Rothamsted Experimental Station
Harpenden
LAWES AGRICULTURAL TRUST

RESULTS
OF THE
FIELD
EXPERIMENTS
1951

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The summaries given in this report are similar to those contained in the appendices to the Annual Reports of the Station before the war. This year's report includes only experiments conducted at Rothamsted and Woburn. The design and supervision of these experiments are the responsibility of the Field Plots Committee (present members: E.M.Crowther (Chairman), H.V.Garner (Secretary), H.H.Mann, J.R.Moffatt, D.J.Watson, F.Yates).

Price: 5/-

Index 1951

Classical Experiments

Broadbalk	Wheat	A/1
Hoosfield	Barley	A/2
Hoosfield	Wheat after fallow	A/3
Agdell	Rotation	A/3
Barnfield	Mangolds and sugar beet	A/4
Park Grass	Hay	A/5
Hoosfield	Barley - Exhaustion Land	A/6
Woburn	Permanent Wheat	A/7
Woburn	Permanent Barley	A/8

Long Term Experiments

3-Course Rotation	Rothamsted	Ba/1
4-Course "	"	Ba/2
6-Course "	Rothamsted and Woburn	Ba/3
Deep Cultivation Rotation	Rothamsted	Bb/1
Ley and Arable Rotations	"	Bc/1
Green Manuring	Woburn	Bd/1
Ley and Arable Rotations	"	Be/1
Market Garden	"	Bf/1
Irrigation	"	Bg/1

Short Term Experiments*

Wheat	Control of Eyespot rotation	Ca/1
Wheat	Control of Wireworm (1)	Ca/2
Wheat	Control of Wireworm (2)	Ca/3
Wheat	Control of Powdery Mildew	Ca/4
Wheat	Late application of nitrogen	Ca/5
Barley	" " " " "	Cb/1
Spring Oats	" " " " "	Cc/1
Spring Beans	Fertilizer placement	Cd/1
Winter Beans	" " " "	Cd/2
Winter Beans	" " " " (Contact)	Cd/3
Potatoes	Application of dung	Ce/1
Potatoes	Methods of planting	Ce/2
Potatoes	Fertilizer placement	Ce/3
Potatoes	Nitrophosphates	Ce/4
Kale	Fertilizer placement	Cf/1
Lucerne	" " " "	Cg/1
Lucerne-Cocksfoot Ley	" " " "	Cg/2
Permanent Grass	" " " "	Ch/1
Permanent Grass	Nitrophosphates	Ch/2
Sugar Beet	Control of Virus Yellows	Ci/1

Miscellaneous Data

Chemical Analyses of Manures		E/1
Meteorological Records	Rothamsted and Woburn	E/2

* At Rothamsted

WHEAT - BROADBALK 1951

The 108th year

For details of treatments etc see Appendix Y 1950.

Cultivations, etc:

Cropped sections. Ploughed all except dung plots: Aug 24. Dung applied and ploughed in: Sept 8. Autumn application of artificials: Oct 23. Seed drilled at 3 bushels per acre: Oct 25. Spring application of nitrogenous fertilizers: Apr 11. Second dressing of nitrate of soda applied to plot 16: May 8. Harvested: Aug 21. Variety: Squareheads Master (13/4).

Fallow section. Ploughed: Aug 24, Apr 24 and July 9.

Summary of Results

Total Grain: cwt per acre Total straw[*]: cwt per acre

Section	III	IV	V	II	Mean	III	IV	V	II	Mean
Years after Fallow	1	2	3	4		1	2	3	4	
2A	30.7	22.7	21.6	18.9	23.5	48.9	36.9	31.6	29.7	36.8
2B	34.6	23.4	22.3	21.0	25.3	52.8	39.2	33.6	33.4	39.8
3	16.2	8.4	8.4	8.1	10.3	23.2	11.7	11.5	11.0	14.4
5	17.6	8.0	7.8	10.4	11.0	28.9	11.5	11.0	18.9	17.6
6	23.7	10.8	8.8	12.2	13.9	35.9	17.8	15.1	22.9	22.9
7	28.7	17.5	13.2	14.1	18.4	50.7	36.5	27.8	28.7	35.9
8	33.2	23.9	22.3	20.6	25.0	60.0	53.7	42.3	44.8	50.2
9	24.6	17.8	14.2	13.3	17.5	42.2	31.7	27.0	24.3	31.3
10	28.7	19.5	13.8	13.8	19.0	45.0	31.4	23.2	22.3	30.5
11	26.9	15.0	15.2	14.6	17.9	36.1	25.6	24.7	22.5	27.2
12	28.6	20.9	17.6	15.7	20.7	38.4	33.0	29.4	23.7	31.1
13	30.9	15.9	11.9	17.3	19.0	50.0	31.1	23.1	33.2	34.4
14	29.7	15.7	18.4	16.0	20.0	42.8	28.7	28.6	25.0	31.3
15	28.0	13.5	8.1	13.2	15.7	40.3	21.7	12.0	19.9	23.5
16	34.1	22.6	19.5	23.2	24.8	61.8	43.5	39.2	37.8	45.6
17	21.9	8.9	6.7	6.3	11.0	33.4	13.2	7.2	9.9	15.9
18	29.0	14.6	12.5	17.5	18.4	45.9	24.7	22.0	30.3	30.7
19	28.1	14.8	12.5	15.2	17.6	39.0	24.8	19.5	19.5	25.7
20	-	-	-	15.2	15.2	-	-	-	28.0	28.0

[*] Includes straw, cavings and chaff.

BARLEY - HOOSFIELD 1954

The 100th Year

For details of treatments etc. see Appendix Y 1950.

Cultivations, etc.: Ploughed: Sept 4. Dung applied: Feb 1. Fertilizers applied: Apr 21. Seed drilled at 3 bushels per acre: Apr 25. Sprayed with D.N.O.C. 1 gallon per acre: June 26. Harvested: Sept 11. Variety: Plumage Archer.

Summary of Results.

Plot	Total Grain cwt per acre	Total Straw* cwt per acre
1 0	8.5	6.1
2 0	8.0	4.9
3 0	6.9	5.4
4 0	11.1	6.3
5 0	6.0	5.9
1 A	9.9	6.8
2 A	13.1	9.6
3 A	15.1	12.1
4 A	12.8	11.7
5 A	7.5	10.7
1 AA	11.2	9.5
2 AA	19.5	13.0
3 AA	14.5	13.0
4 AA	18.5†	14.5†
1 AAS	14.3	10.6
2 AAS	16.4	13.5
3 AAS	16.5	12.9
4 AAS	19.7†	16.3†
1 C	14.3	11.9
2 C	21.4	14.3
3 C	16.3	11.1
4 C	19.0	13.7
7 - 1	9.8	5.9
7 - 2	21.3	13.2
6 - 1	5.9	4.2
6 - 2	6.8	5.0
1 N	16.2	13.1
2 N	14.0	11.9

*Includes straw, cavings and chaff.

†Estimated from the sum of 4 AA and 4 AAS.

WHEAT AFTER FALLOW - HOOSFIELD 1951

Without manure 1851 and since

For details of treatments etc. see Appendix Y 1950

Cultivations, etc.:
Cropped sections. Ploughed: Sept 14. Seed drilled at 3 bushels per acre: Oct 18. Harvested: Aug 24. Variety: Squareheads Master (13/4).
Fallow section. Ploughed: Sept 14, Apr 23 and July 10.

Summary of Results

Mean yields: cwt per acre

Section	I	II	III	
Years after fallow	1	1	3	Mean
Total grain	8.2	7.8	9.3	8.4
Total straw	12.6	11.9	12.7	12.4

CROPS IN ROTATION - AGDELL 1951

Wheat - 4th crop of 26th course 1948-51

Cultivations, etc.:
Ploughed: Aug 10. Seed drilled at 3 bushels per acre: Oct 19.
Harvested: Aug 20. Variety: Squareheads Master (13/4).

Summary of Results

Mean yields: cwt per acre

Manure to Turnips 1948	None since 1848		Mineral Manure No Nitrogen		Complete mineral and nitrogenous manure	
Rotation	Fallow	Clover	Fallow	Clover	Fallow	Clover
Plot	5	6	3	4	1	2
Total Grain	13.1	9.1	16.8	12.5	16.4	15.2
Total Straw	-*	17.4	24.6	26.8	24.9	25.0

*Weight of straw not available.

For details of treatments and rotation see Appendix Y.

MANGOLDS AND SUGAR BEET - BARNFIELD 1951

The 76th and 6th years

For details of treatments etc see Appendix 7, 1950

Cultivations, etc:
Dung applied: Dec 29. Ploughed: Mar 6. Fertilizer applied: May 23. Seed drilled, mangolds - 9 lb per acre, sugar beet - 18 lb per acre: May 26. Singling commenced: June 27. Top dressings applied: July 19. Mangolds lifted: Nov 23. Sugar beet lifted: Dec 8. Varieties: mangolds - Yellow Globe, sugar beet - Klein E. Seed treated with phenol and magnesium sulphate.

Summary of Results

Yields: tons per acre

Cross Dressings

Strip	O	N	A	AC	C
	Mangolds: Roots				
1	4.34	15.35	13.23	17.04	16.21
2	5.33	16.57	13.49	18.97	16.65
4	2.19	(a) 11.99	8.13	9.95	12.04
		(b) 13.87			
5	1.89	11.81	5.10	3.25	4.63
6	1.68	11.03	9.69	11.19	10.68
7	2.11	11.56	10.78	12.26	12.13
8	0.89	5.71	1.88	2.35	4.06
9	7.25				
	Mangolds: Leaves				
1	1.27	3.94	3.77	5.46	4.21
2	2.10	4.55	3.77	5.02	4.70
4	1.49	(a) 4.75	3.50	3.72	4.72
		(b) 4.94			
5	1.05	3.77	1.88	2.52	3.47
6	1.03	3.77	3.94	4.70	4.57
7	1.15	3.62	4.31	5.97	4.72
8	0.59	3.62	1.52	2.32	2.76
9	4.89				

Yields: tons per acre

Cross Dressings

Strip	O	N	A	AC	C
	Sugar Beet: Roots				
1	5.31	6.19	9.53	9.49	10.28
2	2.62	8.75	5.86	6.21	7.54
4	1.26	(b) 5.04	5.80	7.95	6.79
5	0.83	4.94	3.28	3.18	2.97
6	1.22	4.65	7.11	6.85	6.74
7	1.30	6.58	7.56	6.67	6.30
8	1.10	4.55	2.84	3.77	3.02
	Sugar Beet: Tops				
1	5.04	11.99	11.69	13.55	11.99
2	2.59	11.60	5.04	7.98	9.00
4	6.61	(b) 5.43	8.46	13.01	9.44
5	5.97	6.56	3.96	6.17	4.06
6	6.26	4.60	8.37	9.59	7.88
7	6.51	8.02	7.98	12.28	10.32
8	7.14	7.49	4.16	6.51	5.68

HAY - THE PARK GRASS PLOTS 1951

The 96th year

For details of treatments etc.: see Appendix Y 1950.

Cultivations, etc: Minerals applied: Feb 28. Nitrogenous fertilizers applied: 1st dressing - Mar 22, 2nd dressing - May 5. 1st cut: June 21. 2nd cut: Oct 2.

Summary of Results

Yield of Hay: cwt per acre

Plot	Not limed 1st Crop	Not limed 2nd Crop NDE	Not limed Total	Limed 1st Crop	Limed 2nd Crop NDE	Limed Total
1	10.7	9.1	19.8	21.6	6.1	27.7
2	14.0	9.4	23.4	16.1	4.6	20.7
3	12.3	7.9	20.2	15.4	4.1	19.5
4-1	16.0	7.6	23.6	17.0	8.0	25.0
4-2	14.6	3.6	18.2	30.4	6.6	37.0
5-1	15.0	3.5	18.5			
5-2	18.5	8.9	27.4			
6	33.6	15.9	49.5			
7	31.2	17.1	48.3	44.1	8.8	52.9
8	29.2	13.2	42.4	23.6	6.5	30.1
9	49.1	9.9	59.0	48.5	8.8	57.3
10	27.8	11.4	39.2	39.7	8.9	48.6
11-1	44.8	20.1	64.9	62.4	13.8	76.2
11-2	61.3	21.8	83.1	75.4	21.2	96.6
12	16.8	8.9	25.7			
13	37.6	14.6	52.2	38.5	11.9	50.4
14	53.3	18.4	71.7	55.5 ✻	10.8 ✻	66.3 ✻
				44.1 ✻	5.1 ✻	49.2 ✻
15	20.1	11.1	31.2	31.0	3.4	34.4
16	40.1	11.8	51.9	40.5	9.2	49.7
17	16.6	9.6	26.2	25.3	6.2	31.5
18	17.0	7.8	24.8	36.7†	10.1†	46.8†
				34.7††	9.0††	43.7††
19	30.6	11.9	42.5	27.2†	6.0†	33.2†
				30.5††	10.5††	41.0††
20	37.8	11.4	49.2	40.6†	8.5†	49.1†
				41.2††	11.0††	52.2††

✻ Shade

NDE These figures for the second crop are estimated hay yields calculated from the dry matter

† Heavy liming

†† Light liming.

51/A/6

BARLEY - EXHAUSTION LAND HOOSFIELD 1951

For details of previous treatments etc. see Appendix Y, 1950.

Cultivations, etc.: Ploughed: Aug 29 and Jan 27. Seed drilled at 3 bushels per acre, sulphate of ammonia drilled: Apr 16. Harvested: Sept 3. Variety: Plumage Archer.

Summary of Results

Plot	Total Grain: cwt per acre	Total Straw: cwt per acre
1	13.6	14.0
2	12.7	13.4
3	22.9	20.3
4	25.1	22.1
5	15.2	13.8
6	11.2	8.6
7	24.1	21.8
8	23.8	20.3
9	23.4	19.4
10	26.4	21.9

PERMANENT WHEAT - WOBURN STACKYARD 1951

For details of treatments etc. see Appendix Y 1950.

Cultivations, etc: Ploughed: Sept 8. Seed drilled at 3 bushels per acre: Oct 19. Nitrochalk applied: May 7. Sprayed with D.N.O.C: June 11. Harvested: Aug 20. Variety: Squareheads Master (13/4).

Summary of Results

Plot	Nitrochalk dressing cwt per acre	Total grain cwt per acre	Total straw cwt per acre
7	2	6.4	10.9
3	4	8.7	13.3
1	6	12.8	20.5
4	2	9.0	14.6
6	4	12.1	15.9
9	6	12.8	16.7
11b (1)	2	7.1	11.6
11b (2)	4	8.9	14.3
11b (3)	6	14.8	22.2
10b	2	6.2	12.8
11a	4	12.4	16.7
10a	6	17.5	23.5

PERMANENT BARLEY - WOBURN STACKYARD 1951

For details of treatments etc. see Appendix Y 1950.

Cultivations, etc: Ploughed: Sept 7 and again Feb 7. Seed drilled at 3 bushels per acre, nitrochalk applied: Apr 23. Sprayed with D.N.O.C: June 8. Harvested: Sept 24. Variety: Plumage Archer.

Summary of Results

Plot	Nitrochalk dressing cwt per acre	Total grain cwt per acre
7	2	4.0
1	4	0.6
3	6	3.3
4	2	3.9
6	4	4.6
9	6	5.2
11b (2)	2	7.8
11b (3)	4	8.7
11b (1)	6	5.2

Note Owing to the large amount of spurrey in the produce the straw was not weighed, nor was the grain for plots 10a, 10b and 11a.

THREE COURSE ROTATION EXPERIMENT

The 19th year

Ploughing in straw - Long Hoos VI 1951.

For details of rotation and treatment see Appendix Z 1950.

Area of each plot: 0.0200 acre.

Cultivations, etc:

Potatoes (Series 2)

Adco and all autumn fertilizers applied: Jan 29. Straw applied, ploughed all plots: Mar 5. Spring fertilizers applied: May 3. Ridged: May 9. Potatoes planted by dropper into top of ridges: May 10. Earthed up ridges: July 6. Sprayed with copper fungicide, 5 lb per acre: Aug 14 and again Sept 8. Sprayed with 15% sulphuric acid: Sept 26. Lifted Oct 8th. Variety: Majestic.

Barley (Series 1)

Adco, straw and all autumn fertilizers applied: Jan 29. Ploughed: Mar 5. Spring fertilizers applied, seed drilled at 3 bushels per acre: Apr 17. Harvested: Aug 29. Variety: Plumage Archer.

Sugar beet (Series 3)

Adco applied: Jan 29. Autumn fertilizers and straw applied: Jan 30. Ploughed: Mar 5. Spring fertilizers applied: Apr 24. Seed drilled at 18 lb per acre: May 2. Singled: June 18. Lifted: Nov 7. Variety: Klein E.

Standard errors per plot:

Potatoes,	Total clean tubers:	0.500 tons per acre or 7.8% (8 d.f.)
Barley,	Grain:	3.62 cwt per acre or 14.9% (8 d.f.)
Sugar beet,	Total sugar:	4.46 cwt per acre or 13.1% (8 d.f.)
	Tops:	1.31 tons per acre or 14.8% (8 d.f.)

Summary of Results

	Treatments applied 1949/50					Treatments applied 1950/51				
	Art.	Adco	St 1	St 2	Mean	Art.	Adco	St 1	St 2	Mean
Potatoes										
Total clean tubers: tons per acre	5.36	6.40 (±0.289)	6.23	6.16	6.04 (±0.144)	7.50	6.05 (±0.289)	6.22	7.34	6.78 (±0.144)
Percentage ware	75.8	81.5	79.4	81.9	79.6	82.7	82.7	83.7	83.6	83.2
Barley										
Grain: cwt per acre	21.1	20.8 (±2.09)	21.4	24.6	22.0 (±1.04)	30.3	21.3 (±2.09)	28.1	26.8	26.6 (±1.04)
Straw: cwt per acre	19.3	19.9	18.2	22.4	19.9	30.0	19.4	25.7	23.7	24.7
Sugar beet										
Roots (washed): tons per acre	9.84	8.18	10.00	10.30	9.58	12.53	8.43	10.32	8.52	9.95
Sugar Percentage	17.51	17.71	17.37	17.40	17.50	17.45	17.58	17.46	17.16	17.42
Total sugar: cwt per acre	34.5	29.0 (±2.58)	34.8	35.9	33.5 (±1.29)	43.8	29.7 (±2.58)	36.0	29.2	34.7 (±1.29)
Tops: tons per acre	8.35	7.19 (±0.756)	8.88	9.37	8.45 (±0.378)	12.30	7.31 (±0.756)	9.74	7.80	9.29 (±0.378)
Plant number: thous. per acre	27.7	27.8	26.4	27.9	27.4	27.1	26.8	26.5	25.7	26.5

Responses to Magnesium Sulphate

	Treatments applied 1949/50					Treatments applied 1950/51				
	Art.	Adco	St 1	St 2	Mean	Art.	Adco	St 1	St 2	Mean
Potatoes										
Total clean tubers: tons per acre	0.50	1.23 (±0.612)	-0.47	-0.32	0.23 (±0.306)	1.34	0.11 (±0.612)	-0.98	-0.63	-0.04 (±0.306)
Percentage ware	2.4	4.6	-1.3	5.5	2.8	0.8	1.8	6.7	2.1	2.8
Barley										
Grain: cwt per acre	-1.2	-4.1 (±4.43)	-5.3	0.6	-2.5 (±2.21)	-3.7	-1.5 (±4.43)	1.2	-3.4	-1.8 (±2.21)
Straw: cwt per acre	-0.3	-3.1	-6.9	-0.5	-2.7	-2.8	-0.3	2.3	-4.4	-1.3
Sugar beet										
Roots (washed): tons per acre	-0.36	1.40	1.25	1.53	0.95	-1.24	1.03	-3.52	0.09	-0.91
Sugar percentage	0.34	-0.02	-0.30	0.44	0.11	-0.52	0.33	0.16	0.48	0.11
Total sugar: cwt per acre	-0.6	4.9 (±5.47)	3.7	6.3	3.6 (±2.73)	-5.6	4.1 (±5.47)	-12.0	1.1	-3.1 (±2.73)
Tops: tons per acre	-0.67	0.94 (±1.60)	1.95	1.09	0.83 (±0.80)	-2.50	-0.25 (±1.60)	-4.09	0.49	-1.59 (±0.80)
Plant number: thous. per acre	-0.5	-1.7	2.1	1.3	0.3	1.4	2.1	-0.7	-1.1	0.4

FOUR COURSE ROTATION EXPERIMENT

The 22nd year

Direct and residual effects of organics and phosphates - Hoosfield 1951.

For details of treatments and rotation see Appendix Z 1950.

Area of each plot: Potatoes: 0.0242 acre. Barley: 0.030.
Ryegrass and wheat: 0.0244 acre.

Manures (cwt per acre) applied 1950-51

	Organic fertilizers				Additional fertilizers		
Treatment	Organic matter	N	P_2O_5	K_2O	N as Sulph. of amm.	P_2O_5 as Super	K_2O as Mur. of potash
Dung	50 (as F.Y.M.)	1.514	0.566	1.121	0.286	0.634	1.879
Adco	50 (as Adco)	1.207	0.522	0.826	0.593	0.678	2.174
Straw	126 (as Straw)	0.992	0.290	1.614	0.808	0.910	1.386
Super			None		0.36	1.2	0.6
Rock Phosphate			None		0.36	1.2*	0.6

*As rock phosphate

Cultivations, etc.:

Potatoes: Ploughed: Aug 30. Dung and Adco applied: Jan 26. Supplementary fertilizers to dung and Adco and first two dressings to straw plots applied: Jan 30. Straw applied, all plots ploughed: Mar 5. Spring fertilizers, including third dressing to straw plots applied, ridged: May 9. Potatoes planted with dropper machine: May 10. Earthed up ridges: July 19. Sprayed with copper fungicide 5 lb per acre: Aug 14 and again Sept 8. Sprayed with 15% sulphuric acid: Sept 26. Lifted: Oct 9. Variety: Majestic.

Barley. Dung, Adco and supplementary fertilizers, and first two dressings to straw plots applied: Jan 30. Straw applied, all plots ploughed: Feb 7. Ground chalk 19 cwt per acre applied: Apr 5. Spring fertilizers and third dressing to straw plots applied, seed drilled at 3 bushels per acre: Apr 17. Harvested: Sept 10. Variety: Plumage Archer.

Ryegrass. Dung, Adco and supplementary fertilizers, and first dressing to straw plots applied: Sept 14. Straw applied, all plots ploughed: Sept 18. Autumn fertilizers and second dressing to straw plots applied: Oct 12. Sulphate of ammonia and third dressing to straw plots applied: Apr 17. Seed sown at 70 lb per acre: Apr 19. Harvested: July 20. Variety: Western Wolths.

Wheat. Ploughed: Aug 5. Dung, Adco and supplementary fertilizers, and first dressing to straw plots applied: Sept 18. Straw applied, ploughed all plots: Sept 19. Autumn fertilizers applied: Oct 9. Seed drilled at 3 bushels per acre: Oct 18. Second dressing to straw plots applied: Jan 31. Sulphate of ammonia and third dressing to straw plots applied: May 9. Harvested: Aug 24. Variety: Squareheads Master 13/4.

Summary of Results

Manure+	Year of Cycle	Potatoes: Total clean tubers, tons per acre — Additional N: Without	With	Mean	Resp. to Nitrogen	Potatoes: Percentage Ware — Additional N: Without	With	Mean	Resp. to Nitrogen	Barley: Grain cwt per acre	Straw cwt per acre	Ryegrass: Dry matter cwt per acre	Wheat: Grain cwt per acre	Straw cwt per acre
	I	4.63	5.76	5.20	1.13	73.9	85.7	79.8	11.8	25.0	21.4	8.3	15.0	28.3
Manure	II	5.03	7.85	6.44	2.82	78.1	88.0	83.0	9.9	16.6	11.3	6.1	13.7	21.1
as	III	5.13	6.56	5.84	1.43	78.4	83.5	81.0	5.1	15.0	9.8	5.2	13.3	18.6
F.Y.M.	IV	4.01	4.87	4.44	0.86	78.4	84.6	81.5	6.2	12.1	7.9	5.7	11.5	14.7
	V	4.67	5.72	5.20	1.05	77.8	83.5	80.6	5.7	15.3	11.6	5.8	12.9	17.3
Manure	I	6.20	7.82	7.01	1.62	84.8	89.7	87.2	4.9	23.7	19.9	9.8	22.0	38.9
as	II	4.08	5.30	4.69	1.22	82.5	86.2	84.4	3.7	17.6	13.1	5.7	15.0	21.1
Adco	III	4.85	6.20	5.52	1.35	82.3	86.2	84.2	3.9	13.7	10.2	5.2	12.6	19.4
(straw	IV	4.87	4.61	4.74	-0.26	78.3	76.6	77.4	-1.7	14.8	11.2	7.2	12.3	16.5
compost)	V	3.34	3.74	3.54	0.40	74.6	77.6	76.1	3.0	9.7	7.2	5.2	12.6	17.7
	I	5.89	5.24	5.56	-0.65	79.3	81.4	80.4	2.1	24.6	18.0	7.0	18.0	26.6
Manure	II	4.99	6.99	5.99	2.00	76.3	82.0	79.2	5.7	17.8	12.8	2.3	15.4	23.5
as	III	4.99	4.99	4.99	0.00	81.0	80.8	80.9	-0.2	15.4	10.8	6.1	15.2	23.3
Straw	IV	4.71	5.79	5.25	1.08	78.4	79.6	79.0	1.2	12.5	9.6	7.4	12.0	15.7
	V	4.59	5.59	5.09	1.00	79.8	84.2	82.0	4.4	15.7	11.0	4.7	12.6	16.9
	I	6.05	6.18	6.12	0.13	81.0	87.1	84.0	6.1	22.8	18.3	7.7	16.7	27.6
Super-	II	6.32	7.15	6.74	0.83	82.7	86.4	84.6	3.7	21.6	17.0	5.6	15.2	21.8
phosphate	III	5.52	5.54	5.53	0.02	82.6	87.0	84.8	4.4	23.5	18.4	5.8	16.0	23.0
	IV	5.76	7.30	6.53	1.54	80.3	89.9	85.1	9.6	18.7	14.6	4.2	16.5	25.5
	V	4.40	6.72	5.56	2.32	82.8	89.3	86.0	6.5	20.8	18.1	5.9	16.3	24.0
	I	4.68	4.87	4.78	0.19	86.0	85.7	85.8	-0.3	15.5	11.3	6.6	18.4	25.7
Rock	II	4.32	5.45	4.88	1.13	89.3	88.6	89.0	-0.7	21.1	15.8	4.7	16.4	23.5
phosphate	III	3.80	3.65	3.72	-0.15	80.2	82.1	81.2	1.9	19.5	16.7	5.5	15.2	22.5
	IV	4.01	3.46	3.74	-0.55	81.5	82.2	81.8	0.7	22.3	17.8	5.1	17.8	27.2
	V	4.33	2.87	3.60	-1.46	83.7	73.9	78.8	-9.8	20.6	17.2	8.0	15.3	22.3

51/Ba/2.3

+Note. All manures are supplemented by fertilizers as shown in table on page 51/Ba/2.1

SIX COURSE ROTATION EXPERIMENT

The 22nd year

Seasonal effects of fertilizers - Rothamsted Long Hoos IV and Woburn Stackyard, 1951.

For details of rotation and treatments etc. see Appendix Z 1950.

Area of each plot: Rothamsted - 0.0250 acre. Woburn-0.0266 acre.

Cultivations, etc.:

Rothamsted

Sugar beet.
Ploughed: Aug 16 and again Jan 27. Fertilizers applied: Apr 25. Seed drilled at 18 lb per acre: May 2. Singled: June 13. Lifted: Nov 1. Variety: Klein E.

Barley.
Ploughed: Jan 25. Ground chalk applied: Apr 5. Fertilizers applied: Apr 14. Seed drilled at 3 bushels per acre: Apr 16. Harvested: Aug 25. Variety: Plumage Archer.

Clover.
Seed undersown in barley at 40 lb per acre: Mar 21. Autumn fertilizers applied: Oct 4. Sulphate of ammonia applied: May 3. Cut: July 7. Variety: Late flowering Montgomery Red.

Wheat.
Ploughed: Aug 10. Autumn fertilizers applied: Oct 5. Seed drilled at 3 bushels per acre: Oct 18. Sulphate of ammonia applied: May 21. Harvested: Aug 14. Variety: Yeoman.

Potatoes.
Ploughed: Aug 16 and again Jan 27. Fertilizers applied on the flat: May 3. Ridged: May 9. Potatoes planted with dropper machine into top of ridges: May 10. Earthed up: June 23. Sprayed with copper fungicide 5 lb per acre: Aug 14 and again Sept 8. Sprayed with 15% sulphuric acid: Sept 26. Lifted: Oct 9. Variety: Majestic.

Rye.
Ploughed: Oct 19. Ground chalk applied: Oct 20. Autumn fertilizers applied and seed drilled at 3 bushels per acre: Oct 21. Sulphate of ammonia applied: May 21. Harvested: Aug 14. Variety: King II.

Woburn

Sugar beet.
Ploughed: Aug 29 and again Oct 20. Fertilizers applied: Apr 20. Seed drilled at 18 lb per acre: May 2. Singled: June 8. Lifted: Oct 11. Variety: Klein E.

Barley.
Ploughed: Oct 6. Ground chalk applied: Apr 5. Fertilizers applied and seed drilled at 3 bushels per acre: Apr 16. Harvested: Sept 3. Variety: Plumage Archer.

Clover.
Seed undersown in barley at 40 lb per acre: Mar 22. Autumn fertilizers applied: Oct 20. Sulphate of ammonia applied: May 7. Cut: July 9. Variety: Late flowering Montgomery Red.

Wheat.
Ploughed: July 20. Autumn fertilizers applied: Oct 17. Seed drilled at 3 bushels per acre: Oct 19. Sulphate of ammonia applied: May 7. Harvested: Aug 20. Variety: Squareheads Master 13/4.

Potatoes.
Ploughed: Aug 19 and again Oct 5. Fertilizers applied:May 3. Ridged: May 7. Potatoes planted: May 8. Earthed up: July 11. Sprayed with copper fungicide 5 lb per acre: Aug 8 and again Sept 8. Sprayed with 15% sulphuric acid: Sept 26. Lifted: Oct 4. Variety: Majestic.

Rye.
Ploughed: Oct 5. Autumn fertilizers applied: Oct 17. Seed drilled at 3 bushels per acre: Oct 19. Ground chalk applied: Apr 5. Sulphate of ammonia applied: May 7. Harvested: Aug 20. Variety: King II.

Summary of Results

Mean yields per acre and responses in yield per cwt of N, P_2O_5 and K_2O

	Rothamsted	Woburn	Rothamsted	Woburn
	Sugar Beet, roots (washed): tons per acre		Barley, grain: cwt per acre	
Mean	10.05	6.19	27.9	16.9
Response to: N	0.73	5.19	8.7	19.5
P	1.26	-0.65	-1.7	-12.3
K	-0.78	-0.79	0.9	-2.8
	Sugar Beet, sugar percentage		Barley, straw: cwt per acre	
Mean	17.20	16.51	31.0	18.3
Response to: N	-0.63	-1.69	-2.8	5.9
P	0.12	-0.63	-2.5	-10.8
K	-0.17	-1.22	2.9	1.7
	Sugar Beet, total sugar: cwt per acre		Clover, hay: dry matter cwt per acre	
Mean	34.6	20.4	39.2	48.5
Response to: N	1.3	14.9	8.6	-22.1
P	4.7	-3.2	-6.0	29.9
K	-3.0	-4.0	-3.8	-1.5
	Sugar Beet, tops: tons per acre		Wheat, grain: cwt per acre	
Mean	10.66	5.62	26.8	8.7
Response to: N	6.09	6.55	23.4	19.9
P	2.15	-0.65	-0.3	10.7
K	-0.36	-0.15	-0.7	-1.4
	Sugar Beet, plant number: thousands per acre		Wheat, straw: cwt per acre	
Mean	29,3		37.9	16.4
Response to: N	-0.2		36.9	28.5
P	-0.3		0.5	8.3
K	1.6		1.6	-1.5

	Rothamsted	Woburn	Rothamsted	Woburn
	Potatoes, total tubers tons per acre		Rye, Grain: cwt per acre	
Mean	7.42	8.34	25.6	18.1
Response to: N	2.14	4.61	17.0	21.1
P	1.39	2.29	0.0	-5.5
K	0.03	0.60	1.5	3.6
	Potatoes, percentage ware		Rye, straw: cwt per acre	
Mean	85.3	82.0	28.2	17.8
Response to: N	0.4	11.2	13.9	19.5
P	-3.9	2.8	4.1	-4.0
K	3.0	5.3	-0.1	5.1

51/Bb/1.1

DEEP CULTIVATION ROTATION EXPERIMENT

The 8th Year

Deep ploughing, fertilizers and dung - Long Hoos I and II 1951.

For details of rotation and treatments etc see Appendix Z 1950.

Area of each plot: 0.0312 acre. Area harvested: wheat, spring oats, barley, 0.0265 acre; ley 0.0275 acre; sugar beet (half plot), 0.0119 acre; potatoes (half plot), 0.0107 acre.

Cultivations, etc:

Sugar beet (Series 6)

Fertilizers for ploughing in applied: Sept 8. Dung applied and ploughed in 'deep': Sept 29. Dung applied and ploughed in 'shallow': Oct 3. Fertilizers for surface applications broadcast: Apr 26. Seed drilled at 18 lb per acre: May 2. Singled: June 20. Lifted: Nov 7. Variety: Klein E.

Barley (Series 2)

Ploughed: Feb 2 and again Mar 5. Basic slag applied: Apr 11. Seed drilled at 3 bushels per acre and basal sulphate of ammonia applied: Apr 16. Harvested: Sept 3. Variety: Plumage Archer.

Ley (Series 3)

Seeds undersown in barley: Mar 22 1950. Harvested: June 18 1951. Seeds mixture (per acre) 18 lb S.24 perennial ryegrass, 8 lb Montgomery red clover, 2 lb Canadian Alsike clover.

Wheat (Series 4)

Ploughed 'deep' plots: July 19. Ploughed 'shallow' plots: Aug 1. Ploughed all plots: Sept 18. Seed drilled at 3¼ bushels per acre: Nov 1. Basal sulphate of ammonia drilled: May 25. Harvested: Aug 16. Variety: Yeoman.

Potatoes (Series 5)

Fertilizers for ploughing in applied: Sept 8. Dung applied and ploughed in 'deep': Sept 28. Dung applied and ploughed in 'shallow': Oct 3. Ridged: May 15. Fertilizers applied in ridges, potatoes planted: May 18. Earthed up ridges: July 19. Sprayed with copper fungicide 5 lb per acre: Aug 15 and again Sept 8. Sprayed with 15% sulphuric acid: Sept 26. Lifted: Oct 12. Variety: Majestic.

Spring oats (Series 1)

Ploughed: Nov 6. Seed at 4 bushels per acre, and basal sulphate of ammonia drilled: Apr 16. Harvested: Aug 16. Variety: Star.

Standard errors per plot:

Sugar beet	Total sugar,	whole plot, 4.21 cwt per acre or 13.4%	(4d.f
		sub-plot, 2.06 cwt per acre or 6.6%	(7d.f
	Tops,	whole plot, 1.65 tons per acre or 10.8%	(4d.f
		sub-plot, 1.05 tons per acre or 6.9%	(7d.f
Barley	Grain,	2.34 cwt per acre or 8.0%	(4d.f
Ley	Hay,	2.90 cwt per acre or 5.0%	(4d.f
Wheat	Grain,	3.66 cwt per acre or 14.0%	(4d.f
Potatoes	Total clean tubers,	whole plot, 0.861 tons per acre or 18.0%	(4d.f
		sub-plot, 1.249 tons per acre or 26.0%	(7d.f
Spring oats	Grain,	0.819 cwt per acre or 2.4%	(4d.f

Erratum to 1950 Results 50/Bb/1.1

Ley. The seeds mixture should have been shown as 18 lb Ryegrass S.24, 4 lb English red clover (Montgomery), 2 lb American Alsike clover.

Summary of Results

Series 6: Sugar Beet

Responses to treatments

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Roots (washed): Mean yield 9.82 tons per acre									
Ploughing deep-shallow	1.55	-	-	2.13	0.97	1.91	1.19	1.35	1.75
Dung	2.05	2.63	1.47	-	-	2.93	1.17	2.53	1.57
Superphosphate	0.40	0.76	0.04	1.28	-0.48	-	-	0.95	-0.15
Potash	1.33	1.13	1.53	1.81	0.85	1.88	0.78	-	-
Sugar percentage: Mean 16.03									
Ploughing deep-shallow	-0.18	-	-	-0.35	-0.01	-0.28	-0.08	-0.10	-0.26
Dung	-0.01	-0.18	0.16	-	-	-0.07	0.05	-0.20	0.18
Superphosphate	0.11	0.01	0.21	0.05	0.17	-	-	0.10	0.12
Potash	0.18	0.26	0.10	-0.01	0.37	0.17	0.19	-	-
Total Sugar: Mean yield 31.4 cwt per acre									
	(±2.11)					(±2.98)			
Ploughing deep-shallow	4.6	-	-	6.2	3.0	5.5	3.7	4.1	5.1
Dung	6.6	8.2	5.0	-	-	9.3	3.9	7.7	5.5
Superphosphate	1.5	2.4	0.6	4.2	-1.2	-	-	3.2	-0.2
Potash	4.6	4.1	5.1	5.7	3.5	6.3	2.9	-	-
Tops: Mean yield 15.23 tons per acre									
	(±0.825)					(±1.167)			
Ploughing deep-shallow	0.66	-	-	1.61	-0.29	0.73	0.59	0.50	0.82
Dung	1.80	2.75	0.85	-	-	2.53	1.07	1.91	1.69
Superphosphate	0.26	0.33	0.19	0.99	-0.47	-	-	0.50	0.02
Potash	1.10	0.94	1.26	1.21	0.99	1.34	0.86	-	-
Plant Number: Mean 25.6 thousands per acre									
Ploughing deep-shallow	1.5	-	-	0.7	2.3	1.5	1.5	1.1	1.9
Dung	-0.4	-1.2	0.4	-	-	0.4	-1.2	-0.4	-0.4
Superphosphate	0.9	0.9	0.9	1.7	0.1	-	-	1.7	0.1
Potash	-0.2	-0.6	0.2	-0.2	-0.2	0.6	-1.0	-	-
Noxious Nitrogen: Mean 40.9 mgs. %									
Ploughing deep-shallow	0.6	-	-	4.4	-3.2	0.0	1.2	-1.9	3.1
Dung	2.5	6.3	-1.3	-	-	-1.3	6.3	1.9	3.1
Superphosphate	-0.6	-1.2	0.0	-4.4	3.2	-	-	5.6	-6.8
Potash	-3.8	-6.3	-1.3	-4.4	-3.2	2.4	-10.0	-	-

Series 6: Sugar Beet

	Phosphate			Potash			
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	Mean
Roots (washed): tons per acre							
Shallow	8.66	9.58	9.27	8.48	9.97	9.24	9.04
Deep	10.57	10.40	10.81	9.82	11.28	11.42	10.59
No dung	8.15	9.39	9.47	7.89	9.80	9.59	8.79
Dung	11.08	10.59	10.61	10.42	11.45	11.07	10.84
Mean	9.62	9.99	10.04	9.15	10.63	10.33	9.82
Sugar Percentage							
Shallow	16.12	16.12	16.15	15.99	16.20	16.30	16.12
Deep	15.84	15.93	16.16	15.89	15.97	16.02	15.94
No dung	16.01	15.84	16.29	16.04	15.82	16.26	16.04
Dung	15.94	16.21	16.02	15.84	16.36	16.07	16.03
Mean	15.98	16.02	16.16	15.94	16.09	16.16	16.03
Total Sugar: cwt per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	27.9	30.8	29.8	27.1	32.3	30.1	29.1
Deep	33.5	33.2	35.0	31.2	36.1	36.6	33.8
No dung	26.1	29.6	30.8	25.3	30.9	31.2	28.2
Dung	35.4	34.3	34.0	33.0	37.4	35.5	34.7
Mean	30.7	32.0	32.4	29.1	34.2	33.3	31.4
Tops: tons per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	14.74	14.40	15.73	14.43	15.09	15.65	14.90
Deep	15.46	15.11	16.21	14.93	15.99	16.40	15.56
No dung	13.84	14.43	15.22	13.73	14.65	15.22	14.33
Dung	16.36	15.07	16.72	15.63	16.43	16.82	16.13
Mean	15.10	14.75	15.97	14.68	15.54	16.02	15.23

Standard errors (b) for use in horizontal comparisons only, (a) and (c) for use in all other comparisons.

Standard errors:	(a)	(b)	(c)
Total sugar	2.11	1.03	2.23
Tops	0.825	0.526	0.905

Series 6: Sugar Beet

	Phosphate			Potash			
	None	Ploughed In seed	bed	None	Ploughed In seed	bed	Mean
	Plant number: thousands per acre						
Shallow	24.4	25.9	24.8	25.1	24.7	24.4	24.9
Deep	25.9	26.5	27.2	26.3	26.3	26.7	26.4
No dung	25.0	26.5	26.9	25.9	25.6	25.9	25.8
Dung	25.3	25.8	25.1	25.5	25.4	25.2	25.4
Mean	25.1	26.2	26.0	25.7	25.5	25.6	25.6
	Noxious nitrogen: mgs %						
Shallow	41.2	42.5	37.5	43.8	38.8	36.2	40.6
Deep	41.2	45.0	37.5	41.9	46.2	35.0	41.2
No dung	41.9	42.5	32.5	41.9	40.0	35.0	39.7
Dung	40.6	45.0	42.5	43.8	45.0	36.2	42.2
Mean	41.2	43.8	37.5	42.8	42.5	35.6	40.9

Series 1: Barley

Responses to treatments

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
				Grain: Mean yield 29.2 cwt per acre					
	(±1.17)					(±1.65)			
Ploughing deep-shallow	-0.3	-	-	0.1	-0.7	1.4	-2.0	-0.8	0.2
Dung	4.4	4.8	4.0	-	-	5.6	3.2	5.5	3.3
Superphosphate	-1.3	0.4	-3.0	-0.1	-2.5	-	-	-0.5	-2.1
Potash	0.9	0.4	1.4	2.0	-0.2	1.7	0.1	-	-
				Straw: Mean yield 30.5 cwt per acre					
Ploughing deep-shallow	-3.6	-	-	-1.9	-5.3	0.0	-7.2	-4.5	-2.7
Dung	8.5	10.2	6.8	-	-	8.2	8.8	10.5	6.5
Superphosphate	-0.8	2.8	-4.4	-1.1	-0.5	-	-	-1.1	-0.5
Potash	1.3	0.4	2.2	3.3	-0.7	1.0	1.6	-	-

Series 3: Ley

Responses to treatments

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
				Hay: Mean yield 57.5 cwt per acre					
	(±1.45)					(±2.05)			
Ploughing deep-shallow	-1.1	-	-	-0.1	-2.1	-0.9	-1.3	-2.2	0.0
Dung	-0.6	0.4	-1.6	-	-	-0.8	-0.4	-3.6	2.4
Superphosphate	0.7	0.9	0.5	0.5	0.9	-	-	2.1	-0.7
Potash	-0.3	-1.4	0.8	-3.3	2.7	1.1	-1.7	-	-

Series 4: Wheat

Responses to treatments

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 26.1 cwt per acre									
	(±1.83)					(±2.58)			
Ploughing deep-shallow	-0.5	-	-	0.4	-1.4	-0.6	-0.4	0.4	-1.4
Dung	-1.4	-0.5	-2.3	-	-	-3.6	0.8	-1.3	-1.5
Superphosphate	2.4	2.3	2.5	0.2	4.6	-	-	0.1	4.7
Potash	1.7	2.6	0.8	1.8	1.6	-0.6	4.0	-	-
Straw: Mean yield 33.3 cwt per acre									
Ploughing deep-shallow	3.1	-	-	0.4	5.8	3.3	2.9	1.4	4.8
Dung	3.2	0.5	5.9	-	-	0.0	6.4	0.6	5.8
Superphosphate	2.3	2.5	2.1	-0.9	5.5	-	-	-0.2	4.8
Potash	5.0	3.3	6.7	2.4	7.6	2.5	7.5	-	-

Series 5: Potatoes

Responses to treatments

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Total tubers: Mean yield 4.79 tons per acre									
	(±0.431)					(±0.609)			
Ploughing deep-shallow	-1.46	-	-	-0.71	-2.21	-1.08	-1.84	-1.05	-1.87
Dung	2.58	3.33	1.83	-	-	2.37	2.79	3.51	1.65
Superphosphate	0.87	1.25	0.49	0.66	1.08	-	-	0.93	0.81
Potash	1.39	1.80	0.98	2.32	0.46	1.45	1.33	-	-
Percentage ware: Mean yield 82.3									
Ploughing deep-shallow	-2.6	-	-	-1.0	-4.2	-3.5	-1.7	-2.8	-2.4
Dung	6.7	8.3	5.1	-	-	6.5	6.9	9.9	3.5
Superphosphate	-1.8	-2.7	-0.9	-2.0	-1.6	-	-	0.2	-3.8
Potash	4.1	3.9	4.3	7.3	0.9	6.1	2.1	-	-

Potatoes

	Phosphate: None	Phosphate: Ploughed in	Phosphate: In ridges	Potash: None	Potash: Ploughed in	Potash: In ridges	Mean
			Total tubers: tons per acre				
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	4.90	5.34	6.95	4.63	5.90	6.95	5.53
Deep	3.82	3.61	5.01	3.58	3.86	5.24	4.06
No dung	3.17	3.01	4.65	2.35	3.76	5.55	3.50
Dung	5.55	5.94	7.31	5.85	5.99	6.64	6.08
Mean	4.36	4.47	5.98	4.10	4.88	6.10	4.79
			Percentage: ware				
Shallow	85.0	84.7	79.8	81.7	86.1	85.0	83.6
Deep	81.4	80.1	81.1	78.9	83.1	83.2	81.0
No dung	80.0	77.8	78.2	75.4	81.7	83.4	79.0
Dung	86.4	87.0	82.7	85.2	87.5	84.7	85.6
Mean	83.2	82.4	80.4	80.3	84.6	84.1	82.3

Series I: Spring Oats

Responses to treatments

	Mean	Ploughing: Shallow	Ploughing: Deep	Dung: Abs.	Dung: Pres.	Phosphate: Abs.	Phosphate: Pres.	Potash: Abs.	Potash: Pres.
				Grain: Mean yield 34.9 cwt per acre					
Ploughing	(±0.41)					(±0.58)			
deep-shallow	2.2	-	-	1.9	2.5	-1.2	5.6	1.6	2.8
Dung	4.1	3.8	4.4	-	-	4.7	3.5	2.2	6.0
Superphosphate	2.0	-1.4	5.4	2.6	1.4	-	-	2.9	1.1
Potash	0.8	0.2	1.4	-1.1	2.7	1.7	-0.1	-	-
				Straw: Mean yield 36.7 cwt per acre					
Ploughing									
deep-shallow	0.0	-	-	2.4	-2.4	-2.4	2.4	-0.5	0.5
Dung	5.9	8.3	3.5	-	-	7.0	4.8	1.4	10.4
Superphosphate	2.8	0.4	5.2	3.9	1.7	-	-	1.9	3.7
Potash	3.7	3.2	4.2	-0.8	8.2	2.8	4.6	-	-

Standard Errors (b) for use in horizontal comparisons only
(a) and (c) for use in all other comparisons.

	(a)	(b)	(c)
Standard Error Total tubers	0.431	0.624	0.617

LEY AND ARABLE ROTATIONS

Highfield and Fosters Field - 1951.

For details of treatments and rotations etc. see Appendix Z 1950.

Cultivations, etc.:

Highfield

Wheat (Blocks 10 and 11). Ploughed: Oct 2. Seed drilled at 3¼ bushels per acre with basal fertilizers: Oct 19. Ground chalk applied: Mar 1. Nitrochalk applied: May 18. Harvested: Aug 18. Variety: Yeoman.

Potatoes (Blocks 5,6,7,8). Ploughed: Aug 25. Ridged: May 10. Dung, sulphate of ammonia and basal fertilizers applied, potatoes planted: May 16. Earthed up ridges: July 12 and again Aug 1. Sprayed with copper sulphate solution, 5 lb per acre: Aug 15 and again Sept 11. Sprayed with 20% sulphuric acid: Sept 29. Lifted: Oct 15. Variety: Majestic.

Barley (Blocks 1-4). Ploughed: Nov 3. Ground chalk applied to Blocks 1 and 4: Mar 31. Seed drilled at 3 bushels per acre with basal fertilizers: Apr 17. Nitrochalk applied: Apr 19. Harvested: Sept 10. Variety: Plumage Archer. The crop had been laid for a long time and the grain eaten by birds and therefore no yields were recorded.

Hay, Cut Grass, Grazed Ley, Lucerne and Reseeded Grass, all 1st year (Blocks 9 and 12, Reseeded Grass 9-12). Ploughed: Oct 2. Ground chalk applied: Mar 1. Basal fertilizers applied: Apr 23. Nitrochalk applied (none to Lucerne): May 21.

Hay. Seeds sown at 38 lb per acre: Apr 24. Cut: Aug 14.
Cut Grass. Seeds sown at 38 lb per acre: Apr 24. Cut: 4 times - June 5, July 9, Aug 20 and Oct 1. Nitrochalk applied after each cut except the last.
Grazed Ley. Seeds sown at 55 lb per acre: Apr 24. Nitrochalk applied: May 21. Grazed: 7 circuits July 6 - Oct 10.
Lucerne. Seed drilled at 33 lb per acre: Apr 24. Cut: twice - July 30 and Oct 2. Variety: Du Puits.
Reseeded Grass. Seeds sown at 55 lb per acre: Apr 24. Nitrochalk applied: July 20. Grazed: 7 circuits July 6 - Oct 10.

Permanent Grass. 1st year (Blocks 9-12). Ground chalk applied: Mar 1. Basal fertilizers applied: Apr 23. Nitrochalk applied: May 21. Pre-grazing cut: July 6. Nitrochalk applied: July 20. Grazed: 5 circuits July 6 - Oct 10.

Cut Grass, Grazed Ley, Lucerne, Reseeded Grass, Permanent Grass all 2nd year (Blocks 5 and 8, Reseeded and Permanent Grass 5-8). Basal fertilizers applied: Mar 29. Nitrochalk applied (none to Lucerne): May 22.

Cut Grass. Cut: 4 times - May 31, July 9, Aug 20 and Oct 3. Nitrochalk applied after each cut except the last.
Grazed Ley, Pre-grazing cut: June 1. Nitrochalk applied: July 12. Grazed: 7 circuits June 28 - Oct 2.
Lucerne. Cut: 3 times - July 7, Aug 13, Oct 3.
Reseeded Grass, Pre-grazing cut: June 1. Nitrochalk applied: July 20. Grazed: 5 circuits June 28 - Oct 2.
Permanent Grass. Cut: June 1. Nitrochalk applied: July 20. Grazed: 5 circuits June 28 - Oct 18.

Cut grass 3rd year (Blocks 2 and 3). Basal fertilizers applied: Mar 29. Nitrochalk applied: May 21. Cut: 4 times - June 5, July 9, Aug 20 and Oct 1. Nitrochalk applied after each cut except the last.

Grazed Ley, 3rd year (Blocks 2 and 3). Basal fertilizers applied: Mar 29. Nitrochalk applied: May 21. Pre-grazing cut: June 4. Nitrochalk applied: July 14. Grazed: 6 circuits July 2 - Sept 26.
Lucerne, 3rd year (Blocks 2 and 3). Basal fertilizers applied: Mar 29. Cut: 3 times - July 7, Aug 13, Oct 2.
Reseeded grass, 3rd year (Blocks 1-4). Basal fertilizers applied: Mar 29. Ground chalk applied: Mar 31. Nitrochalk applied: May 18. Cut: June 18. Nitrochalk applied: July 5. Grazed: 5 circuits July 14-Oct 26.
Permanent grass, 3rd year (Blocks 1-4). Basal fertilizers applied: Mar 29. Ground chalk applied: Mar 31. Nitrochalk applied: May 18. Cut: June 19. Nitrochalk applied: July 5. Grazed: 5 circuits July 14-Oct 26.

Fosters

Wheat (Blocks 10 and 12). Ploughed: Sept 19. Seed drilled at 3 bushels per acre with basal fertilizers: Oct 21. Ground chalk applied: Feb 7 and again Mar 1. Nitrochalk applied: May 7. Harvested: Aug 18. Variety: Yeoman.

Potatoes (Blocks 5,7,8,9). Ploughed: Aug 21 and again Nov 14. Ridged: May 10. Dung, sulphate of ammonia and basal fertilizers applied: May 15. Potatoes planted: May 16. Earthed up ridges: July 6. Sprayed with copper sulphate solution, 5 lb per acre: Aug 15 and again Sept 8. Sprayed with 20% sulphuric acid: Sept 29. Lifted: Oct 13. Variety: Majestic.

Barley (Blocks 1-4). Ploughed: Nov 1. Seed drilled at 3¼ bushels per acre with basal fertilizers: Apr 17. Nitrochalk applied: Apr 18. Harvested: Aug 30. Variety: Plumage Archer.

Hay, Cut Grass, Grazed Ley, Lucerne and Reseeded Grass, all 1st year (Blocks 6 and 11, Reseeded Grass 6, 10,11,12). Ploughed: Sept 19. Ground chalk applied: Feb 7 and again Mar 1. Basal fertilizers applied: Apr 20. Nitrochalk applied (none to Lucerne): May 8.

Hay. Seeds sown at 38 lb per acre: Apr 20. The crop failed and no yields were recorded.
Cut Grass. Seeds sown at 38 lb per acre: Apr 20. Cut: Oct 5.
Grazed Ley. Seeds sown at 55 lb per acre: Apr 20. Nitrochalk applied: July 21. Grazed: 5 circuits July 11-Sept 27.
Lucerne. Seed drilled at 33 lb per acre: Apr 20. Cut: Oct 5. Variety: Du Puits.
Reseeded Grass. Seeds sown at 55 lb per acre: Apr 20. Grazed: 4 circuits July 13-Oct 21.

Cut Grass, Grazed Ley, Lucerne and Reseeded Grass, all 2nd year (Blocks 5 and 7, Reseeded Grass 5-9). Basal fertilizers applied: Mar 21. Nitrochalk applied (none to Lucerne): May 8.

Cut Grass. Cut: 4 times - June 8, July 10, Aug 22 and Oct 5. Nitrochalk applied after each cut except the last.
Grazed Ley. Cut: June 7. Nitrochalk applied: June 21. Grazed: 6 circuits July 3 - Oct 1.
Lucerne. Cut: 3 times - July 5, Aug 10, Oct 5.
Reseeded Grass. Cut: June 7. Nitrochalk applied: June 21. Grazed: 4 circuits July 3 - Oct 5.

Cut Grass, Grazed Ley, Lucerne and Reseeded Grass, all 3rd year. (Blocks 2 and 4, Reseeded Grass 1-4). Basal fertilizers applied: Mar 28. Nitrochalk applied (none to Lucerne): May 8.

Cut Grass. Cut: 4 times - June 8, July 10, Aug 22, Oct 4. Nitrochalk applied after each cut except the last.
Grazed Ley. Cut: June 7. Nitrochalk applied: July 21. Grazed: 6 circuits July 17 - Oct 5.
Lucerne. Cut: 3 times - July 5, Aug 10 and Oct 4.
Reseeded Grass. Cut: June 18. Nitrochalk applied: July 3. Grazed: 4 circuits July 11 - Oct 13.

Standard errors per sub plot:

Per ¼ plot. Wheat, grain.	Highfield:	3.68 cwt per acre or 11.4% (23 d.f.)
	Fosters:	1.63 cwt per acre or 5.4% (23 d.f.)
Potatoes, total clean tubers.	Highfield:	1.56 tons per acre or 15.6% (21 d.f.)
	Fosters:	1.17 tons per acre or 13.0% (21 d.f.)
Barley.	Highfield:	No yield recorded
	Fosters:	1.72 cwt per acre or 5.7% (21 d.f.)
Hay, dry matter.	Highfield	1.16 cwt per acre or 9.8% (3 d.f.)
	Fosters:	No yield recorded.

Cut Grass, dry matter. Highfield: 5.24 cwt per acre or 8.6% (11 d.f.)
Fosters: 3.63 cwt per acre or 7.0% (11 d.f.)

Summary of Results

Wheat: cwt per acre

	Highfield			Fosters		
	cwt N per acre			cwt N per acre		
	0.3	0.6	Mean	0.3	0.6	Mean
	(±0.92)			(±0.41)		
Grain	32.7	32.1	32.4	23.1	32.5	30.3
Straw	50.6	51.5	51.0	38.1	46.7	42.4

Potatoes

		Highfield			Fosters		
		cwt N per acre			cwt N per acre		
	Dung: tons per acre	0.5	1.0	Mean	0.5	1.0	Mean
				(±0.390)			(±0.293)
Total clean tubers: tons per acre	None	10.26	9.29	9.78	8.44	8.14	8.29
		(±0.552)			(±0.414)		
	15	10.69	9.73	10.21	9.21	10.14	9.68
	Mean	10.48	9.51	9.99	8.83	9.14	8.99
		(±0.390)			(±0.293)		
Percentage Ware	None	88.2	90.5	89.4	91.2	89.7	90.4
	15	89.2	89.7	89.4	90.0	91.1	90.6
	Mean	88.7	90.1	89.4	90.6	90.4	90.5

Barley: cwt per acre

Highfield

Dung: tons per acre applied in 1950

Fosters

		cwt N per acre 0.2	0.4	Mean
				(±0.43)
Grain	None	27.9	30.5	29.2
	Crop failed	(±0.61)		
	15	29.3	32.7	31.0
	Mean	28.6	31.6	30.1
		(±0.43)		
Straw	None	27.7	30.0	28.8
	15	30.1	33.4	31.8
	Mean	28.9	31.7	30.3

One year Hay: Dry Matter: cwt per acre

cwt N per acre 0.3	0.6	Mean	
12.4	11.5	11.9	Crop failed
(±0.58)			

Cut Grass: Dry Matter: cwt per acre

	No. of cuts	cwt N per acre for each cut 0.15	0.30	Mean	No. of cuts	cwt N per acre for each cut 0.15	0.30	Mean
		(±2.62)		(±1.85)		(±1.81)		(±1.28)
1st year	4	40.6	44.5	42.5	1	17.8	15.4	16.6
2nd year	4	64.9	68.3	66.6	4	70.0	72.7	71.4
3rd year	4	67.0	78.9	73.0	4	63.7	71.2	67.5
Mean		57.5	63.9	60.7		50.5	53.1	51.8
		(±1.51)				(±1.05)		

Lucerne: Dry Matter: cwt per acre

	No. of cuts		No. of cuts	
1st year	2	33.3	1	13.0
2nd year	3	72.6	3	84.2
3rd year	3	73.3	3	88.8

Grazed Plots

Estimates from sample cuts of amount of Dry Matter cwt per acre, eaten by sheep.

		Highfield			Fosters		
		cwt N per acre			cwt N per acre		
		0.15	0.30	Mean	0.15	0.30	Mean
Permanent Grass							
1st year blocks	Pre-grazing+ cut	19.0	17.3	18.2			
	Grazing	33.6	34.5	34.0			
2nd year blocks	Pre-grazing+ cut	22.2	25.9	24.0			
	Grazing	31.4	28.9	30.2			
3rd year blocks	Hay	47.0	47.5	47.2			
	Aftermath grazing*	22.0	24.7	23.4			
Ley & Reseeded Grass							
1st year L & R.G.	Grazing	42.7	40.7	41.7	23.0	25.9	24.4
2nd year L & R.G.	Pre-grazing+ cut	30.8	28.6	29.7	38.9	39.8	39.3
	Grazing	26.0	30.4	28.2	24.2	24.3	24.3
3rd year L	Pre-grazing+ cut	35.6	43.8	39.7	32.9	35.5	34.2
	Grazing	30.1	24.5	27.3	30.9	29.9	30.4
3rd year R.G.	Hay	49.5	50.3	49.9	46.9	47.9	47.4
	Aftermath grazing*	16.6	19.7	18.2	24.4	25.8	25.1

+ Owing to pressure of spring work it was necessary to take a preliminary cut before grazing on Permanent Grass 1st and 2nd year blocks, Ley 2nd and 3rd years, Reseeded Grass 2nd year.

* An additional dressing of nitrochalk at the indicated rates was applied to the aftermath.

Note. The estimates of Dry Matter calculated from the sheep weights were considered unreliable and have been omitted.

GREEN MANURING EXPERIMENT

Woburn Stackyard - 1951, the 15th year

For details of treatments etc. see Appendix Z 1950.

Cultivations, etc.:

Green manures (Lower half). Clover and ryegrass undersown in barley: Mar 22. Ploughed fallow, lupin and rape plots: Aug 30, Oct 20 and Mar 21. Sulphate of ammonia applied, lupins and rape sown: Apr 19. Rape dusted with D.D.T: May 12 and 26.

Cabbages (Lower half). Dung and straw applied to fallow, clover and ryegrass plots, and ploughed in: June 8. Basal fertilizers applied, cabbages planted and watered in, on 'early' half plots of fallow, lupins and ryegrass: June 13. Owing to dry weather the cabbages on 'early' half plots failed, and decision was made to replant: July 9. Dung and straw applied to lupin and rape plots and ploughed in: July 10. Reploughed rape plots: July 12. Basal fertilizers applied to remaining plots, cabbages planted and watered in on all plots: July 25. Harvested: Jan 9. Variety: January King.

Barley (Upper half). Ploughed: Mar 29 Ground chalk (44½ cwt per acre) applied: Apr 5. Seed drilled at 3 bushels per acre: Apr 16. Ground chalk (43 cwt per acre) applied: Apr 17. Sulphate of ammonia applied, clover and ryegrass undersown: Apr 18. Harvested: Sept 3. Variety: Plumage Archer.

Standard errors per plot:

Cabbages, weight of headed cabbages: 0.383 tons per acre or 20.4% (9 d.f.)

Barley, grain: 1.99 cwt per acre or 12.6% (7 d.f.)*

*2 missing values.

Summary of Results

Lower Half - Cabbages

	Green Manure					
	None	Lupins	Clover	Rape	Rye-grass	Mean
Weight of headed cabbages: tons per acre			(±0.192)			(±0.086)
No Dung	1.36	1.74	2.43	0.84	1.62	1.60
Dung	1.84	2.81	3.03	0.82	2.28	2.15
No Straw	1.52	2.23	2.85	1.08	2.10	1.96
Straw	1.67	2.33	2.61	0.58	1.80	1.80
Sulph.amm.						
2 cwt per acre	1.09	1.88	2.61	0.42	1.32	1.46
4 cwt per acre	2.11	2.67	2.85	1.24	2.58	2.29
Sulph.amm.to barley*						
Low	1.37	2.28	2.65	0.70	1.64	1.73
High	1.83	2.27	2.81	0.95	2.26	2.02
Mean (±0.135)	1.60	2.28	2.73	0.83	1.95	1.88

Total produce: tons per acre

No Dung	4.44	5.26	5.83	3.87	4.86	4.85
Dung	4.88	6.22	6.42	3.62	5.61	5.35
No Straw	4.59	5.64	6.50	4.43	5.47	5.33
Straw	4.72	5.83	5.75	3.05	5.01	4.87
Sulph.amm						
2 cwt per acre	3.89	5.28	5.72	3.04	4.61	4.51
4 cwt per acre	5.42	6.20	6.53	4.44	5.86	5.69
Sulph.amm.to barley*						
Low	4.33	5.60	5.94	3.78	4.93	4.92
High	4.98	5.87	6.31	3.70	5.54	5.28
Mean	4.66	5.74	6.13	3.74	5.24	5.10

*Sulphate of ammonia to barley and green manure crops, 1950.

Lower Half - Cabbages

Green Manure

	None	Lupins	Clover	Rape	Rye-grass	Mean
Headed cabbages as percentage of total number						
No dung	20.2	24.4	30.2	12.6	23.1	22.1
Dung	25.0	33.9	36.5	12.0	27.6	27.0
No Straw	21.0	30.3	34.8	15.1	27.2	25.7
Straw	24.2	28.0	32.0	9.5	23.5	23.4
Sulph. amm.						
2 cwt per acre	17.2	26.1	33.6	7.5	20.1	20.9
4 cwt per acre	27.9	32.2	33.2	17.1	30.6	28.2
Sulph. amm. to barley*						
Low	21.0	30.0	34.2	10.9	21.5	23.5
High	24.2	28.4	32.6	13.6	29.2	25.6
Mean	22.6	29.2	33.4	12.3	25.4	24.6

Differential Responses

Response to	Mean	Dung Abs.	Dung Pres.	Straw Abs.	Straw Pres.	Sulph. Amm. cwt per acre 2	Sulph. Amm. cwt per acre 4	Sulph. Amm. barley* Low	Sulph. Amm. barley* High
Weight of headed cabbages: tons per acre									
	(±0.121)			(±0.173)					
Dung	0.56	-	-	0.62	0.50	0.33	0.79	0.65	0.47
Straw	-0.16	-0.10	-0.22	-	-	-0.09	-0.23	-0.34	0.02
Sulph. amm.	0.82	0.59	1.05	0.89	0.75	-	-	0.87	0.77
Sulph. amm. to barley*	0.30	0.39	0.21	0.12	0.48	0.35	0.25	-	-
Total produce: tons per acre									
Dung	0.50	-	-	0.66	0.34	0.47	0.53	0.50	0.50
Straw	-0.46	-0.30	-0.62	-	-	-0.38	-0.54	-0.57	-0.35
Sulph. amm.	1.19	1.16	1.22	1.27	1.11	-	-	1.20	1.18
Sulph. amm. to barley*	0.37	0.37	0.37	0.26	0.48	0.38	0.36	-	-
Headed cabbages as percentage of total number									
Dung	4.9	-	-	5.9	3.9	3.8	6.0	6.4	3.4
Straw	-2.2	-1.2	-3.2	-	-	-1.2	-3.2	-4.0	-0.4
Sulph. amm.	7.3	6.2	8.4	8.3	6.3	-	-	7.4	7.2
Sulph. amm. to barley*	2.1	3.6	0.6	0.3	3.9	2.2	2.0	-	-

*Sulphate of ammonia to barley and green manure crops, 1950

Upper Half - Barley

	Green Manure					
	None	Lupins	Clover	Rape	Rye-grass	Mean
Grain: cwt per acre (±1.00)						(±0.45)
No Dung to cabbages 1950	13.7	18.7	14.4	14.2	13.5	14.9
Dung to cabbages	17.1	17.2	17.0	16.7	16.0	16.8
No straw to cabbages 1950	13.4	17.4	15.0	15.1	13.1	14.8
Straw to cabbages	17.3	18.5	16.4	15.8	16.4	16.9
Sulph.Amm. to cabbages 1950						
2 cwt per acre	16.0	17.4	15.1	15.3	12.2	15.2
4 cwt per acre	14.7	18.5	16.4	15.6	17.4	16.5
Sulph.Amm. to barley						
Nil	12.5	14.4	14.7	12.1	13.6	13.5
1½ cwt per acre	18.2	21.5	16.7	18.8	16.0	18.2
Mean (±0.71)	15.4	18.0	15.7	15.4	14.8	15.9

Straw: cwt per acre

No Dung to cabbages 1950	14.0	15.2	16.8	14.4	13.8	14.8
Dung to cabbages	16.8	17.6	18.5	15.4	16.4	17.3
No straw to cabbages 1950	14.2	16.1	19.8	14.2	14.4	15.7
Straw to cabbages	16.6	18.6	15.5	15.5	15.8	16.4
Sulph.Amm. to cabbages 1950						
2 cwt per acre	14.7	19.0	18.7	15.5	14.0	16.4
4 cwt per acre	16.2	15.7	16.6	14.3	16.2	15.8
Sulph.Amm. to barley						
Nil	13.2	15.4	15.0	11.5	14.4	13.9
1½ cwt per acre	17.7	19.3	20.3	18.3	15.8	18.3
Mean	15.4	17.3	17.6	14.9	15.1	16.1

Upper Half - Barley

Differential Responses

Response to	Mean	Dung to Cabbages Abs.	Dung to Cabbages Pres	Straw to Cabbages Abs.	Straw to Cabbages Pres.	Sulph. amm. to cabbages cwt per acre 2	Sulph. amm. to cabbages cwt per acre 4	Sulph.amm. to barley cwt per acre 0	Sulph.amm. to barley cwt per acre 1½
				Grain: cwt per acre					
	(±0.63)					(±0.90)			
Dung to cabbages 1950	1.9	-	-	1.9	1.9	2.9	0.9	0.3	3.5
Straw to cabbages 1950	2.1	2.1	2.1	-	-	2.7	1.5	0.8	3.4
Sulph.amm. to cabbages 1950	1.3	2.3	0.3	1.9	0.7	-	-	1.6	1.0
Sulph.amm. to barley	4.8	3.2	6.4	3.5	6.1	5.1	4.5	-	-
				Straw: cwt per acre					
Dung to cabbages 1950	2.5	-	-	1.2	3.8	2.6	2.4	2.3	2.7
Straw to cabbages 1950	0.7	-0.6	2.0	-	-	0.7	0.7	1.2	0.2
Sulph.amm. to cabbages 1950	-0.6	-0.5	-0.7	-0.6	-0.6	-	-	0.8	-2.0
Sulph.amm. to barley	4.4	4.2	4.6	4.9	3.9	5.8	3.0	-	-

LEY AND ARABLE ROTATIONS

Woburn Stackyard - 1951 the 14th year.

For details of rotations etc., see Appendix Z 1950.

Cultivations, etc.:
Block I. Barley. Ploughed: Oct 4. Ground chalk applied: Apr 5. Seed drilled at 3 bushels per acre, basal fertilizers applied: Apr 16. Harvested: Aug 31. Variety: Plumage Archer.

Block II. Ley - first year. Ploughed: Aug 29 and again Oct 19. Basal fertilizers applied, seeds sown: Apr 19. Nitrochalk applied: Apr 20. Topped: June 18 and July 9. Grazed by sheep: July 16-20, Aug 13-21, Aug 30 - Sept 7, and Sept 27 - Oct 6. Seeds mixture per acre: 21 lb S23 Perennial Ryegrass, 12 lb S143 Cocksfoot, 6 lb Late flowering Montgomery Red Clover, 3 lb S100 White Clover.

Lucerne - first year. Ploughed: Aug 31 and again Oct 19. Basal fertilizers applied, seed drilled at 28 lb per acre: Apr 19. Dusted with DDT: May 25 and June 1. First cut: Aug 10. Second cut: Oct 8. Variety: Du Puits.

Potatoes. Ploughed: Aug 30 and Oct 19. Ridged, basal fertilizers applied: May 3. Potatoes planted: May 7. Earthed up ridges: July 11. Sprayed with Copper fungicide, 5 lb per acre: Aug 18 and again Sept 8. Sprayed with 15% Sulphuric acid: Sept 26. Lifted: Oct 4. Variety: Irish Majestic.

Block III. Potatoes. Ploughed: Oct 19. Ridged, dung applied: May 10. Potatoes planted: May 11. Earthed up ridges: July 11. Sprayed with Copper fungicide, 5 lb per acre: Aug 18 and again Sept 8. Sprayed with 15% Sulphuric acid: Aug 26. Lifted: Oct 5. Variety: Irish Majestic.

Block IV. Ley - second year. Nitrochalk applied: June 23. Grazed by sheep: May 26-30, June 3-8, 16-22, July 2-8, 20-28, Aug 26-28, Sept 10-19.

Lucerne - second year. First cut: July 5. Second cut: Aug 10. Third cut: Oct 10.

Rye. Ploughed: Oct 4. Seed drilled at 3 bushels per acre: Oct 19. Basal nitrochalk applied: Apr 19. Harvested: Aug 15. Variety: King II.

Block V. Ley - third year. Grazed by sheep: May 22-26, May 30 - June 3, June 12-25, July 8-14, July 28 - Aug 5, Aug 21-26, Sept 19-27, Oct 9-19.

Lucerne - third year. First cut: July 5. Second cut: Aug 10. Third cut: Oct 8.

Hay. Seeds mixture undersown in Rye: Mar 28 1950. 2 cwt Nitrochalk per acre applied: Apr 19. First cut: June 8. 1 cwt Nitrochalk per acre applied: June 20. Second cut: Sept 26. Seeds mixture per acre: 27 lb S24 Perennial Ryegrass, 12 lb Montgomery Red Clover, 3 lb Canadian Alsike Clover.

Sugar beet. Ploughed: Aug 30, Oct 4 and Mar 30.
Basal fertilizers applied: Apr 19. Seed drilled at 18 lb
per acre: Apr 24. Singled: June 4. Lifted: Oct 10.
Variety: Klein E.

Standard errors per plot:

Block I. Barley
Grain. whole plot: 2.06 cwt per acre or 11.9% (4 d.f.)
sub plot: 2.73 cwt per acre or 15.8% (4 d.f.)

Block III. Potatoes
Total tubers. whole plot: 0.756 tons per acre or 5.5% (4 d.f.)
sub-plot: 0.694 tons per acre or 5.1% (4 d.f.)

Summary of Results

Barley

Block I

Previous Rotation

	Ley. Lucerne	Arable with hay	Arable with sugar beet	Mean
		Grain: cwt per acre		
No Dung (±1.99)(1)	15.8	19.9	16.3	14.2	16.6
Dung in 1950	17.0	22.6	16.4	15.8	17.9
Mean (±1.45)	16.4	21.2	16.4	15.0	17.3
Increase (±2.73)	1.2	2.7	0.1	1.6	1.3 (±1.36)
		Straw: cwt per acre			
No Dung	16.2	19.6	16.4	15.0	16.8
Dung in 1950	17.8	21.3	18.4	16.4	18.5
Mean	17.0	20.4	17.4	15.7	17.6
Increase	1.6	1.7	2.0	1.4	1.7

Standard error (1) for use in comparisons other than vertical

Block II

Ley. 1st year

	Sheep days of grazing per acre	No. of sheep carried per acre for the year
Mean	556	1.5

Lucerne. 1st year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st Crop	2nd Crop	Total
No Dung	8.1	11.0	19.1
Dung in 1949	8.1	11.6	19.7
Mean	8.1	11.3	19.4
Increase	0.0	0.6	0.6
Previous Rotation			
Lucerne	9 7	12.1	21.8
Arable with Sugar Beet	6.5	10.5	17.0

Block II

Potatoes

	Total tubers tons per acre	Percentage Ware
No Dung	10.03	84.0
Dung in 1949	11.28	86.6
Mean	10.66	85.3
Increase	1.25	2.6
Previous Rotation		
Ley	11.46	87.6
Lucerne	10.56	82.4
Arable with Hay	10.62	85.8
Arable with Sugar Beet	9.98	85.4

Block III

Potatoes

	Previous Rotation				
	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
	Total tubers: tons per acre				
No Dung (±0.637)(1)	14.72	12.62	10.80	10.84	12.24
Dung in 1951	15.98	15.68	14.36	14.18	15.05
Mean (±0.534)	15.35	14.15	12.58	12.51	13.65
Increase (±0.694)	1.26	3.06	3.56	3.34	2.81 (±0.347)
	Percentage Ware				
No Dung	96.0	91.4	91.6	93.2	93.1
Dung in 1951	90.0	92.8	95.1	94.9	93.2
Mean	93.0	92.1	93.4	94.0	93.1
Increase	-6.0	1.4	3.5	1.7	0.1

Standard error (1) for use in comparisons other than vertical

Block IV

Ley. 2nd year

	Sheep days of grazing per acre	No. of sheep carried per acre for the year
Mean	1857	5.1

Lucerne. 2nd year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st Crop	2nd Crop	3rd Crop	Total
No Dung	32.7	11.8	10.6	55.1
Dung in 1948	40.0	13.5	13.0	66.5
Mean	36.4	12.6	11.8	60.8
Increase	7.3	1.7	2.4	11.4
Previous Rotation				
Lucerne	49.9	13.1	13.4	76.4
Arable with Hay	22.8	12.2	10.2	45.2

Rye

	Grain: cwt per acre	Straw: cwt per acre
No Dung	28.1	38.7
Dung in 1948	29.5	41.9
Mean	28.8	40.3
Increase	1.4	3.2
Previous Rotation		
Ley	29.3	42.4
Lucerne	30.8	39.8
Arable with Hay	27.7	37.9
Arable with Sugar Beet	27.5	41.0

Block V

Ley. 3rd year

	Sheep days of grazing per acre	No. of sheep carried per acre for the year
Mean	1947	5.3

Lucerne. 3rd year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st Crop	2nd Crop	3rd Crop	Total
No Dung	40.7	19.4	9.6	69.7
Dung in 1947	44.2	19.4	10.5	74.1
Mean	42.4	19.4	10.0	71.9
Increase	3.5	0.0	0.9	4.4
Previous Rotation				
Lucerne	40.2	17.7	9.5	67.4
Arable with Sugar Beet	44.7	21.1	10.6	76.4

Hay

Yield (85% Dry Matter) cwt per acre

	1st Crop	2nd Crop	Total
No Dung	53.6	17.8	71.4
Dung in 1947	56.8	17.8	74.6
Mean	55.2	17.8	73.0
Increase	3.2	0.0	3.2
Previous Rotation			
Ley	59.9	24.4	84.3
Arable with Hay	50.5	11.2	61.7

51/Be/1.7

Block V

Sugar Beet

	Clean Beet tons per acre	Tops tons per acre	Total Sugar cwt per acre	Sugar %
No Dung	10.16	10.04	33.6	16.53
Dung in 1947	9.92	9.66	33.0	16.62
Mean	10.04	9.85	33.3	16.57
Increase	-0.24	-0.38	-0.6	0.09
Previous Rotation				
Lucerne	11.30	10.28	37.5	16.62
Arable with Sugar Beet	8.78	9.42	29.0	16.53

WOBURN MARKET GARDEN EXPERIMENT

Organic manures and nitrochalk - Lansome 1951 the 10th year.

The present cropping comprises two series, each carrying in turn the crops of a two-course rotation: 1st year - Globe beet followed by Spring Cabbages; 2nd year - Leeks.

System of replication (each series): 4 randomized blocks of 10 plots each, certain interactions being confounded with block differences.

Area of each plot: 0.0125 acre.

Treatments applied to each crop:
Organic manures: Dung; sewage sludge compost; sewage sludge (West Middlesex); vegetable compost, each at 15 and 20 tons per acre.
Nitrochalk; None; 0.3 cwt N per acre on plotsreceiving organic manure. None; 0.3, 0.6, 0.9 cwt N per acre on plots not receiving organic manure. The last two rates are applied in two equal dressings.

Basal manuring per acre: 0.3 cwt P_2O_5; 0.3 cwt K_2O, applied as granular fertilizer (13¾% P_2O_5; 13¾% K_2O).

Cultivations, etc:
Globe beet. Organic manures applied and ploughed in: May 11. Basal manure and nitrochalk applied (first dressing to 0.6 and 0.9 N plots), seed drilled at 13 lb per acre: May 15. Dusted against flea beetle: June 2 and again June 9. Singled:July 9. Second application of nitrochalk to 0.6 and 0.9 N plots: July 12. Lifted: July 31-Sept 13, 1951. Variety: Detroit.

Spring Cabbages 1951-52. Organic manures applied and ploughed in: Sept 17. Basal manures applied: Sept 18. Cabbages planted and watered in: Sept 19. Sprayed with D.D.T: Oct 10. Nitrochalk applied (first dressing to 0.6 and 0.9 N plots): Mar 3. Second dressing of nitrochalk to 0.6 and 0.9 N plots: Mar 14. Cut: May 6-July 7, 1952. Variety: Durham Early.

Leeks 1951-52. Organic manures applied and ploughed in: Apr 27. Basal manures and nitrochalk applied (first dressing to 0.6 and 0.9 N plots): July 16. Leeks planted and watered in: July 23. Second dressing of nitrochalk to 0.6 and 0.9 N plots: Sept 11. Harvested: Jan 8-Mar 28, 1952. Variety: Musselburgh.

Standard errors per plot:
Globe beet, weight of saleable bulbs: 1.25 tons per acre or 20.4% (17 d.f.)
Spring Cabbages, weight of headed cabbages: 0.844 tons per acre or 23.1% (17 d.f.)
Leeks, saleable weight: 0.517 tons per acre or 8.8% (17 d.f.)

Summary of Results

Globe Beet

Organic Manures	Level of manuring (tons/acre)	Nitrochalk, cwt N per acre: None	0.3	0.6	0.9	Mean
Weight of saleable bulbs: tons per acre			(±0.884)			(±0.625)
None		3.98	4.83	4.68	6.42	4.41*
Dung	10	6.68	5.50			6.09
	20	6.07	7.10			6.59
Sludge compost	10	4.95	7.61			6.28
	20	7.05	6.96			7.00
Sludge	10	5.23	5.46			5.34
	20	6.14	8.62			7.38
Vegetable compost	10	5.46	7.14			6.30
	20	6.27	6.46			6.37
Mean (±0.313)		5.98†	6.86†			6.13
Total produce: tons per acre						
None		7.48	8.92	8.62	13.57	8.20*
Dung	10	10.98	10.23			10.61
	20	10.75	12.05			11.40
Sludge compost	10	8.36	12.26			10.31
	20	11.67	11.39			11.53
Sludge	10	8.71	9.92			9.32
	20	10.86	14.29			12.58
Vegetable compost	10	9.21	11.57			10.39
	20	10.37	11.11			10.74
Mean		10.12†	11.60†			10.62
Plant number: thousands per acre						
None		54.4	50.1	47.6	65.8	52.3*
Dung	10	61.2	52.0			56.6
	20	52.6	51.4			52.0
Sludge compost	10	43.8	55.6			49.8
	20	63.4	55.6			59.5
Sludge	10	42.5	50.0			46.3
	20	50.0	63.8			56.9
Vegetable compost	10	50.2	58.9			54.5
	20	52.4	57.0			54.7
Mean		52.0†	55.5†			53.9

* Mean over None and 0.3 cwt N per acre only.
† Excluding 'No organics'.

Spring Cabbages

Organic Manures	Level of manuring (tons/acre)	Nitrochalk, cwt N per acre: None	0.3	0.6	0.9	Mean
Weight of headed cabbages: tons per acre						
			(±0.597)			(±0.422)
None		0.61	2.08	2.88	3.94	1.34*
Dung	10	2.64	2.59			2.62
	20	3.63	5.05			4.34
Sludge compost	10	2.37	3.66			3.02
	20	3.88	4.93			4.40
Sludge	10	3.56	5.34			4.45
	20	6.04	6.72			6.38
Vegetable compost	10	2.43	4.69			3.56
	20	2.39	3.61			3.00
Mean (±0.211)		3.37†	4.57†			3.65
Total produce: tons per acre						
None		1.72	4.10	4.86	5.64	2.92*
Dung	10	4.36	4.68			4.52
	20	5.78	6.86			6.32
Sludge compost	10	4.30	5.88			5.10
	20	5.96	6.63			6.30
Sludge	10	6.18	7.50			6.84
	20	8.01	8.82			8.42
Vegetable compost	10	4.26	6.00			5.13
	20	4.72	5.57			5.14
Mean		5.45†	6.49†			5.59
Percentage headed cabbages, (by number)						
None		14.2	32.0	43.2	53.6	23.1*
Dung	10	45.0	42.1			43.6
	20	49.2	66.4			57.8
Sludge compost	10	42.2	52.4			47.3
	20	52.7	62.4			57.5
Sludge	10	44.0	59.6			51.8
	20	64.0	70.6			67.4
Vegetable compost	10	40.8	68.2			54.4
	20	36.8	51.6			44.2
Mean		46.8†	59.2†			49.5

* Mean over None and 0.3 cwt N per acre only.
† Excluding 'No organics'.

Leeks

Organic Manures	Level of manuring (tons/acre)	Nitrochalk, cwt N per acre: None	0.3	0.6	0.9	Mean
Saleable weights: tons per acre						
			(±0.366)			(±0.258)
None		2.62	3.92	4.93	4.63	3.27*
Dung	10	5.16	5.89			5.52
	20	7.54	7.40			7.47
Sludge compost	10	5.31	6.03			5.67
	20	6.72	6.92			6.82
Sludge	10	6.00	5.94			5.97
	20	6.79	7.21			7.00
Vegetable compost	10	4.80	6.05			5.43
	20	6.51	7.28			6.90
Mean (±0.129)		6.10+	6.59+			5.88
Percentage saleable (by number)						
None		86.8	94.0	95.7	95.2	90.4*
Dung	10	95.8	97.3			96.5
	20	97.9	97.5			97.7
Sludge compost	10	95.8	97.9			96.9
	20	97.8	97.0			97.4
Sludge	10	97.8	97.2			97.5
	20	98.0	98.3			98.1
Vegetable compost	10	98.2	97.0			97.6
	20	97.8	97.6			97.7
Mean		97.4†	97.5†			96.5

* Mean over None and 0.3 cwt N per acre only.
† Excluding 'No organics'.

IRRIGATION EXPERIMENT

The 1st Year

The effects of irrigation and nitrogen - Woburn Butt Close 1951.

The present cropping comprises four series; three of these in turn carry the crops of a 3-course rotation:-

1st year: Early potatoes followed by winter cabbages
2nd year: Sugar beet
3rd year: Barley

The fourth series remains in long term grass for cutting.

System of replication: 3 randomized blocks of 4 plots each, plots being split into two for the application of nitrogen.

Treatments: All combinations of:-
Whole plots. Irrigation: None - O, and three rates A, B, and C applied to crops as under.
Sub plots. Nitrogen: 2 levels applied to crops as under.

Irrigation in inches

Week ending	Early Potatoes A	B	C	Sugar Beet A	B	C	Barley A	B	C	Cut Grass A	B	C
June 18		.14	.35					.56	.77		.57	.76
25		.40	.50		1.20	1.40	.30	.47	.50	.33	.67	.79
July 2		.67	.65						.20			
9					.50	.67		.67	.61			.67
16		.83	.67						.69			
23						.68				.33	.50	.67
30												
Aug 6						.67			.48			.67
13												
20				1.67						.33	.50	
27												
Total: inches	NIL	2.04	2.17	1.67	1.70	3.42	0.30	1.70	3.25	0.99	2.24	3.56

Note. The irrigations shown above were not those originally intended since water was not available until the week ending June 18, and then only at low pressure. The full supply came in late summer in the middle of the wet period.

On Potatoes A was the same as O.

Levels of nitrogen (in addition to N in basal dressing):

cwt N per acre

Early Potatoes:	None;	0.5	Applied as sulphate of ammonia
Winter Cabbages (after potatoes):	0.5;	1.0	Applied as nitrochalk
Sugar beet:	None;	0.4	Applied as nitrochalk
Barley:	None;	0.2	Applied as sulphate of ammonia
Cut grass:	0.15;	0.30	Applied as nitrochalk after each cut

Basal manurings: cwt per acre.

	N	P_2O_5	K_2O
Early potatoes	0.5	0.5	0.75
Winter Cabbages (after potatoes)		NIL	
Sugar beet	0.4	0.4	0.6
Barley	0.2	0.2	0.3
Cut grass (yearly)		0.6	0.6

Cultivations, etc.:
Early Potatoes: Ploughed: Mar 8. Potatoes planted by machine: Apr 25. Fertilizers applied: Apr 25. Earthed up ridges: July 3 Lifted: July 31. Variety: Ulster Chieftain.
Winter Cabbages: Planted and watered in: Aug 2. Cut: Feb 5, 22, Mar 19, 25 and 26. Variety: January King.
Sugar beet: Seed drilled: Apr 24. Fertilizers applied: Apr 25. Singled: June 4. Lifted: Nov 13. Variety: Klein E.
Barley: Seed drilled: Apr 24. Fertilizers applied: Apr 25. Harvested: Aug 29. Variety: Plumage Archer.
Cut grass: Seeds mixture broadcast: Apr 24. Basal fertilizers applied: Apr 25. Cut: July 11, Aug 13, Sept 4, Oct 9. Nitrochalk applied after first three cuts. Seeds mixture (lb per acre): Italian Ryegrass (English leafy) - 6; S26 Cocksfoot - 16; S100 White Clover - 4; Canadian Alsike - 2.

Previous crop, all plots: Potatoes.

Standard errors per plot:

Early Potatoes.	Total clean tubers,	whole plot:	0.238 tons per acre or 4.2% (7 d.f.)
		sub plots:	0.307 tons per acre or 5.4% (9 d.f.)
Cabbages.	Weight headed cabbages,	whole plot:	0.274 tons per acre or 11.2% (6 d.f.)
		sub plot:	0.558 tons per acre or 22.7% (8 d.f.)

Sugar beet.	Total sugar,	whole plot:	2.60 cwt per acre or 5.0% (6 d.f.)
		sub plot:	3.18 cwt per acre or 6.1% (8 d.f.)
	Tops,	whole plot:	0.581 tons per acre or 5.2% (6 d.f.)
		sub plot:	1.24 tons per acre or 11.1% (8 d.f.)
Barley.	Grain,	whole plot:	1.45 cwt per acre or 5.2% (6 d.f.)
		sub plot:	1.98 cwt per acre or 7.1% (8 d.f.)
Cut grass (total of 4 cuts)	Hay (85% D.M.)	whole plot:	4.95 cwt per acre or 8.9% (6 d.f.)
		sub plot:	2.90 cwt per acre or 5.2% (8 d.f.)

Summary of Results

Early Potatoes. Total tubers tons per acre

cwt N per acre	Irrigation 0	B	C	Mean
	(±0.130)*	(±0.183)*		
0	3.78	6.76	7.66	5.49
0.5	3.88	6.97	8.56	5.82
Mean	3.83 (±0.097)	6.86	8.11 (±0.137)	5.66
Difference	0.10 (±0.177)	0.21	0.90 (±0.251)	0.33 (±0.125)

*for use in comparisons other than vertical.

Winter Cabbages

cwt N per acre	Irrigation to previous potato crop 0	A	B	C	Mean
Weight of headed cabbage: tons per acre					
			(±0.278)*		
0.5	2.47	2.31	1.80	1.71	2.07
1.0	3.27	2.96	2.13	2.98	2.85
Mean (±0.158)	2.87	2.63	1.98	2.34	2.46
Difference (±0.456)	0.80	0.65	0.38	1.27	0.78 (±0.228)
Total produce: tons per acre					
0.5	6.22	6.19	5.52	5.75	5.92
1.0	7.75	7.60	6.64	7.51	7.37
Mean	6.98	6.89	6.08	6.63	6.65
Difference	1.53	1.41	1.12	1.76	1.45
Percentage (by number) of Headed Cabbages					
0.5	36.7	33.0	27.2	27.3	31.1
1.0	40.9	38.1	30.9	38.7	37.2
Mean	38.8	35.6	29.1	33.0	34.1
Difference	4.2	5.1	3.7	11.4	6.1

*for use in comparisons other than vertical

Sugar Beet

cwt N per acre	Irrigation 0	A	B	C	Mean
	Clean beet: tons per acre				
0	12.56	13.76	13.41	13.48	13.30
0.4	16.50	16.05	17.55	18.17	17.07
Mean	14.53	14.91	15.48	15.82	15.19
Difference	3.94	2.29	4.14	4.69	3.77
	Sugar percentage				
0	17.34	17.22	17.21	17.06	17.21
0.4	17.23	16.73	17.43	17.21	17.15
Mean	17.28	16.98	17.32	17.13	17.18
Difference	-0.11	-0.49	0.22	0;15	-0.06
	Total sugar: cwt per acre				
			(±1.98)*		
0	43,5	47.5	46.2	46.0	45.8
0.4	56.8	53.7	61.1	62.5	58.6
Mean (±1.50)	50.2	50.6	53.7	54.3	52.2
Difference (±2.60)	13.3	6.2	14.9	16.5	12.8 (±1.30)

*for use in comparisons other than vertical.

Sugar Beet

cwt N per acre	Irrigation 0	A	B	C	Mean
Tops: tons per acre					
		(±0.606)*			
0	7.96	9.04	8.08	9.62	8.68
0.4	12.66	14.28	12.45	14.68	13.52
Mean (±0.336)	10.31	11.66	10.27	12.15	11.10
Difference (±1.010)	4.70	5.24	4.37	5.06	4.84 (±0.505)

*for use in comparisons other than vertical.

Noxious nitrogen: mg./100 g.					
0	26.7	28.3	30.0	26.7	27.9
0.4	28.3	30.0	30.0	28.3	29.2
Mean	27.5	29.2	30.0	27.5	28.5
Difference	1.6	1.7	0.0	1.6	1.3

cwt N per acre	Irrigation 0	A	B	C	Mean
Barley, grain: cwt per acre					
			(±1.16)*		
0	21.7	22.1	25.8	29.0	24.6
0.2	30.1	29.5	31.7	33.2	31.1
Mean (±0.84)	25.9	25.8	28.8	31.1	27.9
Difference (±1.61)	8.4	7.4	5.9	4.2	6.5 (±0.81)
Barley, straw: cwt per acre					
0	22.2	22.5	26.7	32.5	26.0
0.2	29.6	27.7	32.1	36.1	31.4
Mean	25.9	25.1	29.4	34.3	28.7
Difference	7.4	5.2	5.4	3.6	5.4
Cut Grass (Total of 4 cuts): Hay at 85% D.M. : cwt per acre					
after each cut			(±3.09)*		
0.15	40.5	42.9	51.5	60.1	48.8
0.30	56.9	57.9	65.3	70.0	62.5
Mean (±2.86)	48.7	50.4	58.4	65.1	55.6
Difference (±2.36)	16.4	15.0	13.8	9.9	13.7 (±1.18)

*for use in comparisons other than vertical.

WHEAT

Control of Eyespot Rotation Experiment - Little Knott 1951 the 3rd year.

Arrangement of previous treatment crops: 4 longitudinal and 4 cross strips.

Area of each plot: Variable. Area harvested: Plot 225 (WW) 0.008 acre, average of remainder 0.08 acre.

Treatments: Longitudinal strips, crops grown in 1950 -
Wheat; Oats; Barley; Ryegrass
Cross strips, crops grown in 1949 -
Wheat; Winter Beans; Potatoes; Fallow.

Basal manuring: $2\frac{1}{2}$ cwt sulphate of ammonia per acre.

Cultivations, etc: Ploughed: Sept 11. Seed drilled at 3 bushels per acre: Oct 18. Sprayed with D.N.O.C.: May 11. Sulphate of ammonia applied: May 26. Harvested: Aug 23. Variety: Squareheads Master 13/4.

Summary of Results

	Crop in 1950				
	Wheat	Oats	Barley	Rye-grass	Mean
Crop in 1949	Grain: cwt per acre				
Wheat	24.6	33.8	24.9	32.0	28.8
Beans	21.4	33.7	21.8	35.6	28.1
Potatoes	22.4	32.8	25.9	37.3	29.6
Fallow	23.6	35.5	29.8	39.4	32.1
Mean	23.0	34.0	25.6	36.1	29.7
	Straw: cwt per acre				
Wheat	34.7[E]	47.3	38.3	45.8	41.5
Beans	30.7	48.3	34.3	50.1	40.8
Potatoes	29.9	43.8	39.2	51.9	41.2
Fallow	33.5	46.2	40.7	54.9	43.8
Mean	32.2	46.4	38.1	50.7	41.8

[E] Estimated value

WHEAT

Wireworm Experiment 1

Residual and direct effects of insecticides - Little Hoos 1951

System of replication: 3 randomized blocks of 9 plots each.
Area of each plot: 0.0289 acre.
Treatments:
None from 1948 onwards (duplicate plots).
Applied 1948. D.D. injected, 400 lb per acre; Ethylene dibromide 41% solution, injected, 15 gallons per acre; D.D.T. dust combine drilled, $\frac{3}{4}$ cwt per acre; Gammexane broadcast, 2 cwt per acre; Gammexane combine drilled, $\frac{3}{4}$ cwt per acre.
Applied 1951. Chlordane, 100 lb (5%); Gammexane, 56 lb per acre, both combine drilled.

Basal manuring per acre: 2 cwt superphosphate; 1 cwt sulphate of potash; $2\frac{1}{2}$ cwt sulphate of ammonia as top dressing.

Cultivations, etc: Ploughed: Sept 4. Basal phosphate and potash drilled: Oct 26. Seed combine drilled at 3 bushels per acre with insecticides: Oct 27. Sprayed with D.N.O.C.: May 15. Basal sulphate of ammonia drilled: May 25. Harvested: Aug 23. Variety: Nord Desprez. Previous crop: Wheat.

Standard error per plot:
Grain: 2.05 cwt per acre or 12.1% (17 d.f.)

Summary of Results

	Untreated from 1948 onwards	Treatments applied in 1948					Treatments applied in 1951		Mean
		D.D. Injected	Ethylene Dibromide Injected	D.D.T. Dust Drilled	Gammexane Broadcast	Gammexane Drilled	Chlordane Drilled	Gammexane Drilled	
				Grain: cwt per acre					
Mean (±1.18)	14.7(1)	15.6	15.5	20.3	17.2	16.5	18.2	20.1	17.0
Increase (±1.45)		0.9	0.8	5.6	2.5	1.8	3.5	5.4	
				Straw: cwt per acre					
Mean	16.3	17.8	17.8	20.1	18.9	18.0	19.4	20.6	18.3
Increase		1.5	1.5	3.8	2.6	1.7	3.1	4.3	
				Plant number: thousands per acre					
Mean	1056	-	-	-	-	-	1072	1248	1108
Increase		-	-	-	-	-	16	192	
				Plant height: cms. June 11					
Mean	12.6	-	-	-	-	-	12.5	14.8	13.1
Increase		-	-	-	-	-	-0.1	2.2	

Standard error (1) ±0.84

Dashes indicate that no countswere taken.

WHEAT

Wireworm Experiment 2

Residual and direct effects of insecticides - Little Hoos 1951.

System of replication: 3 incomplete randomized blocks of 6 plots each.

Area of each plot: 0.0289 acre.

Treatments:
None from 1948 onwards (duplicate plots).
Applied 1948. Gammexane combine drilled with seed: $\frac{1}{4}$; $\frac{1}{2}$; 1 cwt per acre.
Applied 1951. Aldrin $2\frac{1}{2}\%$, 200 lb per acre; Gammexane, 56 lb per acre, both combine drilled with seed.

Basal manuring: 2 cwt superphosphate and 1 cwt sulphate of potash per acre; $2\frac{1}{2}$ cwt sulphate of ammonia per acre as top dressing.

Cultivations, etc: Ploughed: Sept 4. Basal phosphate and potash drilled: Oct 26. Seed combine drilled at 3 bushels per acre with insecticides: Oct 27. Sprayed with D.N.O.C: May 15. Basal sulphate of ammonia drilled: May 25. Harvested: Aug 23. Variety: Nord Desprez. Previous crop: Wheat.

Standard error per plot:
Grain: 0.787 cwt per acre or 3.6% (10 d.f.)

Summary of Results

	Untreated from 1948 onwards	Treatments applied 1948 Gammexane drilled ¼ cwt per acre	½ cwt per acre	1 cwt per acre	Treatments applied 1951 Aldrin 2½% Gammexane Drilled 200 lb per acre	56 lb per acre	Mean
			Grain: cwt per acre				
	(±0.32)		(±0.58)		(±0.45)		
Mean	19.8	19.5	19.9	20.6	26.2	25.7	21.9
Increase		-0.3	0.1	0.8	6.4	5.9	
			(±0.66)		(±0.55)		
			Straw: cwt per acre				
Mean	20.6	19.7	19.9	20.2	24.4	24.5	21.7
Increase		-0.9	-0.7	-0.4	3.8	3.9	
			Plant number: thousands per acre				
Mean	1003	1950	862	870	1162	1178	1022
Increase		-53	-141	-133	159	175	
			Plant height: cms. June 11				
Mean	14.3	13.8	14.3	12.8	15.6	15.6	14.5
Increase		-0.5	0.0	-1.5	1.3	1.3	

WHEAT

Control of Powdery Mildew - Sawyers III 1951.

System of replication: 2^5 factorial in 4 blocks of 8 plots each, 3 high order interactions being confounded with block differences.

Area of each plot: 0.0252 acre. Area harvested: 0.0197 acre.

Treatments: All combinations of:-
Sulphate of ammonia: None; 0.6 cwt N per acre.
Superphosphate: None; 0.6 cwt P_2O_5 per acre.
Muriate of potash: None; 1.2 cwt K_2O per acre.
Lime sulphur spray, concentration 1 in 80 applied in three doses, each at the rate of 160 gallons per acre: None; in winter; in late spring; in winter and in late spring.

Basal manuring: None.

Cultivations, etc.:- Ploughed: Sept 21. Superphosphate and muriate of potash applied: Oct 26. Seed drilled at 3 bushels per acre: Oct 27. Sulphate of ammonia applied: May 25. Spraying dates: Winter:- Jan 24, Feb 28, Mar 14. Late Spring:- Apr 3, May 14, June 18. Harvested: Aug 27. Variety: Bersee. Previous crop: Wheat.

Standard error per plot:
Grain: 2.08 cwt per acre or 25.1% (9 d.f.)

Notes

(1) The crop was severely infested with eyespot, take-all and weeds.

(2) Counts of Powdery Mildew infection were made and are available.

Summary of Results

	Spraying				
	None	In winter	In late spring	In winter and in late spring	Mean
Grain: cwt per acre					
Sulphate of ammonia					
None (±1.04)	6.3	6.9	6.9	7.6	6.9
0.6 cwt N per acre	9.7	9.6	10.4	8.7	9.6
Response to N (±1.47)	3.4	2.7	3.5	1.1	2.7 (1)
Superphosphate					
None (±1.04)	6.9	6.9	8.6	8.1	7.6
0.6 cwt P_2O_5 per acre	9.1	9.6	8.8	8.1	8.9
Response to P (±1.47)	2.2	2.7	0.2	0.0	1.3 (1)
Muriate of potash					
None (±1.04)	8.5	7.9	9.7	8.6	8.7
1.2 cwt K_2O per acre	7.5	8.6	7.7	7.7	7.9
Response to K (±1.47)	-1.0	0.7	-2.0	-0.9	-0.8 (1)
Mean (±0.73)	8.0	8.2	8.7	8.1	8.3
Straw: cwt per acre					
Sulphate of ammonia					
None	11.6	11.2	11.8	11.7	11.6
0.6 cwt N per acre	20.7	20.4	22.5	20.0	20.9
Response to N	9.1	9.2	10.7	8.3	9.3
Superphosphate					
None	15.1	14.9	16.9	17.0	16.0
0.6 cwt K_2O per acre	17.2	16.6	17.4	14.8	16.5
Response to P	2.1	1.7	0.5	-2.2	0.5
Muriate of Potash					
None	15.8	15.1	17.8	15.5	16.0
1.2 cwt K_2O per acre	16.6	16.4	16.5	16.2	16.4
Response to K	0.8	1.3	-1.3	0.7	0.4
Mean	16.2	15.8	17.1	15.9	16.2

(1) ±0.73

Responses to Treatments

Response to	Sulphate of ammonia abs.	Sulphate of ammonia pres.	Superphosphate abs.	Superphosphate pres.	Muriate of potash abs.	Muriate of potash pres.
	Grain: cwt per acre					
			(±1.04)			
Sulphate of ammonia	-	-	2.8	2.6	2.3	3.1
Superphosphate	1.4	1.2	-	-	0.8	1.8
Muriate of potash	-1.2	-0.4	-1.3	-0.3	-	-
	Straw: cwt per acre					
Sulphate of ammonia	-	-	10.0	8.6	8.5	10.1
Superphosphate	1.2	-0.2	-	-	-0.2	1.2
Muriate of potash	-0.4	1.2	-0.3	1.1	-	-

WHEAT

Late application of nitrogen - West Barnfield II, 1951.

System of replication: 8 randomized blocks of 3 plots each.

Area of each plot: 0.0136 acre.

Treatments:
Nitrochalk: None; 1½; 3 cwt per acre applied as a late top dressing.

Basal manuring: ¾ cwt superphosphate per acre, drilled with seed,
2½ cwt sulphate of ammonia per acre as a spring dressing.

Cultivations, etc.: Ploughed: Oct 5. Seed drilled at 3 bushels per acre, with superphosphate: Oct 24. Sulphate of ammonia drilled: Mar 25. Nitrochalk applied: July 5. Harvested: Aug 27. Variety: Nord Desprez. Previous crop: Spring Beans.

Standard errors per plot:
Grain: 1.58 cwt per acre or 4.3% (14 d.f.)
Straw: 2.00 cwt per acre or 4.7% (14 d.f.)

Summary of Results

	Nitrochalk: cwt per acre as top dressing			
	None	1½	3	Mean
Yield: cwt per acre				
Grain (±0.56)	36.7	35.9	36.4	36.3
Straw (±0.71)	42.8	44.0	42.0	42.9
Crude protein: cwt per acre				
Grain	3.53	3.51	3.62	
Increase		-0.02	0.09	
Straw	1.28	1.44	1.36	
Increase		0.16	0.08	
Percentage uptake of added Nitrogen				
Grain		-1	3	
Straw		12	3	

BARLEY

Late application of nitrogen - Stackyard 1951.

System of replication: 8 randomized blocks of 3 plots each.

Area of each plot: 0.0186 acre.

Treatments:
Nitrochalk: None; 1½; 3 cwt per acre applied as a late top dressing.

Basal manuring: 1 cwt Superphosphate per acre drilled with seed;
2 cwt Sulphate of ammonia per acre as a top dressing.

Cultivations, etc: Ploughed: Mar 31. Seed drilled at 3¼ bushels per acre with Superphosphate: May 2. Sulphate of ammonia applied: June 1. Sprayed with DNOC against weeds, Nitrochalk applied: July 11. Harvested: Sept 13. Variety: Plumage Archer. Previous crop: Kale.

Standard errors per plot:
Grain*: 2.31 cwt per acre or 7.1% (14 d.f.)
Straw*: 1.97 cwt per acre or 7.7% (14 d.f.)

Summary of Results

Nitrochalk: cwt per acre, as top dressing.

	None	1½	3	Mean
	Yield: cwt per acre			
Grain* (±0.82)	31.7	32.4	33.3	32.5
Straw* (±0.76)	24.5	24.8	27.4	25.6
	Crude protein: cwt per acre			
Grain	3.70	4.15	4.50	
Increase		0.45	0.80	
Straw	1.19	1.33	1.61	
Increase		0.14	0.42	
	Percentage uptake of added nitrogen			
Grain		30	27	
Straw		10	14	

* Corrected to 85% dry matter owing to variable conditions during harvesting.

SPRING OATS

Late application of nitrogen - Great Harpenden II 1951.

System of replication: 8 randomized blocks of 3 plots each.

Area of each plot: 0.0186 acre.

Treatments:
Nitrochalk: None; 1½; 3 cwt per acre applied as a late top dressing.

Basal manuring: 1½ cwt Superphosphate per acre drilled with the seed; 1⅔ cwt Sulphate of ammonia per acre as a top dressing.

Cultivations, etc.: Ploughed: Dec 23. Seed drilled at 4 bushels per acre with Superphosphate: Apr 19. Sulphate of ammonia applied: June 4. Nitrochalk applied: July 5. Harvested: Aug 23.
Variety: Sun II. Previous crop: Spring Oats.

Standard errors per plot:
Grain: 0.814 cwt per acre or 4.4% (14 d.f.)
Straw*: 1.06 cwt per acre or 7.7% (14 d.f.)

Summary of Results

	Nitrochalk: cwt per acre, as top dressing			
	None	1½	3	Mean
Yield: cwt per acre				
Grain (±0.29)	17.7	18.4	18.7	18.3
Straw* (±0.38)	12.8	13.9	14.8	13.8
Crude protein: cwt per acre				
Grain	1.98	2.18	2.29	
Increase		0.20	0.31	
Straw	0.55	0.74	0.94	
Increase		0.19	0.39	
Percentage uptake of added nitrogen				
Grain		14	11	
Straw		13	14	

*Corrected to 85% dry matter owing to variable conditions during harvesting.

SPRING BEANS

Fertilizer placement - West Barnfield I, 1951.

System of replication: 4 randomized blocks of 8 plots each, a high order interaction being confounded with block differences.

Area of each plot: 0.0152 acre. Area harvested: 0.0126 acre.

Treatments: None (quadruplicate plots) and all combinations of:
Granular compound fertilizer ($13\frac{3}{4}\%$ P_2O_5, $13\frac{3}{4}\%$ K_2O): 2.65; 5.30 cwt per acre.
Methods of placement: Drilled 3" below surface and 2" to side of seed (duplicate plots); broadcast on the flat and ploughed in (E); broadcast on the seed bed and harrowed in (L); half broadcast on the flat and ploughed in, half drilled; half broadcast on the seed bed and harrowed in, half drilled.

Basal manuring: None

Cultivations, etc.: 'E' fertilizers applied: Mar 8. Ploughed all plots: Mar 8. 'L' fertilizers applied, beans drilled at 4 bushels per acre with placed fertilizers as above: Apr 16. Sprayed with 1% nicotine against blackfly: June 11 and again July 19. Harvested: Sept 8. Previous crop: Wheat.

Standard errors per plot:
Yield, dry matter: 1.32 cwt per acre or 10.1% (18 d.f.)
Plant number: 9.59 thousands per acre or 8.2% (18 d.f.)

Summary of Results

Compound fertilizer cwt per acre	Method of Placement D	E	L	½E½D	½L½D	Mean
		Yield, dry matter: cwt per acre				
	(±0.66)		(±0.99)			
None						12.2 (±0.47)
2.65	13.7	13.4	12.8	14.9	13.0	13.6 (±0.38)
5.30	14.3	15.3	11.5	12.0	11.2	13.1
Mean (±0.66)	14.0 (1)	14.4	12.2	13.5	12.1	13.1

Standard error (1): 0.47.
Mean D.M. 79.0%

		Plant number: thousands per acre				
	(±4.8)		(±7.2)			
None						118 (±3.4)
2.65	120	116	115	98	128	116 (±2.8)
5.30	116	104	125	124	124	118
Mean (±4.8)	118 (2)	110	120	111	126	117

Standard error (2): 3.4

D - Drilled.
E - Broadcast on flat and ploughed in.
L - Broadcast on seed bed and harrowed in.
½E½D - Half broadcast on flat and ploughed in, half drilled.
½L½D - Half broadcast on seed bed and harrowed in, half drilled.

WINTER BEANS

Fertilizer placement - West Barnfield I, 1951.

System of replication: 4 randomized blocks of 8 plots each, a high order interaction being confounded with block differences.

Area of each plot: 0.0152 acre. Area harvested: 0.0120 acre.

Treatments: None (quadruplicate plots) and all combinations of:
Granular compound fertilizer (13¾% P_2O_5, 13¾% K_2O): 2.65; 5.30 cwt per acre.
Methods of placement: Drilled 3" below surface and 2" to side of seed (duplicate plots); broadcast on the flat and ploughed in (E); broadcast on the seed bed and harrowed in (L); half broadcast on the flat and ploughed in, half drilled; half broadcast on the seed bed and harrowed in, half drilled.

Basal manuring: None.

Cultivations, etc.: 'E' fertilizers applied, ploughed all plots: Sept 19. 'L' fertilizers applied: Sept 29. Beans drilled at 3½ bushels per acre with placed fertilizers as above: Oct 6. Harvested: Aug 15. Previous crop: Wheat.

Standard errors per plot:
Yield, dry matter: 1.47 cwt per acre or 5.9% (18 d.f.)
Plant number: 7.69 thousands per acre or 8.9% (18 d.f.)

Summary of Results

Compound fertilizer cwt per acre	Method of Placement D	E	L	½E½D	½L½D	Mean
	Yield, dry matter: cwt per acre					
	(±0.45)(1)		(±0.68)			
None						12.3 (±0.32)
2.65	16.0	14.1	13.5	16.9	16.3	15.5 (±0.26)
5.30	18.9	16.3	14.0	16.6	16.9	16.9
Mean (±0.45)	17.5	15.2	13.8	16.7	16.6	15.2

Standard error (1): 0.32.
Mean D.M. 79.5%

	Plant number: thousands per acre					
	(±3.8)(2)		(±5.8)			
None						80 (±2.7)
2.65	97	86	75	87	97	90 (±2.2)
5.30	89	84	87	97	83	88
Mean (±3.8)	93	85	81	92	90	87

Standard error (2): 2.7

D - Drilled

E - Broadcast on flat and ploughed in.

L - Broadcast on seed bed and harrowed in.

½E½D - Half broadcast on flat and ploughed in, half drilled.

½L½D - Half broadcast on seed bed and harrowed in, half drilled.

WINTER BEANS

Fertilizer placement (Contact) - West Barnfield I 1951.

System of replication: 2 randomized blocks of 6 plots each.

Area of each plot: 0.0152 acre. Area harvested: 0.0121 acre.

Treatments: None, and all combinations of: -
Compound granular fertilizer (13¾% P_2O_5, 13¾% K_2O): 2.65; 5.30 cwt per acre.
Method of placement: Broadcast immediately before drilling (5.30 cwt only; In contact with seed; Drilled 2" to side of seed.

Basal manuring: None.

Cultivations etc: Ploughed: Sept 19. Seed drilled at 3½ bushels per acre with fertilizer applied as above: Oct 6. Harvested: Aug 15. Previous crop: Wheat.

Standard error per plot:
Yield, dry matter: 3.29 cwt per acre or 18.2% (5 d.f.)

Summary of Results

Compound granular fertilizer cwt per acre.	Method of placement: Broadcast	In contact with seed	Drilled 2" to side of seed	Mean
	Yield, dry matter: cwt per acre			
None		(±2.32)		15.3 (±2.32)
2.65		16.4	16.7	16.5 (±1.64)
5.30	21.3	15.9	23.0	20.0 (±1.34)
Mean	21.3 (±2.32)	16.2	19.8 (±1.64)	18.1
	Plant number: thousands per acre			
None				130
2.65		122	130	126
5.30	123	115	120	119
Mean	123	118	125	123

Mean dry matter %: 79.6.

POTATOES

Application of dung - Little Hoos 1951

System of replication: 4 randomized blocks of 12 plots each, plots being split into 2 for the application of N, P, and K; the three 2-factor interactions being confounded with whole plot differences, and certain high order interactions being confounded with block differences.

Area of each sub plot: 0.0175 acre. Area harvested: 0.0140 acre.

Treatments: All combinations of:-

Whole plots — Dung: None; 5; 10; 15 tons per acre.
Method of application: W-Ploughed in, in winter; S-Ploughed in, in spring; R-Placed in the ridges in spring.

Sub plots — Sulphate of ammonia: None; 0.6 cwt N per acre.
Superphosphate: None; 0.6 cwt P_2O_5 per acre.
Muriate of potash: None; 1.0 cwt K_2O per acre.

Basal manuring: None

Cultivations, etc.: Dung applied to 'W' plots; Sept 21. Ploughed all plots: Sept 22. Dung applied to 'S' plots, ploughed all plots: Mar 30. Ridged: May 8. Dung applied to 'R' plots, fertilizers applied in the ridges, potatoes planted: May 11. Earthed up: July 11. Sprayed with copper fungicide 5 lb per acre: Aug.15 and again Sept 11. Sprayed with 15% sulphuric acid to kill off haulm: Oct 2. Lifted: Oct 10. Variety: Majestic. Previous crop: Wheat.

Standard errors per plot: total clean tubers.
Whole plot: 0.670 tons per acre or 12.0% (32 d.f.)
Sub plot: 0.911 tons per acre or 16.3% (30 d.f.)

Summary of Results

Total Clean Tubers: tons per acre

Dung: tons per acre

	0	5	10	15	Mean
Mean (±0.193)	3.78	5.51	6.20	6.81	5.58
Method of application			(±0.335)		(±0.193)
Ploughed in, in winter		5.19	6.07	6.76	6.01
Ploughed in, in spring		5.03	6.19	6.41	5.88
Placed in ridges in spring		6.30	6.35	7.27	6.64
Sulphate of ammonia			(±0.268)*		
None	3.55	4.65	5.54	6.12	4.96
0.6 cwt per acre N	4.01	6.37	6.86	7.51	6.19
Response to N (±0.372)	0.46	1.72	1.32	1.39	1.23 (1)
Superphosphate			(±0.268)*		
None	3.19	5.12	5.81	6.46	5.14
0.6 cwt per acre P_2O_5	4.37	5.90	6.60	7.17	6.01
Response to P (±0.372)	1.18	0.78	0.79	0.71	0.87 (1)
Muriate of Potash			(±0.268)*		
None	2.72	4.93	5.82	6.61	5.02
1.0 cwt per acre K_2O	4.84	6.08	6.59	7.02	6.13
Response to K (±0.372)	2.12	1.15	0.77	0.41	1.11 (1)

Standard error (1) 0.186

*Standard error for use in comparisons other than vertical.

Total Clean Tubers: tons per acre

	Method of application of dung		
	Ploughed in, in winter	Ploughed in, in spring	Placed in ridges in spring
Sulphate of ammonia		(±0.268)*	
None	5.13	5.45	5.73
0.6 cwt per acre N	6.89	6.31	7.55
Response to N (±0.372)	1.76	0.86	1.82
Superphosphate		(±0.268)*	
None	5.54	5.40	6.45
0.6 cwt per acre P_2O_5	6.48	6.36	6.83
Response to P (±0.372)	0.94	0.96	0.38
Muriate of potash		(±0.268)*	
None	5.30	5.53	6.53
1.0 cwt per acre K_2O	6.71	6.23	6.75
Response to K (±0.372)	1.41	0.70	0.22

*Standard error for use in comparisons other than vertical

Responses to treatments (±0.268)**

Response to:	Sulphate of ammonia		Superphosphate		Muriate of potash	
	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
Sulphate of ammonia	-	-	0.71	1.75	0.53	1.93
Superphosphate	0.34	1.38	-	-	0.86	0.86
Muriate of potash	0.41	1.81	1.11	1.11	-	-

**Standard error of horizontal difference between two responses 0.387

Percentage Ware
($1\frac{1}{2}$" riddle)

Dung: tons per acre

	0	5	10	15	Mean
Mean	80.3	86.6	88.2	89.6	86.2
Method of application					
Ploughed in, in winter		87.0	87.6	89.6	88.1
Ploughed in, in spring		85.3	88.8	90.5	88.2
Placed in ridges in spring		87.4	88.1	88.8	88.1
Sulphate of ammonia					
None	81.8	85.6	87.1	89.6	86.0
0.6 cwt per acre N	78.9	87.6	89.3	89.6	86.4
Response to N	-2.9	2.0	2.2	0.0	0.4
Superphosphate					
None	79.6	86.6	88.3	90.3	86.2
0.6 cwt per acre P_2O_5	81.1	86.6	88.1	88.9	86.2
Response to P	1.5	0.0	-0.2	-1.4	0.0
Muriate of potash					
None	73.2	84.7	87.4	90.3	83.9
1.0 cwt per acre K_2O	87.5	88.5	89.0	88.9	88.5
Response to K	14.3	3.8	1.6	-1.4	4.6

Percentage Ware
($1\frac{1}{2}$" riddle)

	Method of application of dung		
	Ploughed in, in winter	Ploughed in, in spring	Placed in ridges in spring
Sulphate of ammonia			
None	86.5	87.6	88.2
0.6 cwt per acre N	89.7	88.8	88.0
Response to N	3.2	1.2	-0.2
Superphosphate			
None	87.9	88.6	88.7
0.6 cwt per acre P_2O_5	88.3	87.8	87.6
Response to P	0.4	-0.8	-1.1
Muriate of potash			
None	86.0	87.5	88.9
1.0 cwt per acre K_2O	90.1	88.9	87.3
Response to K	4.1	1.4	-1.6

Responses to treatments:

Response to:	Sulphate of ammonia		Superphosphate		Muriate of potash	
	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
Sulphate of ammonia	-	-	1.2	-0.4	-0.6	1.4
Superphosphate	0.8	-0.8	-	-	-0.2	0.2
Muriate of potash	3.5	5.5	4.3	4.7	-	-

POTATOES

Methods of Planting and fertilizer application - Great Harpenden, 1951.

System of replication: 3 randomized blocks of 9 plots each.

Area of each plot: 0.028 acre. Area harvested: 0.021 acre.

Treatments: All combinations of:-
Compound fertilizer (7% N, 7% P_2O_5, 10.5% K_2O); None; $7\frac{1}{2}$; 15 cwt per acre.
Methods of planting: A - Draw ridges, broadcast fertilizer over ridges, plant by hand, split back ridges (standard method); D - Broadcast fertilizer on the flat, draw ridges, plant deep in ridges with dropper; S - As D but plant shallow.

Basal manuring: None

Cultivations, etc.: Ploughed: Sept 25 and again Jan 3. Ridged, fertilizer applied, potatoes planted: May 17. Earthed up ridges: July 23. Sprayed with copper fungicide, 5 lb per acre: Aug 16 and again Sept 11. Sprayed with 20% sulphuric acid to kill off haulm: Oct 10. Lifted: Oct 17. Variety: Majestic. Previous crop: Linseed.

Standard errors per plot:
Total clean tubers: 0.768 tons per acre or 12.2% (16 d.f.)
Plant number: 0.562 thousands per acre or 5.0% (16 d.f.)

Summary of Results

Compound Fertilizer cwt per acre	Method of planting A	D	S	Mean
Total Clean Tubers: tons per acre				
		(±0.443)		(±0.256)
0	3.44	4.73	6.03	4.73
$7\frac{1}{2}$	4.67	7.73	7.54	6.65
15	6.59	7.21	8.72	7.51
Mean (±0.256)	4.90	6.56	7.43	6.30
Plant Number: thousands per acre				
		(±0.32)		(±0.19)
0	10.1	11.3	12.2	11.2
$7\frac{1}{2}$	9.6	12.2	12.1	11.3
15	10.2	11.7	11.8	11.2
Mean (±0.19)	9.9	11.7	12.0	11.2

A - Draw ridges, broadcast fertilizer over ridges, plant by hand, split back ridges (standard method).

D - Broadcast fertilizer on the flat, draw ridges, plant deep in ridges with dropper.

S - As D but plant shallow.

POTATOES

Fertilizer placement - Great Harpenden I 1951.

System of replication: 3 randomized blocks of 12 plots each.

Area of each plot: 0.014 acre. Area harvested: 0.0056 acre.

Treatments: None (duplicate plots) and all combinations of:-
Compound granular fertilizer (7% N, 7% P_2O_5, 10½% K_2O): 7½; 15 cwt per acre
Methods of placement: In front of seed shoe; in sidebands 4" to side of seed and at same depth as seed; broadcast on flat before planting by machine; in contact with seed; half broadcast on flat before planting, half in contact with seed.

Basal manuring: None

Cultivations, etc.: Ploughed: Sept 25 and again Jan 23. Ridged, potatoes planted, fertilizers applied: May 11. Earthed up ridges: July 12. Sprayed with copper fungicide 5 lb per acre: Aug 16 and again Sept 11. Sprayed with 20% sulphuric acid: Oct 10. Lifted: Oct 20. Variety: Majestic. Previous crop: Linseed.

Standard error per plot:
Total tubers: 1.45 tons per acre or 13.8% (23 d.f.)

Summary of Results

Total tubers: tons per acre

Compound Fertilizer cwt per acre	Method of placement: In front of seed shoe	Sidebands 4" to side and at same depth as seed	Broadcast on flat before planting	In contact with seed	½ broadcast on flat before planting, ½ in contact with seed	Mean
			(±0.838)			
None						7.04 (1)
7½	9.30	11.51	9.06	9.89	10.92	10.13 (2)
15	13.07	11.59	13.34	11.77	11.96	12.35 (2)
Mean (±0.593)	11.19	11.55	11.20	10.83	11.44	10.54

Standard errors: (1) 0.593
(2) 0.375

POTATOES

Nitrophosphates - Highfield 4 1951.

System of replication: 5 randomized blocks of 6 plots each.

Area of each plot: 0.014 acre.

Treatments: None; Sulphate of ammonia; Granular superphosphate; Sulphate of ammonia and Superphosphate; British nitrophosphate (12.8% N, 15.25% P_2O_5); Dutch nitrophosphate (20% N, 20.3% P_2O_5). The dressings supply 0.39 cwt N and 0.39 cwt P_2O_5 per acre, the British nitrophosphate receiving extra N as Sulphate of ammonia to reach this standard.

Basal manuring: 2 cwt Muriate of potash per acre.

All fertilizers were directed into the bottom of the furrows.

Cultivations, etc: Ploughed: Mar 1. Ground chalk, 24 cwt per acre, applied: Apr 18. Ridged, fertilizers applied: May 7. Potatoes planted: May 8. Earthed up ridges: July 12. Sprayed with copper fungicide 5 lb per acre: Aug 15 and again Sept 11. Sprayed with 20% Sulphuric acid: Sept 29. Lifted: Oct 15. Variety: Majestic. Previous crop: Permanent grass.

Standard error per plot:
Total clean tubers: 1.03 tons per acre or 14.7% (20 d.f.)

Summary of Results

	No fert-ilizer	Sulphate of Ammonia	Super-phosphate	Sulphate of Ammonia and Super-phosphate	British Nitro-phosphate	Dutch Nitro-phosphate	Mean
			Total clean tubers: tons per acre				
Mean (±0.462)	6.67	7.16	7.20	7.47	7.04	6.46	7.00
Increase (±0.653)		0.49	0.53	0.80	0.37	-0.21	
			Percentage Ware ($1\frac{1}{2}$" riddle)				
Mean	79.2	73.3	80.3	79.1	78.9	81.6	78.8
Increase		-5.9	1.1	-0.1	-0.3	2.4	

KALE

Fertilizer placement - Highfield 4 1951.

System of replication: 3 randomized blocks of 6 plots each.

Area of each plot: 0.0152 acre. Area harvested: 0.0076 acre.

Treatments: None (duplicate plots) and all combinations of:-
Compound granular fertilizer (13¾% P_2O_5, 13¾% K_2O): 2.65; 5.30 cwt per acre.
Method of placement: Broadcast; Drilled 2" to side of seed.

Basal manuring: 5 cwt nitrochalk per acre.

Cultivations, etc.: Ploughed: Mar 1. Ground chalk, 24 cwt per acre applied: Apr 18. Nitrochalk drilled, fertilizer broadcast: May 7. Seed drilled at 8 lb. per acre with fertilizer: May 7. Sprayed with DDT emulsion 4 pints per acre against fleabeetle: May 25. Dusted with DDT ½ cwt per acre against cabbage white caterpillar: July 17. Cut: Nov 22. Variety: Thousand Head. Previous crop: Permanent Grass.

Standard error per plot:
Total yield: 1.84 tons per acre or 10.1% (11 d.f.)

Summary of Results

Method of placement	Compound fertilizer: cwt per acre None	2.65	5.30	Mean
Total yield: tons per acre				
		(±1.06)		(±0.75)
Broadcast		19.19	17.56	18.38
Drilled 2" to side of seed		18.46	19.58	19.02
Mean (±0.75)	17.25	18.83	18.57	18.22
Plant number: thousands per acre (1 Block only)				
Broadcast		95.3	117.7	106.5
Drilled 2" to side of seed		74.7	90.8	82.8
Mean	60.1	85.0	104.3	83.1

LUCERNE

Fertilizer placement - Long Hoos IV 1951

System of replication: 3 randomized blocks of 12 plots each.

Area of each plot: 0.00798 acre. Area harvested: 0.00644 acre.

Treatments - applied 1950 and 1951: No fertilizer (duplicate plots); no fertilizer but plots drilled over both in 1950 and 1951 (duplicate plots); and all combinations of:-
Compound granular fertilizer (10% P_2O_5, 20% K_2O): 2.5; 5.0 cwt per acre.
Method of placement: Broadcast during preparation of seed bed 1950; drilled in bands 3" below surface and 2" to side of seed 1950; half broadcast during preparation of seed bed 1950, half broadcast on surface 1951; half drilled beside seed 1950, half drilled beside rows of plants 1951.

Basal manuring: None.

Cultivations, etc.: Fertilizers applied: Mar 30. 1st cut: June 20. 2nd cut: July 31. 3rd cut: Sept 26. Variety: Du Puits.

Standard errors per plot:
Dry matter, 1st cut: 2.95 cwt per acre or 5.6% (24 d.f.)
2nd cut: 2.37 cwt per acre or 11.2% (24 d.f.)
3rd cut: 2.41 cwt per acre or 9.4% (24 d.f.)

See. 1950 edition p.p. 50/Cg/1.1-1.2

Summary of Results

Dry matter: cwt per acre

Compound fertilizer cwt per acre	Method of placement: Broadcast In seedbed '50	Drilled 3" below surface, 2" to side of seed	Broadcast ½ on seedbed '50, ½ on surface '51	Drilled ½ beside seed '50, ½ beside rows '51	Mean
		1st cut			(±0.85)
None (±1.20)	51.6†	50.0†			50.8
2.5 (±1.70)	53.3	55.1	53.3	50.6	53.1
5.0	52.6	56.1	48.9	54.1	52.9
Mean (±1.20)	53.0*	55.6*	51.1	52.3	52.3
		2nd cut			(±0.68)
None (±0.97)	19.9†	22.6†			21.2
2.5 (±1.37)	21.1	22.0	19.8	21.8	21.2
5.0	21.3	20.5	19.5	22.5	20.9
Mean (±0.97)	21.2*	21.2*	19.6	22.2	21.1
		3rd cut			(±0.70)
None (±0.98)	24.7†	25.9†			25.3
2.5 (±1.39)	26.3	25.4	24.0	25.1	25.2
5.0	26.3	26.6	26.9	24.9	26.2
Mean (±0.98)	26.3*	26.0*	25.5	25.0	25.6

† See treatment description

* Excluding 'None'.

Mean Dry Matter %. 1st cut: 22.0
2nd cut: 25.2
3rd cut: 19.8

LUCERNE - COCKSFOOT LEY

Fertiliser placement - Fosters Corner 1951.

System of replication: 3 randomized blocks of 6 plots each.

Area of each plot: 0.0152 acre.

Treatments: No fertilizer; no fertilizer but plots drilled over to assess damage to sward; and all combinations of:-
Compound granular fertilizer (15% P_2O_5, 13¾% K_2O): 3.3; 6.6 cwt per acre.
Method of placement: Broadcast; Drilled.

Basal manuring: None

Cultivations, etc.: Fertilizer applied: Mar 29. Cut: June 18 and weighed green.

Standard error per plot:
Ley, dry matter: 2.89 cwt per acre or 6.8% (10 d.f.)

Summary of Results

Ley, dry matter: cwt per acre

Method of placement	Compound fertilizer: cwt per acre None	3.3	6.6	Mean
		(±1.67)		(±1.18)
Broadcast	42.3†	45.3	43.1	44.2*
Drilled	39.9†	43.0	43.2	43.1*
Mean (±1.18)	41.1	44.1	43.2	42.8
Difference (±2.36)	-2.4	-2.3	0.1	-1.1* (±1.67)

† See treatment descriptions.

* Excluding 'None'

Mean Dry Matter %: 28.0

PERMANENT GRASS

Fertilizer placement - Highfield 9 1951.

System of replication: 3 randomized blocks of 6 plots each.

Area of each plot: 0.0152 acre.

Treatments: No fertilizer; no fertilizer but plots drilled over to assess damage to sward; and all combinations of:-
Compound granular fertilizer (15% P_2O_5, 13¾% K_2O): 3.3; 6.6 cwt per acre.
Method of placement: Broadcast; Drilled.

Basal dressing: 3 cwt Nitrochalk per acre.

Cultivations, etc.: Fertilizer applied: Mar 28. Cut: June 19 and weighed green.

Standard error per plot:
Grass, dry matter: 2.49 cwt per acre or 7.9% (10 d.f.)

Summary of Results

Grass, dry matter: cwt per acre

Method of placement	Compound fertilizer: cwt per acre None	3.3	6.6	Mean
		(±1.43)		(±1.01)
Broadcast	28.4†	34.6	35.5	35.0*
Drilled	27.4†	31.2	31.2	31.2*
Mean (±1.01)	27.9	32.9	33.3	31.4
Difference (±2.03)	-1.0	-3.4	-4.3	-3.8* (±1.43)

† See Treatment descriptions

* Excluding 'None'

Mean Dry Matter %: 22.7

PERMANENT GRASS

Nitrophosphates - Highfield 9 1951.

System of replication: 6 × 6 Latin square.

Area of each plot: 0.0102 acre

Treatments: None; Sulphate of ammonia; Superphosphate; Sulphate of ammonia and superphosphate; British nitrophosphate (12.8% N, 15.25% P_2O_5); Dutch nitrophosphate (20% N, 20.3% P_2O_5). The dressings supply 0.39 cwt N and 0.39 cwt P_2O_5 per acre, the British nitrophosphate receiving extra N to reach this standard.

Basal manuring: 1⅓ cwt muriate of potash per acre.

Cultivations, etc.: Fertilizer applied: Mar 28. Cut: July 3.

Standard errors per plot:
Hay, dry matter: 1.52 cwt per acre or 5.4% (20 d.f.)
P_2O_5 uptake: 0.00803 cwt per acre or 6.7% (20 d.f.)

Summary of Results

	No fert-ilizer	Sulphate of Ammonia	Super-phosphate	Sulphate of Ammonia and Super-phosphate	British Nitro-phosphate	Dutch Nitro-phosphate	Mean
	Hay, dry matter: cwt per acre						
Mean (±0.62)	24.9	29.9	23.5	30.5	29.6	29.8	28.1
Increase (±0.88)		5.0	-1.4	5.6	4.7	4.9	
	P_2O_5 uptake: cwt per acre						
Mean (±0.0033)	0.101	0.115	0.109	0.137	0.125	0.134	0.120
Increase (±0.0046)		0.014	0.008	0.036	0.024	0.033	

Mean Dry Matter %: 72.6

SUGAR BEET

Control of Virus Yellows - Long Hoos I, II and III 1951.

System of replication: 5 randomized blocks of 2 plots; each plot being split into three for singling dates.

Area of each sub-plot: 0.0278 acre.

Treatments:
Whole plots: Sowing date. 1 - As early as possible. 2 - As soon as previous sowing above ground.
Sub plots: Singling date. A - Early (cotyledons and first leaf less than 1"); B - Normal (cotyledon and 4 leaves); C - Late (8-12 leaves).

Basal manuring: 3 cwt nitrate of soda, 4 cwt superphosphate and 2 cwt muriate of potash per acre.

Cultivations, etc.: Ploughed: Oct 21. Basal fertilizers applied: Apr 19. Seed drilled at 18 lb per acre: '1' plots - May 2; '2' plots - May 21. Singled: Plots 1A - June 8, 1B and 2A - June 14, 1C and 2B - June 22, 2C - June 29. Lifted: Nov 15. Variety: Klein E. Previous crop: Wheat.

Standard errors per plot:
Total sugar: whole plot, 1.70 cwt per acre or 5.8% (4 d.f.)
sub plot, 4.35 cwt per acre or 14.9% (16 d.f.)
Percentage Virus Yellows
(transformed values) whole plot, 2.53 or 10.8% (4 d.f.)
sub plot, 4.25 or 18.1% (16 d.f.)

Note. The analysis of the incidence of Virus Yellows has been carried out on percentages transformed to degrees, and all tests of significance should be applied to the transformed values.

Summary of Results

Sowing Date	Singling Date			Mean
	Early	Normal	Late	
	Total Sugar: cwt per acre (a and b)			
2nd May	35.9	34.0	22.7	30.8
21st May	32.1	26.4	24.0	27.5
Mean (±1.38)	34.0	30.2	23.4	29.2
Diff. (±2.49)	-3.8	-7.6	+1.3	-3.3 (±1.07)

(a) = ±1.94 for use in horizontal comparisons only.
(b) = ±1.76 for use in all other comparisons.

Sowing Date	Early	Normal	Late	Mean
	Roots (washed): tons per acre			
2nd May	10.95	10.05	6.91	9.30
21st May	9.58	8.08	7.29	8.32
Mean	10.27	9.07	7.10	8.81
Diff.	-1.37	-1.97	+0.38	-0.98
	Sugar Percentage			
2nd May	16.5	16.9	16.5	16.6
21st May	16.8	16.4	16.5	16.5
Mean	16.6	16.6	16.5	16.6
Diff.	+0.3	-0.5	0.0	-0.1
	Plant No: thousands per acre			
2nd May	25.9	23.9	17.4	22.4
21st May	21.9	22.0	20.5	21.5
Mean	23.9	23.0	19.0	21.9
Diff.	-4.0	-1.9	+3.1	-0.9
	Noxious Nitrogen : Mg %			
2nd May	15.0	16.0	19.0	16.7
21st May	17.0	21.0	20.0	19.3
Mean	16.0	18.5	19.5	18.0
Diff.	+2.0	+5.0	+1.0	+2.6

Singling Date

Singling Date

Sowing Date	Early	Normal	Late	Mean
	Percentage Virus Yellows (means calculated from transformed values)			
2nd May	12.5	17.6	15.6	15.1
21st May	17.0	21.9	11.3	16.5
Mean	14.8	19.6	13.4	15.9
Diff.	+4.5	+4.3	-4.3	+1.4
	Percentage Virus Yellows (transformed values) (a and b)			
2nd May	20.7	24.8	23.3	22.9
21st May	24.4	27.9	19.6	24.0
Mean (±1.34)	22.6	26.3	21.5	23.5
Diff. (±2.72)	+3.7	+3.1	-3.7	+1.1 (±1.60)

(a) = ±1.90 for use in horizontal comparisons only.
(b) = ±1.92 for use in all other comparisons.

CHEMICAL ANALYSES OF MANURES USED IN THE THREE, FOUR AND SIX COURSE ROTATIONS 1951

Manures	% Organic Matter	% N	% P_2O_5	% K_2O
Three Course Rotation				
Wheat Straw	81.3	0.64	0.19	1.04
Adco Compost	18.4	0.44	0.19	0.30
Sulphate of Ammonia		21.0		
Nitrate of Soda		15.5		
Superphosphate			20.4 (total)	
Muriate of Potash				60.0
Four Course Rotation				
Wheat Straw	81.3	0.64	0.19	1.04
Adco Compost	18.4	0.44	0.19	0.30
Dung	13.0	0.39	0.15	0.29
Sulphate of Ammonia		21.0		
Superphosphate			20.4 (total)	
Mineral Phosphate			27.8	
Muriate of Potash				60.0
Six Course Rotation				
Sulphate of Ammonia		21.0		
Superphosphate			20.4 (total)	
Muriate of Potash				60.0

METEOROLOGICAL RECORDS ROTHAMSTED 1951

(Departure from long period means in brackets)

Month	Total Hours of Sunshine	Mean Temperature (°F.) Air[1]	Dew Point	In Ground 1 ft	In Ground 4 ft	Ground[2] Frosts	Rainfall (in) Total 1/1000 acre Gauge	Rain[3] days	Drainage through 20 in. soil	Wind[4] m.p.h.
Jan.	43 (-10)	38.1 (+0.7)	36.0	37.4	41.3	15	3.49 (+0.97)	21	3.64	5.4
Feb.	50 (-19)	37.7 (-0.7)	34.4	37.1	40.6	18	4.74 (+2.84)	23	4.18	5.3
Mar.	92 (-26)	39.1 (-2.2)	34.3	38.7	40.6	15	3.61 (+1.72)	22	2.15	6.3
Apr.	183 (+28)	43.7 (-2.1)	36.6	43.4	42.5	10	2.85 (+0.90)	18	1.59	6.3
May	134 (-63)	49.7 (-2.2)	43.8	48.6	45.5	1	2.62 (+0.47)	17	0.54	6.7
June	250 (+46)	56.5 (-0.8)	48.9	58.4	50.5	0	1.15 (-1.03)	9	-	4.9
July	193 (-3)	61.6 (+0.9)	53.9	62.7	54.4	0	1.31 (-1.26)	9	-	3.8
Aug.	156 (-30)	58.7 (-1.5)	52.6	60.0	56.6	0	3.92 (+1.37)	18	1.08	3.4
Sept.	114 (-33)	57.1 (+1.0)	53.4	57.4	56.6	0	3.47 (+1.11)	13	1.68	3.7
Oct.	107 (+2)	48.5 (-0.4)	45.6	49.6	54.0	7	1.31 (-1.70)	14	0.35	3.4
Nov.	60 (-3)	46.5 (+4.1)	44.4	45.9	54.1	4	5.39 (+2.61)	27	4.77	3.4
Dec.	52 (+7)	41.2 (+2.7)	38.4	40.9	46.6	11	2.12 (-0.47)	17	1.59	5.5
Year	1434 (-104)	48.2 (-)	43.5	48.3	48.6	81	35.98 (+7.53)	208	21.57	4.8

(1) Mean of Maximum and Minimum.
(2) Number of nights grass min. 30°F. or less.
(3) Number of days rainfall was 0.01 in. or more.
(4) At 2 metres above ground level.

Erratum to 1950 report E/2.1 Under 'Rainfall (in) Total', for '1/100 acre' read '1/1000 acre'.

51/E/2.1

METEOROLOGICAL RECORDS WOBURN 1951

Month	Total hours of Sunshine	Mean Temperature (°F) Air (1)	Mean Temperature (°F) In Ground 1 ft.	Grass Minimum: °F	Total Rainfall: (in.) 8" gauge	Rain (2) days
January	44	38.5	37.7	31.4	2.57	17
February	66	38.2	37.3	30.4	3.54	21
March	92	39.2	39.5	31.2	3.46	21
April	185	43.9	44.6	33.0	3.02	12
May	144	49.9	50.5	41.2	2.41	15
June	243	56.8	59.5	43.5	0.83	11
July	191	61.5	64.8	45.0	1.76	10
August	171	59.2	61.0	45.9	3.77	20
September	120	57.6	57.4	44.8	2.05	13
October	101	47.5	49.0	34.8	1.24	11
November	63	46.8	45.9	37.1	4.35	26
December	61	41.4	41.0	31.4	1.56	16
Year	1481	48.4	49.0	37.5	30.56	193

(1) Mean of Maximum and Minimum.

(2) No. of days rainfall was 0.01 in. or more.