THE USE OF WEEDKILLERS IN RELATION TO FAT LAMB PRODUCTION

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CLOVER damage following the use of hormone weedkillers can be serious in establishing pastures and clover seed crops. No great concern has been felt over temporary suppression in general grazing pastures, especially where this has been minimised by prior hard grazing and careful application.

During the summer of 1954 reports became current in Otago and Southland that lambs grazing pastures sprayed with hormone weedkillers during the spring were not thriving and that drafting percentages and carcass weights had fallen below expectation. Several observations involving trial weighings of lambs from treated and control areas came to the notice of the writer in which the evidence for stock deterioration appeared undeniable. All available evidence indicates that 2,4-D and MCP are harmless to animals when applied at normal rates. Cattle, sheep, and horses grazed exclusively on vegetation treated with these chemicals have shown no ill effects. Direct toxicity to stock was, therefore, discounted (1).

The weedkillers widely used for the control of thistle species in pasture, MCP and 2,4-D formulations, are known to damage clover species. Initially it was assumed that a decrease in the clover content of the pasture with consequent lowering of its nutritive value was primarily the cause of the trouble. What was not clear, however, was the effect of a reduction in clover content on the total feed available for grazing and whether under conditions of uniform stocking in these trials a feed shortage had developed. A trial was laid down at Invermay Research Station in October 1955 to investigate these points.

EXPERIMENTAL AREA

A 12-acre area of apparent uniformity was divided into three 4-acre blocks of highly productive ryegrass-cocksfoot-dominant pasture of unknown age. White clover only was present and apart from a light infestation of Californian thistle the area was weed free. Point analysis of the sward prior to spraying showed that two blocks were identical in clover content (30 per cent.) and that the third was somewhat lower (23 per cent.). To ensure that at least one of the intended treatments would initially be comparable with control it was decided to depart from a random allotment of treatments to areas. To maintain the stock numbers needed for experimental purposes the pasture was spelled and at the time of spraying was 4in. to 6in. high.

SPRAY TREATMENTS

Salts of MCP have been shown to be particularly severe on seedling white clover, but at maturity little or no damage is said to occur (2). Esters of 2,4-D on the other hand, although not so severe at the seedling stage, are less suitable for application to mature pastures. The ethyl ester of 2,4-D and the potassium salt of MCP were selected for trial primarily because of their wide use in practice. Possible differences in sward composition on the treated areas resulting from varying toxicity were also sought which might aid in assessing the effect of

clover intake on lamb growth. Both were applied at 5/11/55 at 1lb. acid equivalent per acre in 10 gallons of water.

STOCKING

The area was stocked at 8/11/55 with Romney ewes with lambs at foot. The lambs at this time were approximately 2 months old and all were of similar age. Each block received 32 ewes and 33 lambs apportioned at random, giving a stocking rate of 8 ewes plus lambs per acre. A final adjustment ensured that equal numbers of twins occurred on each block. Dry ewes were used to equate carrying capacity throughout the period of the trial. The grazing period ceased 2 months later at weaning at 10/1/56. Lambs were weighed monthly and at weaning were drafted under normal commercial conditions.

PASTURE PRODUCTION AND COMPOSITION

Total production was measured by frame enclosures. Changes in sward composition were recorded by monthly point analysis, the results being checked against the botanical analysis of herbage cut from the frames. This latter technique would more truly represent the species intake of the grazing animal. Satisfactory agreement in trends was found between the two methods.

A uniformity cut preceded spraying and because of poor summer growing conditions only two further frame cuts were made prior to weaning.

RESULTS

Ample rain fell in November, the month following application of the treatments, and cattle were necessary to control excess feed on all areas. A prolonged dry spell followed for the remainder of the grazing period. Heavy stocking and dry conditions led to a progressive decline in quality and quantity of feed on all areas and consequently lamb liveweight gains were below normal. Conditions were, however, typical of those to be seen elsewhere on the Station and in Otago generally.

As the pasture was not grazed prior to treatment to reduce clover leaf, marked distortion and discoloration of clovers resulted, 2,4-D appearing more severe than MCP.

In the 30 days following treatment the clover content of the MCP block was reduced 75 per cent., the 2,4-D block 71 per cent., and the control block 28 per cent. From then until weaning, again approximately 30 days, further decreases of 9 per cent., 13 per cent., and 35 per cent., respectively virtually eliminated clovers from the treated areas.

The loss of the clover component of the sward in all treatments through factors of grazing and climate were thus greatly accentuated by both hormone treatments.

Total pasture production was depressed over the grazing period on both treated blocks by some 13 per cent. Much of this can be associated with the loss of the clover fraction, although in the latter half of the period the control area outyielded both MCP and 2,4-D in grass production as well.

The distribution of production is shown in Table 1.

TABLE 1—PASTURE PRODUCTION IN LB. DRY MATTER

Period	Control			MCP			2,4-D		
	Grass	Clover	Total	Grass	Clover	Total	Grass	Clover	Total
9/11/55— 30/11/55	2,530	280	2,810	3,340	70	3,410	3,030	90	3,120
1/12/55— 5/1/56	2,250	120	2,370	1,080	—	1,080	1,390	10	1,400
	4,780	400	5,180	4,420	70	4,490	4,420	100	4,520

LAMB PRODUCTION

Lamb liveweight gains for the period 7/11/55 to 10/1/56 and corrected for sex ratio are recorded in Table 2.

TABLE 2—LIVEWEIGHT GAINS IN LB.

Period	Control	MCP	2,4-D
7/11/55 — 8/12/55	16.29	13.77	13.03
9/12/55 — 10/1/56	8.84	8.63	7.71
Total	25.13	22.40	20.74

Analysis of variance showed the depression of liveweight gain of 2.73lb. for MCP and 4.39lb. for 2,4-D to be significant at the 5 per cent. and 1 per cent. levels respectively.

DISCUSSION

Significant differences in liveweight gain have been shown to have occurred on pasture differing in grass/clover ratio and differing in total herbage production. Both these factors singly or in combination could have led to the observed differences in liveweight gain. Examination of the distribution of the occurrence of these factors in relation to the growth curve of the lambs leads to definite conclusions.

It will be noted in Table 2 that the greater part of the liveweight differential appeared at the end of the first month of grazing under conditions of abundant growth and where total feed intake was not a limiting factor. At this time marked clover suppression was occurring and the clover contribution to feed intake was being reduced by some 60 to 70 per cent. on treated areas (Table 1).

In the second month, although total production on the control block exceeded that of the treated areas, comparable liveweight gains suggest that feed availability had not yet become a limiting factor. Further, although clover contribution in treated areas was by now negligible, the control area was itself without appreciable clover, insufficient, in fact, to alter the nutritive value of the diet. Further differences in liveweight gain did not, therefore, develop.

It seems probable that the nutritive quality of the higher clover control pastures at a time of total feed adequacy was associated with the better performances of the stock on that area and that later declines in total pasture production on treated areas were insufficient to account for lower over-all liveweight gains.

CONCLUSION

This trial was not conducted to show that lambs thrive on clover. It does indicate that the control of weeds should not become an end in itself. Certain hormone weedkillers are known to cause clover damage. This damage has been somewhat lightly regarded as being of a temporary nature and justified by the necessity to control weed growth. Suppression of clovers, resulting in a reduction of their contribution to the feed intake of the grazing animal may occur in a period, however temporary, when those pastures are required for a specialised use. If, as in lamb fattening, the nutritive value of the pasture is related to the grass/clover balance a serious productive loss can result. This loss is not recovered by the passing of the temporary phase.

The duration of clover suppression in mixed pastures, and its long-term effect on production is still being studied, and the situation clearly demands careful selection of material, time, and method of application if production losses are to be avoided.

REFERENCES

1. Ling, L. Weed Control by Growth Regulating Substances, FAO Agricultural Study No. 13, 1951.
2. Maclean, S. M., et al. Tolerance of Clovers to Weedkillers, New Zealand Journal of Agriculture, 90:450, 1955.

DISCUSSION

Q.—(1) Were the areas closely grazed before spraying? (2) Would autumn spraying be the answer?

A.—(1) Heavy stocking was necessary to investigate lamb weight gains and satisfactory feed was required initially, so that close grazing before spraying could not be carried out. (2) The trial was to investigate problems that had arisen through spring spraying, which is a standard practice.

Comment: (1) Pastures were virtually weed free in the above trial. (2) Defoliation through grazing before spraying does not necessarily reduce clover damage.

Q.—With higher clover population in the pasture would one get comparable results?

A.—Not certain. The clover content of control did fall sharply. If it had not, the differences in lamb weight gains could have been greater still.

Q.—Were the clovers mainly white?

A.—Yes. White clover was the only species present.

Q.—Were the cattle as carefully selected as the sheep when used in the spring flush?

A.—Equal care was taken. Seventeen cattle were required for only a very short period.

Comment: A trial in Southland gave similar results.

Q.—Are the results statistically correct without having replicated treatments?

A.—It is difficult to replicate stock trials. One increases the number of stock in a given treatment rather than number of replicates, for example, 30 sheep were used. Fewer would not do. They were selected for age and corrected for sex ratio on a statistical basis. Fencing, watering, gates for access, etc., cause difficulties in replication.

Comment: These were the results from only one trial and under one set of seasonal conditions. Such trials would have to be continued over a number of seasons to obtain significant results.