1983

Evaluation of annual grass control 1982 1983

D Nicolas

EVALUATION OF ANNUAL GRASS CONTROL USING HERBICIDES ON ANIMAL, PASTURE AND SUBSEQUENT CROP PRODUCTION AT NORTH BANNISTER

Trial: 82 Na 29

File: 3978/EX

Location: Culford 'North Bannister'

History:

The previous trial name under D. Nicholas was 68 Na 1/2303EX. The aim was to investigate the performance of 8 sub clover cultivars under grazing. The trial consisted of 2 replicates x 2 stocking rates x 8 cultivars. The site was continuously grazed until 1979 when it was cropped to barley. In 1980 the site was re-cropped to wheat. The pastures were not set stocked in 1981. In 1982 a collaborative trail with Mr A. Dunlop from Sheep and Wool, Animal Production Division was set up to investigate the;

1. Effect of chemical grass control on pasture production and subsequent animal production on 4 of the original 8 cultivars of sub-clover

2. Effect of the previous years grass control on take-all levels in a following crop.

Design:

Four of the originally sown cultivars were selected (Seaton Park, Daliak, Geraldton and Dinninup) to give a range in maturity. The original plots stocked with 8 wethers/plot were equally divided and 4 sheep placed on each half. One half was sprayed with Kerb-W-50® (Rhom and Haas) on May 18, 1982, following the break of season. The original stocking rates of 7.5 and 10 wethers/ha were maintained on each treatment.

The experiment was arranged in a split-plot design.

It was decided that 1 Replicate would be run in a 1:1 crop:pasture rotation while the other in a 1:2, with grass control 2 years prior to cropping.

Methods:

All plots were fenced and watered in March 1982. Sheep were selected from the farmers bulk weaner flock and stratified into weight and wool classes. Sheep were allocated to plots from 4 stratified groups with 1 animal from each group. The weaners were dye banded at the start of the experiment and periodically during the year to determine wool growth rate. The animals were weighed fortnightly to monthly to determine liveweight changes. Shearing usually took place in November.

Measurements of pasture on offer and growth rate (using cages) were taken to coincide with the weighing of the animals. Botanical composition of the pasture was also recorded at this time. From late spring until the break of season the following year pasture samples were taken to determine digestibility and protein content. Sub-clover seed production was measured in January of each season taking 20 ($0.2m^{-2}$) quadrats per plot. In 1983 residual seed was also measured from 20 cores ($0.63\ dm^{-2}$) per plot.

Soil samples were taken in March 1983 and analysed for pH, organic carbon, total soil nitrogen and available NO_3^-, NH_4^+.

Kerb W-50® (Rhom and Haas) was applied at 1.0 kg/ha in 70 litres of water with a boom spray.

The 1983 cropped area was sprayed with Spray.seed® at 1.5L/ha, plus 1.0L/ha DDT and 0.5L/ha Banex® on May 17. The crop was sown on May 19 at 47kg/ha with Eradu. Superphosphate was drilled with the seed at 120kg/ha. Rates of nitrogen were topdressed using a combine on June 16 at the following rates, 0, 32, 64, 140, 280, 400 kg/ha Agran (34% nitrogen). On August 8, 500 ml/ha Banex® + 1.0L/ha Buctril® was applied to remove regenerated sub-clover under the crop.

Plant samples were taken on September 19 to determine anthesis dry matter and take-all on the roots.

All plots were harvested using a Winterstieger small plot harvester in early December.

General notes:

The original (68 Nal) trial plot numbers were changed due to the division of the plots (see attached trial plan)

PLOT NO.	CULTIVAR	SR	PLOT NO.	TREATMENT (+ Kerb®)
2	Seaton Park	10	1	+
			2	-
3	Daliak	7.5	3	-
			4	+
5	Geraldton	7.5	5	+
			6	-
6	Seaton Park	7.5	7	+
			8	-
10	Dinninup	7.5	9	-
			10	+
12	Dinninup	10	11	-
			12	+
15	Geraldton	10	13	+
			14	-
16	Daliak	10	15	-
			16	+
17	Daliak	7.5	17	+
			18	-
18	Seaton Park	10	19	-
			20	+
24	Seaton Park	7.5	21	-
			22	+
25	Geraldton	7.5	23	+
			24	-
26	Dinninup	7.5	25	-
			26	+
28	Dinninup	10	27	+
			28	-
30	Daliak	10	29	-
			30	+
31	Geraldton	10	31	-
			32	+

Results and Discussion:

1982 Pasture Production

Sub clover density was recorded on May 24 1982 after allocating the sheep to the plots. Previous stocking history appeared to slightly reduce the density of sub clover, however, the differences were non significant.

There also appeared to be a cultivar effect on density with Geraldton and Daliak having a higher density than either Seaton Park or Dinninup (Table 1).

Table 1: The effect of cultivar and previous stocking rate on the density of sub clover.

Cultivar Stocking Rate	density (Plants dm^{-2}) Seaton Park	Dinninup	Daliak	Geraldton
7.5/ha	4.8	6.2	8.6	8.0
10.0/ha	5.8	5.7	7.7	6.6
$\bar{x}$	5.3	5.9	8.1	7.3

Standard Error

Cultivar	±	1.0
Stocking Rate	±	0.7
Kerb	±	0.4

Plots 19, 20, 7, 8 (Seaton Park) and 27, 28 (Dinninup) had low densities.

There was a significant effect ($P<0.01$) of herbicide treatment on the amount of pasture on offer in spring 13.8 to 25.10.82. At all other times there was no effect of herbicide, cultivar or stocking rate on pasture on offer. There was a small non significant stocking rate effect on pasture on offer, with less pasture on the 10/ha plots. Pasture production was highest in late spring and corresponded to the maturity of the cultivars. The later the maturity the more pasture produced. It was evident that Geraldton and Daliak were too early for the environment and Dinninup produced marginally more feed than Seaton Park. Pasture growth was extremely slow in July-August and due to the poor feed availability situation it was decided to remove sheep from 21.7.82 to 7.8.82 to allow the pasture to put on some growth. Animals lost substantial amounts of liveweight up to 21/7 and it was considered undesirable to push them any harder. Sheep stocked at 7.5/ha lost in the order of 5-6 kg/hd while those stocked at 10/ha lost 7-9 kg/hd. In general the grass free pastures lost (1 kg/hd) more than the control grassy pastures (Table 2).

Table 2: Cumulative liveweight loss (kg) from 18/5/82 - 21/7/82.

Herbicide	- Kerb®		+ Kerb®	
Stocking rate	7.5	10	7.5	10
Cultivar				
Seaton Park	2.1	9.0	5.5	8.3
Daliak	6.8	7.9	7.5	9.0
Geraldton	5.9	6.3	6.3	7.8
Dinninup	6.3	5.7	5.5	8.0
$\bar{x}$	5.3	7.2	6.2	8.0

Pasture composition was measured throughout the season. In general the use of the grass selective herbicide Kerb® resulted in a high level of annual grass control (Table 3). The control pasture was comprised mainly of subclover (60%) and annual grasses (40%). There were only small amounts of broadleaf herbaceous weeds, like capeweed. The main grasses present varied from plot to plot but were either annual ryegrass, silvergrass or bromegrass (ripgut; Bromus diandrus).

Table 3: Pasture composition 13/8/82.

Stocking rate			7.5/ha			
Herbicide		- Kerb®			+ Kerb®	
Cultivar	Clover	Grass %	Weed	Clover	Grass %	Weed
Seaton Park	45	55	< 1	97	3	< 1
Daliak	60	40	< 1	96	2	2
Geraldton	71	29	< 1	97	3	< 1
Dinninup	61	39	< 1	99	< 1	0
			10/ha			
Seaton Park	53	46	1	97	1	2
Daliak	60	38	2	98	2	0
Geraldton	62	37	1	99	0	1
Dinninup	61	38	1	100	0	0

Sprayed and unsprayed pasture samples of the 4 sub clover cultivars failed to show any difference in digestibility when sampled at or near senescence 26/10/83 (Table 4). Dinninup, however, appeared to have a higher digestibility than the other cultivars. There appeared to be an effect of maturity with the earliest cultivar Geraldton having a lower digestibility than the later cultivars, however, these differences were non significant, as was the differences in protein content.

Table 4: Digestibilty (%) and protein content of four sub clover cultivars following herbicide application to remove grasses and subject to two grazing pressures (26/10/83 sampled).

Herbicide	- Kerb®		+ Kerb®	
Stocking rate	Digestibility %	protein %	Digestibility %	Protein %
Cultivar		7.5/ha		
Seaton Park	63.0	14	59.5	15
Daliak	56.5	15	52.0	14
Geraldton	52.0	15	50.0	14
Dinninup	63.5	17	67.0	17
		10/ha		
Seaton Park	56.0	15	51.0	16
Daliak	59.0	13	61.0	13
Geraldton	59.0	13	57.0	16
Dinninup	64.5	16	63.5	17

Standard Error	Digestibility	Protein
Cultivar	± 2.9	± 0.19
Stocking Rate	± 2.1	± 0.14
Kerb®	± 1.1	± 0.04

Pasture grab samples taken on 13/12/82 were also analysed for digestibility and protein (Table 5). There was a significant kerb effect ($p < 0.01$) on protein content with the grass free pasture being double that of the control grassy pasture. There was significant ($p < 0.05$) interaction between cultivar and kerb and stocking rate and kerb, with Dinninup due to its high clover content in the unsprayed pasture having a high protein content (Table 5). There was a significant ($p < 0.01$) effect of Kerb® on digestibility, with the sprayed pasture having a lower digestibility. Due to low amounts of pasture on the surface subsequent pasture samples were not collected from the sprayed pastures, however, a sample collected from the control pasture stocked at 7.5/ha on 16/2/82 revealed a large drop in the protein content of Dinninup from 9.2% to 4.8% (Table 5).

Table 5: Effect of herbicide treatment on digestibility (DDM) and protein content of pastures.

Herbicide	- Kerb®				+ Kerb®	
Date	13/12/82		16/2/82			
Analysis	DDM	Protein	DDM	Protein	DDM	Protein
			7.5/ha			
Seaton Park	44	4.1	41	4.2	41	11.1
Daliak	47	5.8	41	5.1	37	12.6
Geraldton	45	4.5	42	3.8	35	13.2
Dinninup	51	9.2	43	5.1	43	11.6
			10/ha			
Seaton Park	48	7.6			41	10.6
Daliak	46	4.5			32	11.8
Geraldton	41	5.7			35	10.0
Dinninup	38	8.6			36	11.3

Standard Errors 13/12/82

	Digestibility	Protein
Cultivar	± 3.1	± 0.18
Stocking Rate	± 2.2	± 0.13
Kerb	± 1.8	± 0.06

Small samples of capeweed were collected from various pasturs and analysed for digestibility (69%) and protein (16%) on 26/10/83. Capeweeds digestibility was greater than sub clover at this time and had as high a protein content. Annual ryegrass had a digestibility of 60% and a protein content of 9%.

Sub clover seed yields were measured in January 1982.

1983 Pasture Production

Sub clover regeneration in 1983 was extremely good with pastures averaging 28 plants/dm^2. On the average over four cultivars there was little difference between the untreated and Kerb® treated areas in terms of regeneration at both 7.5 and 10 sheep/ha, however, there was a significant stocking rate effect ($p < 0.05$), with less regeneration at 10/ha (Table 6). The four other cultivars not used in the trial were also recorded, and had densities similar to the four cultivars used in the trial (Table 6).

Table 6: Sub clover regeneration 12/5/83 following herbicide treatment in 1982.

Herbicide	- Kerb		+ Kerb	
stocking rate	7.5	10	7.5	10
Cultivar				
Seaton Park	28	23	37	29
Daliak	38	24	40	25
Geraldton	41	29	22	24
Dinninup	28	31	23	13
Uniwager	20	29		
Dwalganup	33	33		
Woogenellup	27	28		
Midland B	16	22		

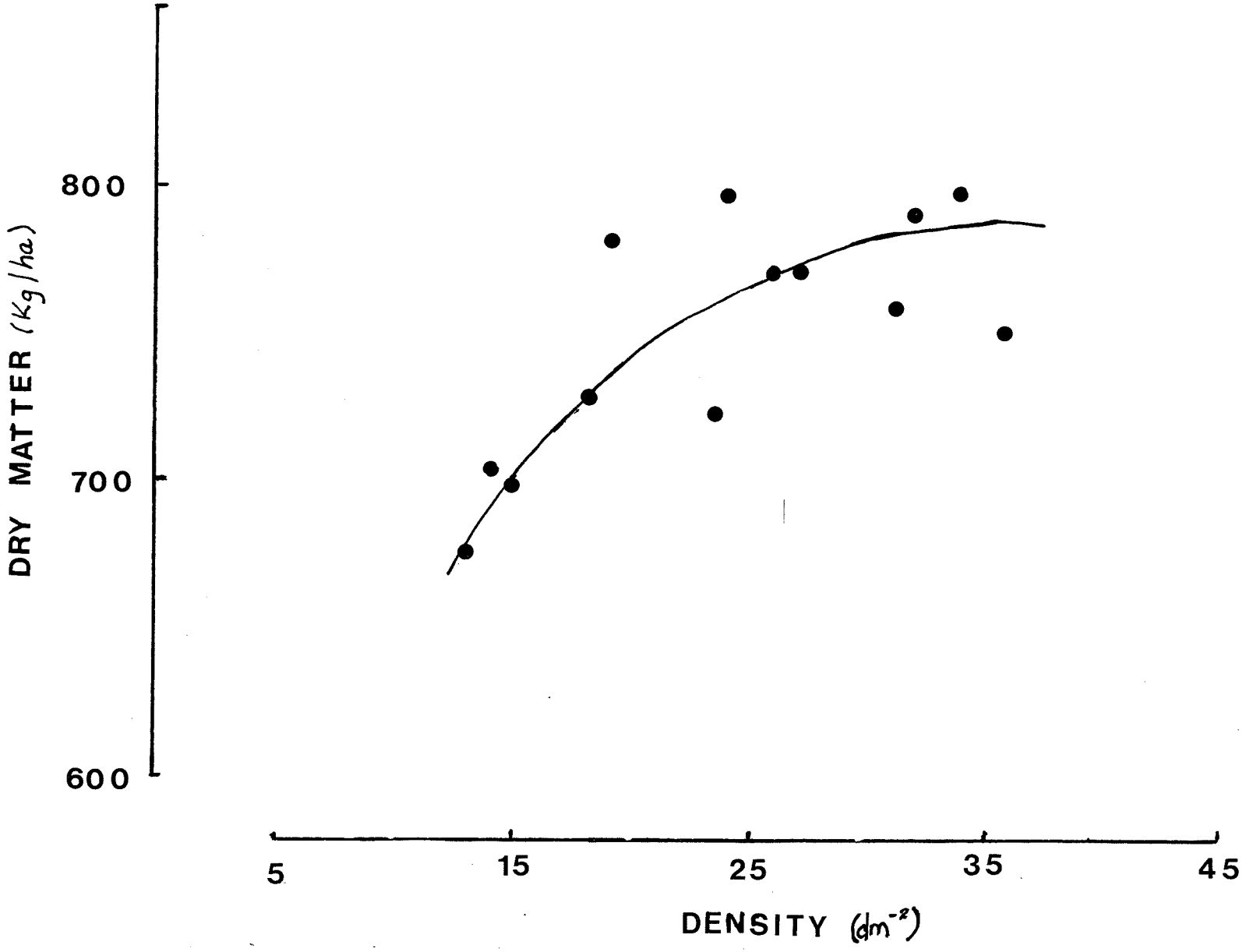
Standard Errors

Cultivar	±	4.3
Stocking Rate	±	3.1
Kerb®	±	4.9

There was a relationship between early winter pasture dry matter (10/6/83) and density. At densities greater than 25 plants/dm^2 there was little increase in dry matter (Figure 2).

Figure 1: Early pasture production in relation to sub. clover density.

Figure 1: Sub clover Density, Dry Matter Yield Relationship



Due to the excellent germination and start to the season in 1983, pasture growth was excellent. Total ungrazed pasture production on 5/10/83 is presented in Table 7.

Table 7: Total ungrazed pasture production at 5/10/83 (t/ha).

Herbicide	- Kerb®		+ Kerb®	
stocking rate	7.5	10	7.5	10
Cultivar				
Seaton Park	5.0	6.4	5.1	4.6
Daliak	5.3	8.6	9.0	8.9
Geraldton	3.3	5.0	4.6	3.0
Dinninup	3.7	4.9	4.1	5.0

Both Dinninup and Seaton Park were still growing on the 5/10 and the dry matter for these cultivars is not a total yearly figure. Late in the season 20/10/83 it was also noticed that the spatial arrangement of the treatments markedly affected total dry matter, for example; Plots 10, 11, 12 and 13 on the top of the hill had senesced while plots 2, 3 and 4 were still green at the bottom of the hill due to moisture differences. It was evident that site variability is a major factor influencing pasture production on the site.

In 1983 there was little effect of stocking rate on pasture production. Some grass was observed to come back into the plots treated with Kerb® in 1982. The grass was annual ryegrass and the reason for its re-emergence is coupled to the dark dormancy seed conservation mechanism of the species. The plants appearing were from seed at least 2 years old.

Pasture composition for the treated areas in 1983 is presented in Table 8.

Table 8: Pasture composition (15/8/83) for pastures treated in 1982 and stocked at 7.5 and 10 sheep/ha.

Herbicide	- Kerb®					
Stocking rate	7.5			10		
Composition	Grass	Clover	Capeweed	Grass	Clover	Capeweed
Cultivar						
Seaton Park	40	52	8	34	62	4
Daliak	49	51	0	48	45	7
Geraldton	35	63	2	20	73	7
Dinninup	44	56	0	34	62	4

+ Kerb®

Stocking rate	7.5			10		
Composition	Grass	Clover	Capeweed	Grass	Clover	Capeweed
Cultivar						
Seaton Park	13	84	3	10	86	4
Daliak	13	70	17	13	83	4
Geraldton	12	87	1	4	94	2
Dinninup	0	100	0	3	95	2

Residual sub clover seed under the 2nd year pastues and the crop were measured on August 3, 1983. In general the Kerb sprayed pastures contained a higher amount of residual sub clover seed. The small seeded and early maturing cultivars Geraldton and Daliak had very high residual seed levels. There was a stocking rate effect on residual seed level with 10 ha^{-1} reducing residual seed levels by 26% for the unsprayed control and 30% for the Kerb® sprayed pastures. The Kerb® treated pastues had 28% and 21% more residual seed at 7.5 and 10.0 sheep/ha respectively than the untreated grassy pasture. Residual seed levels were lower under the cropped area, however, this area grew less pasture the previous year. In the cropped area residual seed levels were reduced by the previous stocking history. The unsprayed control was reduced by 58% while the Kerb® treated area was reduced by 47% when stocked at 10/ha compared to 7.5/ha (Table 9).

Table 9: Residual sub clover seed yield (3/8/83) kg/ha.

Herbicide	- Kerb®				+ Kerb®			
Stocking Rate	2nd year pasture 7.5	10	Under crop 7.5	10	2nd year pasture 7.5	10	Under crop 7.5	10
Cultivar								
Seaton Park	331	457	415	154	613	413	334	103
Daliak	786	624	327	242	898	919	370	189
Geraldton	903	492	1085	385	1262	782	835	515
Dinninup	528	326	406	157	672	308	377	207
$\bar{x}$	637	474	558	234	861	605	479	253

1982 Animal Production

In 1982 there was no significant effect of either cultivar, stocking rate or herbicide on sheep liveweight until 21/7/82 at which time stocking rate and herbicide treatments had a significant effect ($P < 0.05$). There was a 1.6 kg/hd difference between stocking rates and 1.1 kg/hd difference between herbicide treatments. The sheep were removed at this point in time due to their excessive weight loss and the lack of pasture growth due to a cold, wet winter and poor density of sub clover (see Tables 1, 2). The sheep were re-allocated to the plots on 7/8/82. All animals had put on weight and eliminated any of the previous treatment differences, however, by 6/9/82 there

was significant stocking rate effect ($P < 0.05$) and herbicide effect ($P < 0.01$) with there being a 2.4 kg difference between stocking rates and a 4.6 kg difference between herbicide treatments (+ or - grass control), in favour of the control pasture. These differences between stocking rates and herbicide treatments were significant and were maintained through monthly weighing until 9/5/83 (Figure 3a, b, c, d). On 27/9/82 there was a significant cultivar x herbicide interaction with animals on the Dinninup sprayed pasture having a much lower liveweight than those on the unsprayed pasture at both stocking rates. At no other time was there a significant interaction between cultivar and herbicide treatment, although, there was a marked depression in the liveweight of the animals on the sprayed Dinninup plots. These animals also showed a marked weight gain during December and January compared to the other cultivars; this could be associated with higher levels of digestible protein available to these animals at this time (refer Table 4 and 5). It would be postulated that not only was pasture availability limiting these animals but their feed intake may have been low due to the palatability of Dinninup early in the season. In fact, rapid weight gain was only observed with these animals from October onwards. This coincided with Dinninup flowering. It is not known at this time whether formonentin content of Dinninup falls at flowering or other factors improve its palatability (such as carbohydrate content). This is an area of work which needs investigation.

1983 Animal Production

There was no effect of herbicide treatment or stocking rate on the liveweight of sheep grazing Seaton Park in 1983 (Figure 3c). There was, however, a carry over effect from the 1982 season on the liveweight of the herbicide treated and high stocked (10/ha) animals. These animals entered the 1983 season with a 4 kg less liveweight and this difference was maintained throughout the year.

There was no effect of herbicide treatment on the liveweight of sheep on Daliak, however, there appears to be an effect of stocking rate from late June to September (Figure 3a).

There was a marked interaction between stocking rate and herbicide treatment for animals grazing on Geraldton pasture. At 10/ha there was no effect of herbicide, however at 7.5 ha there was a marked effect associated the carry over from the 1982 season, where the control animals started at 54 kg and the animals on the Kerb® treated pasture started at 46 kg (Figure 3d).

There was a marked herbicide effect and possibly a stocking rate effect on the liveweight of animals grazing on Dinninup. There were some liveweight differences carrying over from 1982 into 1983. The animals on Dinninup responded exactly the same as in 1982. In 1983, however, there was not a pasture availability problem and further points to palatability being a major factor governing intake and hence liveweight gain during winter. The point of liveweight gain was once again associated with early spring and the period just prior to flowering (Figure 3b).

Wool growth in 1982 was significantly affected by stocking rate ($p < 0.05$), and not herbicide treatment. In 1983, sheep on sprayed Dinninup pasture had lower wool growth than those on the unsprayed control (Table 10).

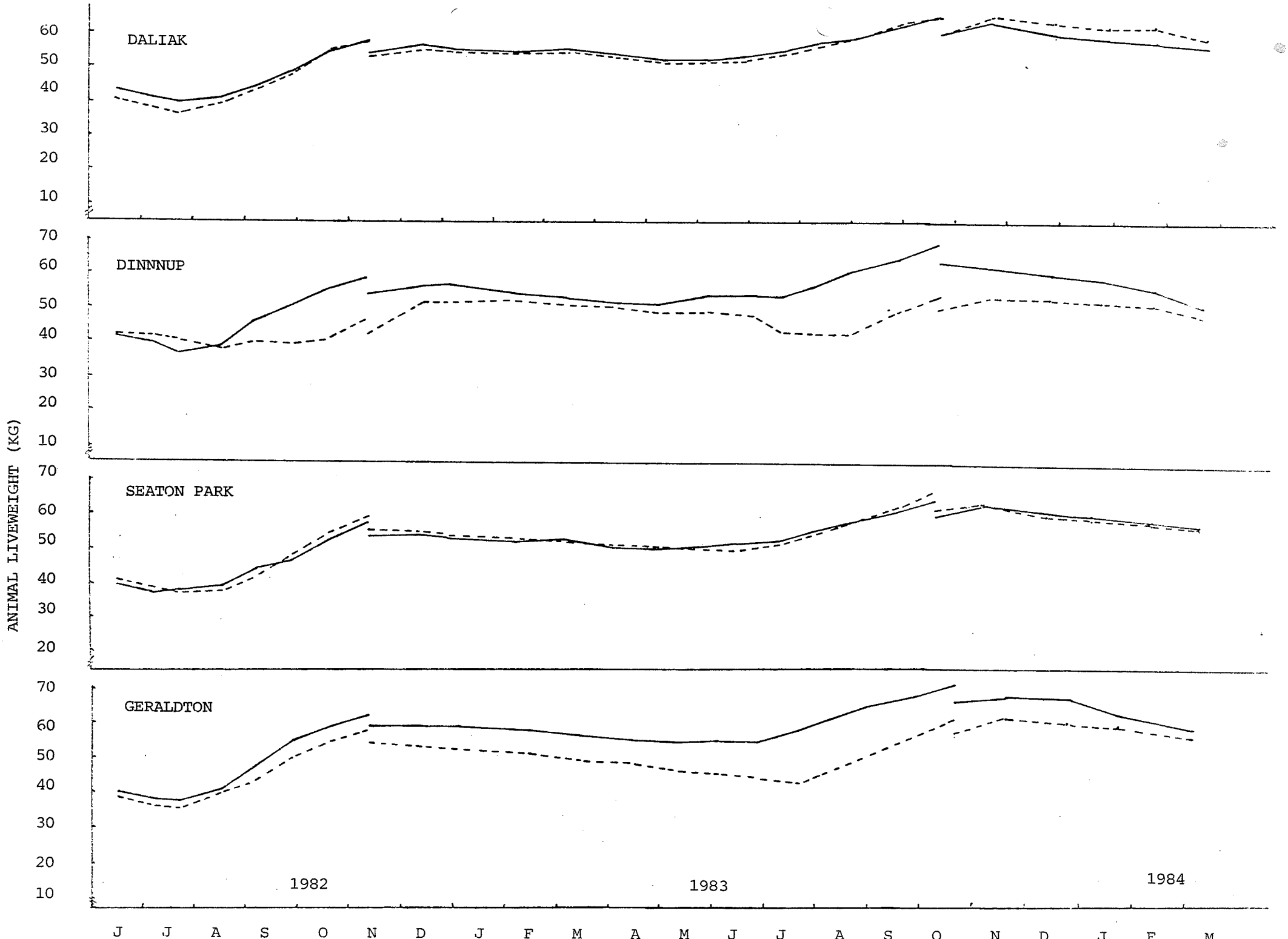

DALIAK
DINNNUP
SEATON PARK
GERALDTON
ANIMAL LIVEWEIGHT (KG)
10
20
30
40
50
60
70
1982
1983
1984
J J A S O N D J F M A M J J A S O N D J F M

Table 10: Wool growth in 1982, 1983 for sheep grazing four clover cultivars, treated and untreated with herbicide to give annual grass control.

Herbicide	- Kerb®				+ Kerb®			
Year	1982		1983		1982		1983	
Stocking rate	7.5	10	7.5	10	7.5	10	7.5	10
Cultivar								
Seaton Park	3.9	3.4	5.2	4.5	3.8	3.5	4.8	4.6
Daliak	3.5	3.4	4.8	4.2	3.8	3.5	4.9	4.7
Geraldton	3.8	3.8	4.8	4.1	3.8	3.5	4.2	4.2
Dinninup	4.2	3.7	4.9	5.1	3.6	3.5	3.9	4.5

Standard Errors		1982
Cultivar	±	0.14
Stocking Rate	±	0.10
Kerb	±	0.09

1983 Crop Production

The crop in 1983 was sown to Eradu on May 19, after the area had been sprayed with Sprayseed® and Banex®. The untreated plots were observed to have a large silvergrass infestation, which was thought to be due to the single cultivation at seeding tickling up the silvergrass. Due to the lack of a suitable herbicide to remove silvergrass; no spraying was done. A small amount of sub clover regenerated under the crops and was sprayed out with Banex and Buctril®. Plot 21 (Seaton Park) had a large residue of grass at seeding and this prevented adequate combine penetration, as a result poor wheat establishment occurred.

Sheep broke through a gate and ate some of plot 29. White heads were observed late in the season on some of the untreated plots.

Total soil nitrogen levels were slightly higher in the sprayed Dinninup pastures at both stocking rates. There was little difference between the sprayed and unsprayed treatments for the other 3 cultivars. Soil pH and organic carbon levels were similar for all cultivars and treatments. There was a marked increase in available NH_4^+ and NO_3^- in the unsprayed cultivars stocked at 10/ha (Table 11).

Table 11: Soil Analysis 1983

Herbicide	- Kerb®							
Stocking Rate	7.5				10.0			
Soil Analysis	pH	Organic Carbon %	Total Soil nitrogen %	Available $NH4^+$+ NO_3- ppm	pH	Organic Carbon %	Total Soil nitrogen %	Available $NH4^+$+ NO_3- ppm
Seaton Park	5.8	5.3	0.29	25	5.8	4.3	0.22	35
Daliak	5.7	5.1	0.27	28	5.7	4.6	0.24	41
Geraldton	5.7	5.7	0.29	35	5.6	6.0	0.30	25
Dinninup	5.6	4.8	0.27	28	5.7	5.2	0.29	58
$\bar{x}$	5.7	5.2	0.28	29	5.7	5.0	0.26	40
	+ Kerb®							
Seaton Park	5.7	5.6	0.29	31	5.7	4.7	0.25	32
Daliak	5.7	4.9	0.25	29	5.7	4.0	0.20	27
Geraldton	5.7	5.2	0.27	23	5.6	4.9	0.25	28
Dinninup	5.6	5.7	0.32	23	5.5	5.8	0.31	33
$\bar{x}$	5.7	5.3	0.28	26	5.6	4.8	0.25	30

Anthesis dry matter was collected by taking five sections of 2 rows x 0.5 m per 50 m plot. Whole plants were pulled and the tops separated from the roots. The roots were used to estimate the level of take-all (Gauemannomyces graminis). There was a marked anthesis dry matter response to nitrogen even though the soil levels of nitrogen were high (Table 11). There also appeared to be an effect of cultivar on the nitrogen response with Dinninup having a higher anthesis dry matter than the other cultivars. There was a herbicide effect on anthesis dry matter. This was presumably due to the increased grass weeds in the unsprayed control plots compared to the Kerb® treated plots. There also appeared to be a relationship between previous stocking rate and weed levels in the crop, with less grass in the plots previously stocked at 10/ha.

Wheat grain yields were poor in the areas not manipulated to remove grass weeds the previous season. The sprayseed/direct drill technique failed due to secondry germinations of silvergrass and to some extent ryegrass. In future years a light working two weeks prior to seeding may be necessary to eliminate this problem.

Table 13: Crop grain yield (t/ha) for four cultivars of sub clover previously at 7.5 and 10.0 sheep/ha and sprayed to controlled grasses.

Herbicide	- Kerb®				+ Kerb®			
Cultivar	Seaton Park	Daliak	Geraldton	Dinninup	Seaton Park	Daliak	Geralton	Dinninup
Stocking rate				7.5/ha				
Rate of Agran (34.0) (kg/ha)								
0	-	0.4	0.8	0.7	1.3	1.0	2.0	2.1
34	-	0.6	0.9	1.5	1.5	1.0	2.1	2.0
68	-	0.6	0.8	1.0	1.4	0.9	2.3	2.2
136	-	0.5	1.0	0.9	1.6	1.2	2.3	2.2
272	-	0.6	1.1	1.2	1.9	1.3	2.3	2.4
408	-	0.7	1.3	0.9	2.1	1.4	2.5	2.1
Stocking rate				10.0/ha				
0	0.5	0.5	0.8	1.1	0.8	1.2	0.8	1.4
34	0.6	0.5	0.8	1.1	0.9	1.2	1.1	1.5
68	0.5	0.5	0.9	1.0	0.9	1.3	0.8	1.6
136	0.6	0.6	1.3	1.3	1.1	1.4	1.4	2.2
272	1.0	0.8	1.1	1.6	1.0	1.4	1.1	1.6
408	0.9	0.6	1.3	1.2	1.3	1.3	1.3	1.8

CONCLUSIONS

- The use of herbicides to remove annual grasses resulted in lower pasture production in the initial spraying year, however, losses were less evident in the following year. This was reflected in the 1983 liveweights, where 1982 liveweight carryover differences were the major factor affecting liveweight trends. Poor pasture performance in 1982 was associated with poor clover establishment density.

- Kerb® gave excellent grass control in 1982 and this was carried over to 1983, however, some annual ryegrass did regenerate. There appeared to be little difference in digestibility between the sprayed or unsprayed treatments, however, there were marked differences in protein content. The pure sub-clover (Kerb treated) plots had a higher protein content than the unsprayed controls. Dinninup had a higher protein content than the other 3 cultivars in December but by February there was little difference between cultivars in terms of protein content.

- Pastures regenerated well in 1982 and sub clover density was high.

- There was a crop response to nitrogen on all plots even though the soil nitrogen levels were high. Silver grass presented a major problem on the unsprayed control plots and reduced yield.

- Due to he extreme site variability and lack of replicates makes the intrepretaion of the data difficult.

These were no real marked response to added nitrogen even though early in the season marked visual differences were noted. Grain yields from Dinninup plots appeared to be slightly above that of the other cultivars. The yield increases associated with pasture manipulating the previous year with kerb may have been a result of direct weed level differences or take-all differences. Due to the large effect silvergrass had on the trial results, interpretation of the major effects is impossible.

Table 12: Anthesis dry matter (t/ha) for four cultivars previously stocked at 7.5 and 10/ha and sprayed to control grasses.

Herbicide	- Kerb®				+ Kerb®			
Cultivar	Seaton Park	Daliak	Geraldton	Dinninup	Seaton Park	Daliak	Geraldton	Dinninup
Stocking rate				7.5/ha				
Rate of Agran (34.0) (kg/ha)								
0	-	1.0	1.4	1.0	1.5	2.5	2.7	3.2
34	-	1.0	1.2	1.3	1.3	2.6	3.3	2.9
68	-	1.1	1.8	1.2	1.5	2.5	3.2	3.1
136	-	1.1	1.7	1.2	1.5	2.8	3.8	3.1
272	-	1.5	1.8	1.7	2.0	3.0	3.6	3.6
408	-	1.7	2.4	2.0	2.9	3.6	3.9	3.3
Stocking rate				10/ha				
0	1.0	0.8	1.5	1.4	1.6	1.9	1.1	2.3
34	1.5	0.7	1.4	1.7	1.4	2.2	1.2	2.4
68	1.6	0.8	1.9	2.5	1.9	2.4	1.2	2.7
136	1.5	1.0	2.2	2.2	2.4	2.5	1.6	3.3
272	2.1	1.2	2.2	2.7	2.1	2.6	1.4	2.9
408	1.7	1.1	2.5	2.7	2.5	2.1	2.1	3.7