when they returned to the paddock. Data was analysed using regression analysis and generalised linear models with a normal error distribution or a binomial error distribution with a logit link function.

The CAWD remote drafter operated with a high accuracy with only 2.1% incorrect drafts recorded during the experimental period out of a total of 7027 sheep passes through the remote drafter. The actual number of accesses to supplement for each treatment group was similar to that intended (Table 1). Deviations from the intended number of accesses to supplement were mainly due to sheep not coming through to water on their allocated day of treatment access (Table 1), although some instances were due to incorrect drafts.

Table 1. Effect of allocated frequency of access to lupins supplement on the actual frequency of sheep accesses and on the time spent by sheep in the supplement yard

	Treatment					
	Control	Lup1	Lup2	Lup4	Lup7	s.e.d
No. supplement yard accesses/week	0.02	0.69	1.98	3.35	6.04	
Logit (% of days sheep passed through the drafter at least once on their day of supplement access out of the maximum possible days)	-	2.8^{ab} (94)	4.2^{b} (98)	2.0^{a} (88)	2.4^{a} (92)	0.52
Time in supplement yard (min/feeding session)	-	13.1^{ab}	14.4^{b}	9.6^{a}	8.8^{a}	2.66

The average consumption of lupins was 668 g DM/head.access (note: lupins intake for individual treatment groups could not be determined due to the nature of the feeding system). The variance in growth rate of animals in the Control group was much larger than the variances of the other groups, which had homogeneous variances The relationship between mean growth rates (29, 52, 69, 69 and 76 g/head.d for Control, Lup1-7, respectively; GR), weighted with the reciprocal of the group variances, and actual frequency of access to lupins/week (F) was described by the exponential equation: GR = 74.4 (s.e. 2.32) – 46.3 (s.e. 6.27) * 0.345 (s.e. 0.0896)^{F}, adjusted r^2 = 0.94, P = 0.030. The growth rate response plateaued at about 3.0 actual accesses/week corresponding to a growth rate of 72.5 g/head.d. This is in contrast to the linear response relationships obtained in the pen studies (e.g., Bowen *et al.* 2007) and may have been caused by a higher substitution rate of lupins for forage under grazing conditions or by the inverse relationship between frequency of access and the time spent by sheep in the supplement yard (Table 1). This experiment has demonstrated application of the remote drafting supplementation system for the first time under grazing conditions and with the drafter operated completely from solar power.

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