

Losses of subterranean clover seed from dry pasture residues during grazing by sheep in summer-autumn

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In pastures based on subterranean clover (*Trifolium subterraneum* L.), hereafter referred to as sub clover, seed production and survival is essential for the natural regeneration of dense, productive pastures. However, heavy grazing of dry pasture residues in summer-autumn may severely deplete seed reserves. Sheep have been shown to progressively deplete medic pods and seeds from hard-setting soil (1) but there is very little detailed understanding of the intake, passage and survival of sub clover seed ingested by sheep. Therefore, the impact of sheep grazing dry sub clover pasture residues was examined in a field experiment on hard-setting, red-brown earth soil at the Waite Institute.

Methods

In 1986 a paddock was sown with a 30kg/ha mixture of sub clover comprising equal weights of five cultivars: Nungarin, Dalkeith, Trikkala, Junee and Clare. Ten Merino wethers fitted with faecal-collection harnesses were introduced to the 0.33ha paddock on 2 February 1987 and grazed continuously for seventy days. Faeces were collected daily, weighed and subsampled. The sub sample was washed through a square-holed 1mm test sieve and any seeds recovered were tested for germination in a humidified incubator at 19°C. Dry pasture residues on the site were sampled on 30 January 1987 then every seven days while the sheep grazed the area. Thirty-three circular samples were taken on a grid pattern, using an infiltrometer ring (28cm diameter), to measure the disappearance of total pasture residue including burrs and seeds.

Results and discussion

Table 1. Progressive decline in the quantity of dry sub clover pasture and its component burrs and seeds during grazing by sheep and the impact on viable seed output.

Component	Cumulative grazing period (days)											Sig. level†
	0	7	14	21	28	35	42	49	56	63	70	
Sub clover residue (kg DM/ha)	6619	7950	5202	4788	4795	4167	4077	3287	2607	2737	2559	***
Sub clover burr (kg/ha)	1872	1905	1509	1324	1151	729	679	477	310	292	315	***
Burr in residue(%)	28	29	29	27	22	15	15	15	12	13	13	***
Burrs (#/m ²)	4606	4832	4160	3779	3324	2318	2329	1776	1228	1190	1294	***
Burr weight (mg)	40.5	38.7	37.7	33.1	31.4	30.0	27.9	26.0	24.0	25.2	22.5	***
Seeds (#/burr)	2.39	2.73	2.35	2.54	2.02	2.00	2.12	2.31	1.78	1.29	1.48	***
Total seed (#/m ²)	11008	13191	9776	9599	6714	4636	4937	4102	2186	1535	1915	***
Seed weight (mg)	7.29	7.24	6.73	7.21	10.0	6.69	6.85	6.79	4.95	5.79	6.82	n.s.
Viable seed output (from 10 sheep)	-	2005	4082	5880	5165	6509	6964	5814	7055	2216	1983	***

† The significance of overall decline, $P < 0.001$ ***, n.s. = not significant

Sheep selected the largest burrs containing the most seed and the largest seed first, leaving the ecologically-least-fit seeds. These results parallel those obtained with medic pods (1). Data on daily output of viable sub clover seed [i.e. potential germination of both permeable (soft) and impermeable (hard) seed] following ingestion were described by a quadratic function, $y = -336.2 + 425.7x - 5.953x^2$, $r = 0.756^{***}$, $n = 70$.

At the start of grazing very little seed was voided because sheep were eating green weeds and dry leaf and stem from sub clover in preference to burrs. As leaf and stem material declined, more burrs were ingested, hence an increase in viable seed output. The subsequent decrease in viable seed output can be attributed to declining availability of burrs. The throughput of total viable seed was estimated at 1.5% (soft=0.5%, hard=1.0%) of the intake.

1. Carter, E.D. (1981). Proc. XIV Int. Grassl. Cong., Lexington, Kentucky, U.S.A.: 447-50.