NEW ZEALAND GRASSLAND ASSOCIATION.

REVIEW OF TOPDRESSING IN THE AUCKLAND PROVINCE.,

P.W. Smallfield, Department of Agriculture, Hamilton.

Topdressing is the basis of Auckland farming; of the four million acres in sown grass in the North Auckland and Auckland Land Districts, one and three--quarter million acres were topdressed in 1937 and these topdressed pastures produce the bulk of Auckland's butterfat and fat stock - farm production has followed the manure bag.

The Waikato was, I think, the first district to adopt topdressing as a farm practice; and the first attempt at pasture improvement by topdressing was probably made in the early "eighties" on old grassland near Cambridge. Early Waikato topdressing was done with a mixture of superphosphate, bonedust and rock phosphate, but no extensive topdressing was carried out until the dairy industry was properly established early in the present century. The first cargo of basic slag arrived in New Zealand in 1892 and the fertiliser soon proved its value as a rejuvenator of old pastures'; by 1900 top-dressing was becoming-a recognised'practice in the Waikato and the fertilisers used were slag or a mixture of equal parts super, bonedust and rock phosphate. Importations of slag rose from 4,000 tons in 1909 to 30,000 tons in 1914 and during this period slag was extensively used for topdressing, During the war topdressing was still practised, but as the war progressed supplies of slag were cut off and it was during the war year's that superphosphate became increasingly popular as a topdressing fertiliser.

From 1919 to the present time the practice of

topdressing has shown remarkable expansion; North Auckland, Bay of Plenty and Rotorua Districts have adopted topdressing and improved methods of grassland management as general farm practices. Superphosphate has continued to be increasingly popular for topdressing, but slag and rock phosphates have retained a place, Lime has become cheaper and liming more common; attention is now being paid to potash topdressing; but the use of nitrogenous fertilisers to provide special feed during the winter and early spring has been adopted only to a very limited extent indeed. The areas topdressed in North Auckland and Auckland Land Districts during the twelve months ended 31st January 1937 were:

	North Auckland. (acres)	Auckland. (acres)
Fertilisers only ,	362,302	685,526
Lime only	18,141	27,773
Fertilisers and lime	188,702	424,927
	569,145	1,138,226

The farmers' problem in topdressing is to decide on the type of phosphate to use and whether lime and potash are necessary additions to the phosphatic dressing. .The requirements necessarily differ on various soil types and to assist the farmer the Fields Division of the Department of Agriculture has laid down a large number of observational topdressing plots on all the important soil types in the Auckland Province, The main trials have aimed at securing data on the response from lime, superphosphate and potash on the various types of soil; other trials have been conducted to test the efficiency of various types of phosphatic fertilisers as well as responses to lime and potash, At laying down the plots have been treated as follows (1) carbonate of lime 1 ton per acre (2) phosphates 3 cwt. per acre (3)30% potash salts 2 cwt. per acre; thereafter

the plots received annual dressings of 3cwt. of phosphates, 5cwt. of lime and 2 cwt. of 30% potash salts, The method adopted to indicate the nature of the differences has been to award points based on visible responses as compared with 'no manure' as follows: 0, no visible response; ? doubtful response: 1 slight response: 2, fair response: 3, good response: 4, very good response: 5, excellent response: half points are also used, e.g. $1\frac{1}{2}$ = slight to fair,

The responses to fertilisers for the more recent trials are given in tables in the appendix. Lime responses have varied with the maturity of the soil. The young soils (volcanic ash showers) of the Bay of Plenty and Central Plateau do not respond to lime, the slightly podsolised soils of the Waikato give a slight'response and the mature podsols and red brown soils of South and North Auckland give marked lime responses. North Auckland started phosphatic topdressing before there were good transport facilities and supplies of reasonably priced lime and North Auckland has always been a fairly large user of slag and rock phosphates. On the lime responsive soils of North and South Auckland, slag alone is better than super alone, lime and super is generally better than slag alone-, super and lime and slag and lime are about equal, although there is an indication that slag and lime may be slightly better than super and lime. Except for the Waihi district and some peat soils of the Waikato, potash responses are not very marked in Auckland, On some sandy peats and mature podsols in North Auckland potash appears necessary and in the Waikato lime, super and potash have given slightly better results than super and lime.

These observational. topdressing plots have, and will continue to serve, a very useful purpose. They have indicated major soil deficiencies, but with the progress of

topdressing practice and the advancement of soil survey work a more accurate measure of soil response to fertilisers is required. These observational plots do not measure small differences in production and give no measure of total production, or that important and rather elusive factor of quality or palatability or feeding value. The statements that feed from slagged pastures is of better feeding value than from pastures dressed with super., that potash may improve feeding value without increasing production warrant investigation. These latter problems require investigation at research stations, but for the major soil response survey the time has come for simple experiments that will give some definite measure of production. This need is becoming increasingly apparent with the advancement in soil survey work and progress in soil chemistry necessitates improvement in the field technique of measuring fertiliser responses on grassland - the chemist cannot be expected to perfect methods of soil examination for the availability of plant nutrients unless the fields experimenter can supply definite figures of plant production.

The field experiments must be simple, there must be many of them and they must cover a very wide range of soils. The first attempts to measure responses were carried out by mowing pastures with a lawnmower and because the pasture sward changed under this method it was abandoned in favour of Hudsons well known mowing and grazing technique; this method has the disadvantage of transference of fertility from plot to plot and the extent of this transference is now under investigation at Ruakura. . . . . .

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was abandoned without just cause; the pastures certainly became clovery but with the use of improved strains of ryegrass and white clover the sward does not deteriorate to any very great extent; the sward certainly does not become a mass of flat weeds as in the early trials. The regularly mown and ungrazed swards may not be identical in composition with a grazed sward, they tend to get clovery, but I suggest that for a manurial response survey for pasture work the more clovery the pasture the better. 'For what is the index plant in topdressing? Why, white clover. White clover is the first plant to reflect to application of phosphates, potash and lime. If white clover grows vigorously the grasses grow vigorously and a productive pasture is obtained. I feel that the next stage in measuring fertiliser responses in topdressing is to replace observation by cutting and weighing dominantly white clover swards. The trials would not give the full measure of pasture production but they would be a step forward and the results should be more accurate than observation and would certainly be of considerable help to the soil chemist, Pedologists, chemists and agricultural instructors are all interested in this matter; definite plans should be made' for improvement of the technique of manurial response survey work,

I divide topdressing experiments into two classes: first, those that must'be done at institutions, i.e. grazing experiments - experiments to measure butterfat production and the fattening qualities of pastures, and there is a very definite need for these experiments to be started; second, there are the co-operative experiments with farmers and these are definitely the most important. They may be placed on a variety of soil types and they are the most practical means of influencing topdressing

practice; in this class come the observational topdressing plots which have been discussed in this paper. These I desire to see continued and extended but as I have already stressed they should be accompanied by simple mowing experiments to give a definite measure of fertiliser response. I believe that white clover growth is a satisfactory index of fertiliser response and this should be measured; it does not tell the whole story of production but will I think give valuable additional information to that furnished by the observational plots.

APPENDIX - TABLES OF RESPONSES TO FERTILISERS.

TABLE. I.

Responses to Fertilisers : Bay of Plenty.

Trial	Soil Type	Responses to Fertilisers : 0, no response: ?, doubtful: 1, slight: 2, fair: 3, good : 4, very good: 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/1 20	Sandy loam	?	2	0	3	2	2
121	" "	0	3	?	3	3	3
124	" "	0	3	0	3	3	3
139	" "	0	3	0	3	3	3
140	" "	0	3	0	3	3	3
141	" "	0	3	?	3½	3½	4
I 62	" "	1	3	0	4	3	4
176	" "	2	3	0	4	3	4
201	" "	1	2	0	2	2	2
240	" "	½	2½	½	2½	2½	3
254	" "	0	2	0	2	2	2
255	" "	0	2½	0	3	3	3
256	" "	1	3½	½	4	4	4
257	" "	½	3	½	3½	3½	3½
258	" "	½	4	0	4	4	4½
261	" "	?	1½	?	2	2½	3½
274	" "	0	2½	?	2½	2½	3
275	" "	0	1½	0	1½	1½	1½
283	" "	½	2	?	2½	2½	2½
362	" "	0	3½	0	3½	3½	3½
288	Gravelly sand	0	2	0	2	2	2
276	Peat	?	½	?	2	1½	2

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TABLE II.

Responses to Fertilisers : Central Plateau,

Trial	Soil Type	Responses to Fertilisers : 0, np reponse: ?, doubtful: 1, slight: 2, fair: 3 good: 4 very good: 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
I 6/1/156	Sandy loam	1	4	1	3½	3½	3½
188	" "	1	2½	½	3	3	3½
189	" "	-1	3½	1½	3½	4	4
190	" "	?	3	1	3½	3	3½
191	" "	-2	3	0	3½	3	3
203	" "	-1	2	1	3	4	3½
206	" "	1	3	1	3	3½	3
207	" "	-⅕	3	⅕	3	3	3
209	" "	1	3	½	3	3½	3½
2-10	" "	1	2½	?	2½	3	2½

TABLE III.

Responses to Fertiliser : Waikato

Trial	Soil type	-Responses to Fertilisers : 0, no response: ?, doubtful: 1 slight: 2, fair: 3, good: very good 5 excellent response.					
		Limo	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash-
16/1/243	Hamilton clay loam	1	2	1	2	3	3½
25.1	" "	1	3	1	3½	3½	4
252	" "	½	1	½	1	1	1
422	" "	½	2½	½	2½	3	3
423	" "	1	2	1	2½	2½	3
239	Horotiu sandy Loam	½	1½	1½	2	3	3
342	" "	½	1½	2	2	3	4
346	" "	½	2½	½	2½	3	3
374	" "	1	1½	½	2	2	2½
376	" "	½	1	1½	1½	2½	3
343	Whatawhata clay loam	½	2	½	2	2	2½
404	" "	1	2	½	2½	2½	
235	Te Kowhai loam	½	1	½	1½	1½	1½
236	" "	1	1½	½	2	2	2½
344	" "	½	1½	1	1½	2	2
375	Rotokauri clay loam	1½	2½	½	3	3½	3½
377	" "	1	1½	½	2	2½	2½
378	" "	1½	2½	1	3	3	3½
387	Ohaupo silt loam	1	2	2	2½	3	3
391	" "	1	2	½	2½	2½	3½
393	" "	1	1½	½	2	2	2
394	" "	1½	2	2	2½	2½	3
242	Peat	½	1½	1	2½	2½	3
352	"	½	1½	2	2	3	3½
389	"	½	1½	3½	1	4	4
390	"	½	1½	½	1	1	1
421	"	1	1½	½	1½	2½	2½

TABLE IV.

Responses to Fertilisers : South Auckland,

Trial	Soil type	Responses to Fertiliscrs : 0, no response: ?, doubtful: 1 , slight: 2, fair: 3 good : 4, very-good:. 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
I 6/1/263	Silt	0	3	0	3	3	2½
177	Red brown soil	3	2	?	4	2	4
178	" " "	?	1	0	1	1	1
198	" " "	?	?		1	?	1
246	" " "	0	½	2	½	3	3
279	" " "	1½	2½	?	4	2½	4
282	" " "	1	2½	0	3	2	2
285	" " "	1½	1½	0	3	1½	2
311	" " "		½	2	1	2	3
313	" " "	-	1½	0	3	2	3
314	" " "	-	½	0	½	1	1
167		1	1	0	2	1	2
169	Clay	3	3	?	3	?	3
195	"	3	1		4	1	4
			2	0	2½	1	4
258	"	2	3½	0	4½	4½	4½
245	Loam	½		1½	½	2½	2½
			1	-1	3	2	2
249	"	?	3	0	2	2	2
289	"	½	0	1½	1	2	3
247	Sand	0	1	1½	1	2	2½

TABLE V.

Responses to Fertilisers : North Auckland.

Trial	Soil Type	Responses to Fertilisers : 0, no response: ?, doubtful: 1, slight: 2, fair: 3, good: 4, very good: 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/94	Silt	0	2	1	4	3	4
147	"	1	1½	?	2	3	5
181	"	1	2	1	3	2	4
297	"	1	2½	0	5	2½	4
298	"	1	2	0	3½	2	3½
317	"	1	1	2	2	2½	3
373	"		1½	0	2½	1	3½
384	"		2	½	3½	2	4½
160	Red brown soil	2	2	0	4	3	4
180	" " "	1	2	?	3	3	4
184	" " "	2	2	?	3	1	3
266	" " "		2	0	2½	2	3½
267	" " "		1½	½	2½	2	3½
269	" " "		2	0	3	2	3
271	" " "	½	1½	½	2	2	2½
316	" " "	1	2	1	3	2½	4
383	" " "		2½	0	4½	2½	2½
385	" " "		2	0	3	2	3
427	" " "		1½	0	2½	2½	3
428	" " "		1½	0	2½	2½	3
431	" " "		2	0	3	2½	4½
432	" " "		1½	½	2	1½	3
492	"		2	0	3	2½	3
98	Clay	0	1	?	3	3	5
132	"	1	1	1	3	2½	4½
183	"	4	3	0	5	2	3
185	"	2	1½	0	3½	2½	4
260	"	1½	2	0	3	2	4
265	"		3½	0	4½	3	5
278	"		2	0	2½	2	3
280	"		2	0	3	2	3
290	"	1	2	0	3	2½	4
293	"	0	2	0	2	2	3
315	"	1½	2	0	3	2	4
291	Loam	½	3	0	3½	3	4
292	"	?	2	0	2	2	3
294	"	1	4	0	5	4½	5
295	"	½	3½	0	4	3½	4½
268	Sand		2½	0	3½	3	4
281	"		3	0	3½	3	4½
270	Sandy peat	½	4	1	4	4	4½
284	" "		2	0	3	3	4

TABLE VI.

Responses to Fertilisers : North & South Auckland.

Trial	Soil Type	Responses to Fertilisers : 0, no response: ?, doubtful: 1, slight: 2, fair; 3, good: 4, very good: 5, excellent response.						
		Slag	Super	Lime + Super	Lime + Slag	Lime + Super+ Potash	Lime+ Slag+ Potash	Potash
16/1/373	Silt	2½	1½	2½	3½	3½	4½	0
384	"	3½	2	3½	3½	4½	5	½
266	Red brown soil	2½	2	2½	2½	3½	3½	0
267	" " "	3	1½	2½	3	3½	4	½
269	" " "	2	2	3	3	3	3½	0
311	" " "	0	1	1	0	3	1½	2
313	" " "	2	1½	3	3	3	3	?
314	" " "	0	½	½	0	5	5	1
383	" " "	2	½	2½	2½	2½	3½	0
385	" " "	2½	2½	3	3	2½	4½	½
427	" " "	2½	½	2	3	2½	3½	0
428	" " "	2	1½	2½	3	3	3½	0
431	" " "	2	1½	2½	2½	3	3	0
432	" " "	3	2	3	4	4½	4½	0
492	" " "	2½	1½	2½	3	3	3½	½
265	Clay	2½	1½	2½	3	3	3½	0
278	"	2½	2	3	3	3	3	0
280	"	4	3½	4	4½	4	4½	0
318	"	4	4	4½	4	4½	4½	0
284	Sandy peat	2½	2	3	3	5	5	1

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APPENDIX - TABLES OF RESPONSES TO FERTILISERS.

TABLE I.

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		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/120	Sandy loam	?	2	0	3	2	2
121	" "	0	3	?	3	3	3
124	" "	0	3	0	3	3	3
139	" "	0	3	0	3	3	3
140	" "	0	3	0	3	3	3
141	" "	0	3	?	3½	3½	4
162	" "	1	3	0	4	3	4
176	" "	2	3	0	4	3	4
201	" "	1	2	0	2	2	2
240	" "	½	2½	½	2½	2½	3
254	" "	0	2	0	2	2	2
255	" "	0	2½	0	3	3	3
256	" "	1	3½	½	4	4	4
257	" "	1½	3	½	3½	3½	3½
258	" "	1½	4	0	4	4	4½
261	" "	?	1½	?	2	2½	3½
274	" "	0	2½	?	2½	2½	3
275	" "	0	1½	0	1½	1½	1½
283	" "	½	2	?	2½	2½	2½
362	" "	0	3½	0	3½	3½	3½
288	Gravelly sand	0	2	0	2	2	2
276	Peat	?	½	?	2	1½	2

TABLE II.

Responses to Fertilisers : Central Plateau.

Trial	Soil Type	Responses to Fertilisers : 0, no reponse: ?, doubtful: 1, slight: 2, fair: 3 good: 4 very good: 5, excellent response. Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/156	Sandy loam	1	4	1	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$
188	" "	1	$2\frac{1}{2}$	$\frac{1}{2}$	3	3	$3\frac{1}{2}$
189	" "	-1	$3\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$	4	4
190	" "	?	3	1	$3\frac{1}{2}$	3	$3\frac{1}{2}$
191	" "	-2	3	0	$3\frac{1}{2}$	3	3
203	" "	-1	2	1	3	4	$3\frac{1}{2}$
206	" "	$-\frac{1}{2}$	3	1	3	$3\frac{1}{2}$	3
207	" "	1	3	$\frac{1}{2}$	3	3	3
209	" "	1	$2\frac{1}{2}$	$\frac{1}{2}$	3	$3\frac{1}{2}$	$3\frac{1}{2}$
210	" "	1		?	$2\frac{1}{2}$	3	$2\frac{1}{2}$

TABLE III.

Responses to Fertiliser : Waikato

Trial	Soil type	Responses to Fertilisers : 0, no response: ?, doubtful: 1 slight: 2, fair: 3, good: 4, very good: 5 excellent response. Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/243	Hamilton clay loam	1	2	1	2	3	$3\frac{1}{2}$
251	" "	1	3	1	$3\frac{1}{2}$	$3\frac{1}{2}$	4
252	" "	$\frac{1}{2}$	1	$\frac{1}{2}$	1	1	1
422	" "	$\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	3	3
423	" "	1	2	1	$2\frac{1}{2}$	$2\frac{1}{2}$	3
239	Horotiu sandy Loam	$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	3	3
342	" "	$\frac{1}{2}$	$1\frac{1}{2}$	2	2	3	4
346	" "	$\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	3	3
374	" "	1	$1\frac{1}{2}$	$\frac{1}{2}$	2	2	$2\frac{1}{2}$
376	" "	$\frac{1}{2}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	3
343	Whatawhata clay loam	$\frac{1}{2}$	2	$\frac{1}{2}$	2	2	$2\frac{1}{2}$
404	" "	1	2	$\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	
235	Te Kowhai loam	$\frac{1}{2}$	1	$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
236	" "	1	$1\frac{1}{2}$	$\frac{1}{2}$	2	2	$2\frac{1}{2}$
344	" "	$\frac{1}{2}$	$1\frac{1}{2}$	1	$1\frac{1}{2}$	2	2
375	Rotokauri clay loam	$1\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{2}$	3	$3\frac{1}{2}$	$3\frac{1}{2}$
377	" "	1	$1\frac{1}{2}$	$\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{1}{2}$
378	" "	$1\frac{1}{2}$	$2\frac{1}{2}$	1	3	3	$3\frac{1}{2}$
387	Ohaupo silt loam	1	2	2	$2\frac{1}{2}$	3	3
391	" "	1	2	$\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$
393	" "	1	$1\frac{1}{2}$	$\frac{1}{2}$	2	2	2
394	" "	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3
242	Peat	$\frac{1}{2}$	$1\frac{1}{2}$	1	$2\frac{1}{2}$	$2\frac{1}{2}$	3
352	"	$\frac{1}{2}$	$1\frac{1}{2}$	2	2	3	$3\frac{1}{2}$
389	"	$\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$	1	4	4
390	"	$\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	1	1	1
421	"	1	$1\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$

TABLE IV.

Responses to Fertilisers : South Auckland.

Trial	Soil type	Responses to Fertilisers : 0, no response: ?, doubtful: 1, slight: 2, fair: 3 good : 4, very good: 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/263	Silt	0	3	0	3	3	2½
177	Red brown soil	3	2	?	4	2	4
178	" " "	?	1	0	1	1	1
198	" " "	?	?		1	?	1
246	" "	0	4	2	½	3	3
279	" "	1½	23	?	4	2½	4
282	" "	1	2½	0	3	2	2
285	" "	1½	1½	0	3	1½	2
311	" "	-	½	2	1	2	3
313	" "	-	1½	0	3	2	3
314	" "	-	½	0	½	1	1
167	Clay	1	1	0	2	1	2
169	"	3	?	?	3	?	3
195	"	3	I		4	1	4
250	"	2	2	0	2½	1	4
318	"		3½	0	4½	4½	4½
245	"	½	1	1½	1½	2½	2½
249	Loam	?	3	-1	3	2	2
286	"	½	?	0	2	2	2
289	"	½	0	1½	1	2	3
247	Sand	0	1	1½	1	2	2½

TABLE V.

Responses to Fertilisers : North Auckland.

Trial	Soil Type	Responses to Fertilisers : 0, no response: ?, doubtful: I, slight: 2, fair: 3, good: 4, very good: 5, excellent response.					
		Lime	Super	Potash	Lime + Super	Super + Potash	Lime + Super + Potash
16/1/94	Silt	0	2	1	4	3	4
147	"	1	1½	?	2	3	5
181	"	1	2	1	3	2	4
297	"	1	2½	0	5	2½	4
298	"	1	2	0	3½	2	3½
317	"	1	1	2	2	25	3
373	"	-	1½	0	2½	1	3½
384	"	-	2	½	3½	2	4½
160	Red brown soil	2	2	0	4	3	4
180	" " "	1	2	?	3	3	4
184	" " "	2	2	?	3	1	3
266	" " "	-	2	0	2½	2	3½
267	" " "	-	1½	½	2½	2	3½
269	" " "	-	2	0	3	2	3
271	" " "	½	1½	½	2	2	2½
316	" " "	1	2½	1	4	29	4½
383	" " "	-	½	0	2½	2	2½
385	" " "	-	2½	0	3	i·	2½
427	" " "	-	½	0	2	½	3
428	" " "	-	1½	0	2½	1½	4½
431	" " "	-	½	0	2½	2	3
432	" " "	-	2	½	3	2	3
492	" " "	-	1½	0	2½	IQ	3
98	Clay	0	3	1	3	3	3
132	"	1	2	?	3	1	5
183	"	4	1	1	5	3	3
185	"	2	1	0	3	25	4½
260	"	1½	3	0	5	2	3
265	"	-	1½	0	2½	1	3
278	"	-	2	3	3	3	4
280	"	-	3½	0	4	2½	4
290	"	1	2	0	4	2½	2½
293	"	0	2	0	2	2	3
315	"	1½	2	0	3	3	4
291	Loam	?	3	0	4	2	2½
292	"	1	2	0	4½	3	2½
294	"	½	4	0	5	2	5
295	"	½	3	0	3½	3	3½
268	Sand	-	2½	1	3½	3	4
281	"	½	3	?	4	4	4½
270	Sandy peat	-	4	1	4	4	4½
284	" "	-	2	-	3	4	4½

TABLE VI.

Responses to Fertilisers : North & South Auckland.

Trial	Soil Type	Responses to Fertilisers : 0, no response: ?, doubtful: 1, slight: 2, fair; 3, good: 4, very good: 5, excellent response.						
		Slag	Super	Lime + Super	Lime + Slag	Lime + Super + Potash	Lime + Slag + Potash	Potash
16/1/373	Silt	2½	1½	2½	3½	3½	4½	0
384	"	3½	2	3½	3½	4½	5	½
266	Red brown soil	2½	2	2½	2½	3½	3½	0
267	" " "	3	1½	2½	3	3½	4	½
269	" " "	2	2	3	3	3	3½	0
311	" " "	0	½	1	0	3	1½	2
313	" " "	2	1½	3	3	3	3	?
314	" " "	0	½	½	0	5	5	1
383	" " "	2	2½	2½	2½	2½	3½	0
385	" " "	2½	2½	3	3	2½	4½	½
427	" " "	2½	2½	2	3	2½	3½	0
428	" " "	2	1½	2½	3	3	3½	0
431	" " "	2	1½	2½	2½	3	3	0
432	" " "	3	2	3	4	4½	4½	0
492	" " "	2½	1½	2½	3	3	3½	½
265	Clay	2½	1½	2½	3	3	3½	0
278	"	2½	2	3	3	3	3	0
280	"	4	3½	4	4½	4	4½	0
318	"	4	4	4½	4	4½	4½	0
284	Sandy peat	2½	2	3	3	5	5	1

DISCUSSION.

E. B. Levy :

You have heard Mr. Smallfield's paper on topdressing practices in the Waikato and technique in regard to these experiments, I think seeing that we are running late it would be rather better to confine our questions today to the topdressing practices more in relation to the Waikato and allow a more general description on the technique of topdressing experiments after Mr. Syme's paper tomorrow. That is if it meets with your approval and Mr. Smallfield's, we will confine our questions to topdressing practices in the Waikato,

R. B. Tennent :

I am very interested in Mr. Smallfield's paper it is very lucid, very concise, gives the picture very briefly and very clearly. One th ing which is interesting and particularly with reference Lo the Waikato, there may be an explanation for it, but I do not know if there is, and that is there has been a considerable reduction in the use of fertil iser in the Waikato this year. The Waikato has steadily progressed in the use of fertiliser but during the past season the figures for various fertilisers, particularly superphosphate , have gone down in the Waikato and it has occurred to me that probably a large measure that can be bound up by the recent deplorable outbreak of facial eczema, A number of farmers have, Mr. Chairman, thought that the use of fertilisers and the use particularly of superphosphate is encouraging or has been responsible for facial eczema, I think that position should be clarified, In no way could the facial eczema have been attributed to superphosphate. I am afraid that in genera?.. there has been a growing up of late of a consensus of opinion that fertilisers are detriment al to stock. A considerable amount of propaganda has gone round to lead one to that opinion. I bring up that point which is dealing wi th topdressing practice in the Waikato and I would like Mr. Smallfield to just throw a little bit of light and give his opinions as to why there has been this falling off in the use of fertiliser.

E.A. Madden:

In connection with Mr. Tennent's remarks about topdressing I know there have been many occasions where it is thought superphosphate may have played a great part in facial eczema. Well facial eczema was found in the Manawatu district. I went on to one or two farms where large numbers of sheep were badly affected. On one of these farms - they were running sheep only and just a few cattle to control the pastures - one paddock had 5 cwt. lime per acre put on it 6 years or 7 years ago because there had been a suggestion of grass staggers. There had been no other kind of fertiliser used on that farm in the last 30 or 40 years. On the other farm there has been no fertiliser used not even lime and yet both these farms had facial eczema very badly.

G.H. Holford:

I wish to deal mainly with one particular point in regard to recovery of the phosphate we apply. As you know we apply half a million tons of phosphate a year, one of the outstanding things that come up with 40 years topdressing, the recovery of phosphate had been independently greater than 10%. Mr. Connell has told you of the economics of topdressing and what it does

and yet it seems particularly inefficient that we get only 10% of the recovery that we apply. We apply phosphate ultimately for the animal, through the plant to the animal, If we do not recover more than 15% over, that 15% is sown is purely balance for the. soil, Is there any direction in which we can move in order to get a greater recovery of phosphate from the plant to the animal? There must be some indication by way of liming. It was mention&d that we put on,, 1 ton of lime, but on certain soils it may need 2 or 3 tons to bring it up to neutrality, so it seems that possibly the amount of lime may be a factor in 'forming a base which would combine with phosphate in a way that the plant may recover it.

The other point is the use of lime with the phosphate, There is also the question of putting lime in pellet form. These are tho things I think we shall have to consider more, that the recovery of the phosphate we apply is important. I will mention tomorrow what has been done overseas in the granulation of fertilisers. I believe that we have to move along these lines and see what can be done in regard to applying fertilisers on hill country. Some means by which we can save labour.

H.E. Annett:

I am afraid that the seriousness of facial eczema was not realised. There is no doubt whatever there is an indication that the use of fertiliser has something to do with the facial eczema. Firstly a committee was set up and this committee stressed early in July the fact that there was no connection between heavy fertilisation and facial eczema. It is quite obvious that we have had a very heavy outbreak where no fertilisers were used at all. I think that is a point that should receive very wide publicity. Owing to the heavy loss the farmers have so much, feed they do not want to topdress. The farms are understocked. They have not the finance to buy fertilisers. At the time there was no machinery whereby farmers could arrange finance.

P.W. Smallfield:

Mr. Madden and Dr. Annett have covered some of the points raised by Mr. Tennent. From the investigation it is quite definite that facial eczema occurred quite badly on farms that had never been topdressed as it did on farms which had been topdressed. Facial eczema was found in areas that did topdress but there were cases - quite a number of cases - on farms which had not been topdressed where facial eczema was very bad indeed. The falling off of topdressing in the Waikato this year was partly due to facial. eczema and partly due to the additional points that Dr. Annett raised and also there is a further point that' has had a considerable bearing. Our winter was abnormally wet and during the winter there is generally some fertiliser put on, but this winter was so wet that farmers did not put it on. If our production is to continue the manure will have to be put on. There is one point in. topdressing Mr, Kolford raised, that is in connection with hill country pastures. To me the immediate problem in hill country topdressing is not so much the actual application of the manure but to get legumes into pur hill country pastures so that topdressing is profitable. We are conducting a number of experiments along these lines; on poor hill country there has been quite a lot of topdressing done in past years, with quite 'poor results. I am

quite sure that hill country topdressing will progress. Mr. Holford also raised the point about soils that have very high lime requirements. We have in the Auckland Province quite a large number of soils that require very large' applications of lime before you get much response to phosphate, One particular soil north of Dargaville where 3 cwt. superphosphate or 3 cwt. slag will give nothing at all. Add a ton of lime and you get just a response , add 2 tons of lime and you get a good response.