

Rothamsted Experimental Station
Harpenden
LAWES AGRICULTURAL TRUST

RESULTS
OF THE
FIELD
EXPERIMENTS

1939 - 1947

VOLUME 1

Rothamsted Experimental Station

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Laws Agricultural Trust

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of the

FIELD

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Vol. I. Classical and Long-Term Experiments

The summaries given in this report are similar to those given in the appendices to the Annual Reports of the Station before the war. Only experiments conducted at Rothamsted and Woburn are included. The design and supervision of these experiments are the responsibility of the Field Plots Committee (Members during the period covered by this report: E.M.Crowther (Chairman), H.V.Garner (Secretary), D.J.Finney, J.R.Moffatt, R.G.Warren, D.J.Watson, F.Yates).

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WHEAT - BROADBALK

The first experimental crop of wheat on Broadbalk was sown in the autumn of 1843 for harvesting in 1844, and wheat has been grown each year ever since. The plot treatments varied until 1852 when the present system of manuring was established.

The general purpose of the experiment was to determine over a long period of years the manurial requirements of wheat, testing dung alone and a number of combinations of the ash constituents of crops (compounds of phosphorus, potassium, sodium and magnesium), together with several forms of nitrogen compounds. One plot running the whole length of the field was assigned to each of the treatments tested. Several varieties, some of them now out of cultivation, have been used during the experiment, but since 1899 Squareheads Master or the very similar Red Standard has been sown.

Weeds have always been a problem on Broadbalk, but in spite of this, continuous cropping was maintained until the harvest of 1925, except that half of every plot was fallowed in 1904 and the remainder in 1905, and this process was repeated in 1914 and 1915. In 1926 it was decided that more systematic methods must be tried and a system of regular bare fallowing was introduced. The field was divided into five equal sections so that every year a part of each of the original $\frac{1}{2}$ acre plots could be under fallow and the remainder under crop. From 1926-29 two sections were cropped yearly, leaving three fallow; in 1930 the whole field was cropped and then in 1931 the present arrangement was begun under which one section of the field is fallowed every year. In each year therefore, the yields of every treatment are obtained for the 1st, 2nd, 3rd and 4th years after fallow.

Since 1943 it has been necessary to hand weed wild oats before harvesting

Treatments
Symbols and amounts per acre

O	Unmanured
N ₁ , N ₂ , N ₃	Sulphate of ammonia, 43 lb.N, 86 lb.N, 129 lb.N
N ₁ ', N ₂ '	Nitrate of soda, 43 lb.N, 86 lb.N
P	Superphosphate, 65 lb.P ₂ O ₅
K	Sulphate of potash, 98 lb.K ₂ O
S	Sulphate of soda, 366 lb.
M	Sulphate of magnesia, 280 lb.
C	Complete mineral manure, consisting of superphosphate (65 lb.P ₂ O ₅), sulphate of potash (98 lb.K ₂ O), sulphate of soda (100 lb.) and sulphate of magnesia (100 lb.)
C'	As C but without the superphosphate
D	Farmyard manure, 14 tons
R	Rape cake (castor bean meal from 1940 onwards), 1889 lb.

Dung is ploughed-in in autumn. Rape cake and minerals are applied in autumn on the seed bed. 21.5 lb. N per acre of the N₁, N₂ and N₃ treatments is applied in autumn and the remainder of the dressing in spring, except that Plot 15 receives its full dressing in autumn. Nitrate of soda ~~is applied~~ is applied in spring, there being two applications at intervals of a month on plot 16. Plot 2A was unmanured before 1885.

The experiment is discussed, and early departures from the present manuring scheme are described by Sir John Russell and D.J.Watson in "The Rothamsted Field Experiments in the growth of wheat", Imp.Bureau Soil Sci.Tech.Comm. No.40.

Investigations by the Soil Microbiology Department are described by B.N.Singh, "The effect of artificial fertilizers and dung on the numbers of amoebae in Rothamsted soils", J.Gen.Microbiol. 3, (1949), 204.

Weed surveys have been made annually by the Botany Department.

Wheat - Broadbalk

The present following cycle and the preceding fallows are shown in the diagram below. (C = crop, F = fallow). The sections (I to V) are numbered in order from the upper (western) end of the field. Preparatory to the first fallow the field was harvested in five separate sections (1925).

Year	I	II	III	IV	V	Year	I	II	III	IV	V
1926	F	F	F	C	C	1931, -36, -41, -46	F	C	C	C	C
1927	F	F	F	C	C	1932, -37, -42, -47	C	F	C	C	C
1928	C	C	F	F	F	1933, -38, -43, -48	C	C	C	C	F
1929	C	C	F	F	F	1934, -39, -44, -49	C	C	C	F	C
1930	C	C	C	C	C	1935, -40, -45, -50	C	C	F	C	C

Plot 20 extends over sections I and II only.

Crop Notes

Crop Year	Date sown	Date harvested	Variety
1939	Oct. 26	Aug. 18	Red Standard
1940	Oct. 25	Aug. 8	Squareheads Master
1941	Oct. 25	Aug. 20	Squareheads Master
1942	Oct. 24	Aug. 15	Red Standard
1943	Oct. 15	Aug. 4	Red Standard
1944	Oct. 16	Aug. 5	Red Standard
1945	Nov. 8	Aug. 12	Red Standard
1946	Oct. 20	Aug. 16	Squareheads Master 13/4
1947	Oct. 31	Aug. 8	Squareheads Master 13/4

In 1941 there was a considerable amount of lodging, particularly on plots 2A, 2B, 8, 12, 14 and 16.

A/1.4

		Total Grain: cwt. per acre					Total Straw: cwt. per acre				
Years after fallow		1	2	3	4	Mean	1	2	3	4	Mean
96th season, 1939											
Plot	Section	V	II	I	III		V	II	I	III	
2A	D	24.1	18.5	15.7	19.7	19.5	62.7	40.1	43.0	42.8	47.2
2B	D	26.1	23.5	15.7	18.1	20.8	64.2	51.6	48.9	47.8	53.1
3	O	16.7	7.7	8.7	8.9	10.5	29.7	17.0	16.4	19.1	20.6
5	C	18.6	9.9	9.3	7.8	11.4	36.1	24.9	21.9	19.2	25.5
6	N ₁ C	22.5	13.8	10.9	11.8	14.8	45.3	33.9	29.5	54.5	40.8
7	N ₂ C	26.4	19.3	13.5	15.8	18.8	55.8	43.4	39.8	37.7	44.2
8	N ₃ C	20.8	21.6	11.8	12.5	16.7	59.0	54.7	62.9	52.9	57.4
9	N ₁ 'C	24.1	16.2	11.3	14.0	16.4	53.5	35.2	28.5	29.8	36.8
10	N ₂	20.2	19.6	14.4	17.1	17.8	38.8	35.6	33.4	32.4	35.0
11	N ₂ P	18.6	18.9	13.4	15.8	16.7	36.6	35.7	28.8	30.4	32.9
12	N ₂ PS	21.2	20.4	14.8	16.4	18.2	42.4	40.1	32.7	32.3	36.9
13	N ₂ PK	23.1	17.5	14.4	15.3	17.6	55.2	42.1	33.8	35.2	41.6
14	N ₂ PM	24.6	19.9	14.1	17.1	18.9	52.7	35.3	29.1	32.4	37.4
15	N ₂ *C	17.8	16.5	12.7	12.8	15.0	37.1	34.3	28.8	29.3	32.4
16	N ₂ 'C	25.4	18.5	11.8	13.5	17.3	69.4	48.9	43.6	44.9	51.7
17	N ₂ and C in (C) alternate (N ₂) years	13.7	10.1	5.6	7.9	9.3	31.6	24.4	18.8	21.8	24.2
18		22.5	17.1	14.6	13.5	16.9	43.8	38.1	34.8	25.9	35.6
19	R	21.8	17.5	12.4	16.2	17.0	42.6	32.6	27.1	29.2	32.9
20	N ₂ C'	19.3	13.2			16.2	42.6	32.7			37.6

97th season, 1940											
Plot	Section	IV	V	II	I		IV	V	II	I	
2A	D	33.1	31.9	27.7	15.4 ⁺	27.0	55.7	44.6	42.2	39.3	45.4
2B	D	37.0	29.0	32.3	23.8 ⁺	30.5	57.8	42.4	46.5	43.3	47.5
3	O	21.5	13.6	12.6	15.4	15.8	28.6	18.7	16.7	18.3	20.6
5	C	25.5	12.7	14.4	16.3	17.2	38.8	17.0	17.9	22.6	24.1
6	N ₁ C	30.5	17.1	17.8	20.8	21.6	47.3	25.6	23.6	28.2	31.2
7	N ₂ C	34.6	21.1	24.4	26.7	26.7	61.7	35.2	37.7	42.4	44.2
8	N ₃ C	32.2	27.1	27.4	29.9	29.2	61.8	51.7	47.5	55.3	54.1
9	N ₁ 'C	31.7	19.0	20.9	26.3	24.5	50.7	30.3	33.0	43.4	39.4
10	N ₂	14.8	18.4	17.5	19.8	17.6	26.0	24.3	21.9	27.8	25.0
11	N ₂ P	27.9	19.0	20.0	20.9	22.0	41.4	31.5	25.3	30.0	32.0
12	N ₂ PS	32.9	20.3	22.9	25.5	25.4	48.1	29.8	30.9	36.2	36.2
13	N ₂ PK	35.7	17.8	22.5	24.0	25.0	59.7	33.3	33.6	37.7	41.1
14	N ₂ PM	34.4	18.7	22.1	24.3	24.9	54.9	30.2	30.4	36.2	37.9
15	N ₂ *C	32.6	15.1	22.6	25.8	24.0	51.8	25.1	33.3	38.3	37.1
16	N ₂ 'C	33.8	26.8	29.6	27.6	29.4	60.8	40.1	43.0	45.3	47.3
17	N ₂ and C in (N ₂) alternate (C) years	33.7	25.2	26.2	28.6	28.4	56.4	39.1	39.3	42.2	44.2
18		24.4	11.0	11.5	12.2	14.8	33.5	17.1	17.3	15.3	20.8
19	R	34.2	19.0	21.0	20.7	23.7	52.3	28.5	29.3	31.6	35.4
20	N ₂ C'	-	-	20.4	23.0	21.7	-	-	25.4	33.4	29.4

		Total Grain: cwt. per acre					Total Straw†: cwt. per acre				
		Years after fallow									
		1	2	3	4	Mean	1	2	3	4	Mean
98th season, 1941											
Plot	Section	III	IV	V	II		III	IV	V	II	
2A	D	16.8	13.7	14.4	9.5	13.6	40.1	26.6	25.0	25.4	29.3
2B	D	19.2	16.0	16.2	9.1	15.1	41.8	30.8	23.3	25.7	31.6
3	O	14.3	4.5	6.6	4.7	7.5	23.9	7.6	8.7	7.8	12.0
5	C	14.9	5.0	7.2	5.9	8.2	23.3	10.3	12.4	10.0	14.0
6	N ₁ C	15.7	9.6	9.8	7.6	10.7	29.1	16.1	15.2	14.0	18.6
7	N ₂ C	17.1	14.2	12.6	11.3	13.8	39.7	31.7	27.2	22.2	30.2
8	N ₃ C	20.9	14.3	13.1	16.2	16.1	46.2	37.6	32.1	35.0	37.7
9	N ₁ 'C	17.8	12.1	11.9	11.6	13.4	34.6	22.8	22.2	22.8	25.6
10	N ₂	13.8	14.3	12.5	12.2	13.2	26.6	27.2	19.6	17.4	22.7
11	N ₂ P	16.7	14.5	10.9	11.1	13.3	30.2	26.1	19.4	18.0	23.4
12	N ₂ FS	18.2	16.0	14.1	13.8	15.5	35.0	27.0	23.6	20.2	26.4
13	N ₂ FK	19.3	14.5	9.9	11.3	13.8	23.1	23.0	22.1	18.6	24.2
14	N ₂ FM	19.7	16.7	11.8	12.3	15.1	34.4	23.3	22.3	13.4	25.8
15	N ₂ *C	13.4	12.0	5.6	9.8	11.4	36.7	20.1	11.7	14.2	20.7
16	N ₂ 'C	21.7	15.9	14.9	15.7	17.0	49.7	36.2	31.7	31.0	37.2
17	N ₂ and C in alternate years (C) (N ₂)	15.6	5.7	4.0	4.1	7.4	35.5	8.4	6.2	6.4	14.1
18		18.8	12.2	12.4	10.1	13.4	31.8	21.3	21.6	18.0	23.2
19	R	18.0	13.5	9.3	9.2	12.5	29.9	22.7	13.3	11.6	19.4
20	N ₂ C'				11.6	11.6				19.6	19.6

99th season, 1942											
Plot	Section	I	III	IV	V		I	III	IV	V	
2A	D	20.7	23.7	24.5	27.9	24.2	52.2	43.2	45.1	43.6	46.0
2B	D	19.6	26.8	23.6	26.6	25.4	53.5	43.2	45.1	42.4	47.3
3	O	15.7	10.1	15.9	15.0	14.2	22.7	13.5	20.1	13.6	18.7
5	C	21.6	11.7	16.7	17.0	16.8	34.7	15.5	23.7	20.7	23.6
6	N ₁ C	25.1	16.3	13.6	21.5	20.4	42.3	22.7	26.7	29.4	30.3
7	N ₂ C	28.9	23.0	27.1	26.4	26.4	43.3	33.9	37.1	36.4	39.0
8	N ₃ C	25.8	25.7	23.3	24.8	26.3	52.4	39.8	41.6	39.7	43.4
9	N ₁ 'C	27.1	20.5	17.8	18.0	20.8	45.2	29.1	24.3	24.0	30.6
10	N ₂	22.9	23.4	13.5	17.2	20.5	32.2	28.6	22.8	21.4	26.2
11	N ₂ P	18.2	21.3	17.9	16.6	18.5	29.2	28.2	23.1	31.2	27.9
12	N ₂ FS	24.5	24.4	25.4	21.0	23.8	37.0	36.3	29.7	26.3	32.3
13	N ₂ FK	23.0	22.7	23.3	23.8	24.5	48.5	31.3	33.1	32.9	36.4
14	N ₂ FM	25.0	22.4	25.0	22.3	23.7	35.4	32.2	32.2	23.6	32.1
15	N ₂ *C	23.6	20.9	23.7	21.2	23.6	49.8	33.5	33.5	32.6	37.4
16	N ₂ 'C	23.1	25.6	24.3	23.5	25.4	46.6	36.2	35.5	33.9	33.0
17	N ₂ and C in alternate years (N ₂) (C)	23.3	22.2	25.8	24.0	25.2	43.4	31.6	37.2	34.7	36.7
18		21.6	10.4	11.5	13.6	14.3	29.6	14.6	15.5	22.1	20.4
19	R	31.1	22.2	23.0	24.7	25.2	42.7	29.7	33.1	33.3	34.7
20	N ₂ C'	24.0				24.0	35.0				35.0

† Includes straw, cavings and chaff. * Sulphate of ammonia applied in autumn.

Years after fallow		Total Grain: cwt. per acre					Total Straw†: cwt. per acre				
		1	2	3	4	Mean	1	2	3	4	Mean
100th season, 1943											
Plot	Section	II	I	III	IV		II	I	III	IV	
2A	D	23.5	20.0	15.9	6.6	17.7	62.5	49.8	41.0	46.8	50.0
2B	D	29.7	21.4	23.1	14.4	22.2	65.9	57.5	48.6	49.4	55.4
3	O	25.0	13.4	10.1	8.6	14.3	37.9	17.6	14.2	11.1	20.2
5	C	24.9	12.3	11.0	8.8	14.2	43.3	17.6	17.3	14.1	23.1
6	N ₁ C	25.0	17.0	14.7	13.3	17.5	46.3	28.2	26.1	25.3	31.5
7	N ₂ C	28.5	26.1	21.7	21.3	24.4	54.4	50.7	44.8	43.9	48.4
8	N ₃ C	27.3	23.6	20.5	18.9	22.6	58.7	60.0	54.3	54.3	56.8
9	N ₁ 'C	26.5	20.8	16.4	16.5	20.0	46.8	40.5	32.8	33.1	33.3
10	N ₂	24.1	25.1	20.6	19.0	22.2	36.4	41.2	34.3	31.0	35.7
11	N ₂ P	23.8	24.7	19.6	19.3	21.8	36.2	42.4	30.7	30.9	35.0
12	N ₂ PS	25.8	23.4	21.7	22.9	23.4	44.2	43.3	36.2	40.5	41.0
13	N ₂ PK	30.0	21.3	19.5	20.3	22.8	53.7	47.5	38.7	42.3	45.6
14	N ₂ PM	26.4	25.1	20.9	21.6	23.5	41.1	45.9	35.4	38.0	40.1
15	N ₂ *C	26.5	22.2	19.1	19.5	21.8	45.1	41.9	37.3	36.0	40.1
16	N ₂ 'C	33.2	25.6	28.7	23.5	27.8	56.1	52.2	50.8	43.5	50.6
17	N ₂ and C in (C) alternate (N ₂) years	23.3	11.4	9.7	8.5	13.2	36.4	17.3	14.4	12.5	20.2
18		27.8	22.1	22.2	22.2	23.6	45.3	38.1	39.9	39.8	40.8
19	R	28.9	23.6	19.1	20.2	23.0	43.6	37.8	31.5	35.3	37.0
20	N ₂ C'	23.2	19.9			21.6	36.2	37.2			36.7

101st season, 1944											
Plot	Section	V	II	I	III		V	II	I	III	
2A	D	29.8	22.7	16.6	15.8	21.2	62.4	48.5	41.8	36.4	47.3
2B	D	29.2	27.5	22.5	23.2	25.6	53.3	51.6	50.0	48.8	50.9
3	O	18.6	8.3	7.9	9.1	11.0	21.4	12.1	12.1	12.0	14.4
5	C	20.2	9.0	9.1	10.2	12.1	29.3	11.8	11.8	14.1	16.8
6	N ₁ C	25.1	11.7	14.9	13.1	16.2	38.7	18.7	22.9	19.2	24.9
7	N ₂ C	29.5	19.3	22.8	20.6	23.0	46.3	36.9	33.6	33.9	38.9
8	N ₃ C	29.9	23.6	24.9	27.0	26.4	54.5	44.4	53.2	45.4	49.4
9	N ₁ 'C	23.9	13.9	15.4	19.8	18.2	35.1	22.2	23.2	31.3	28.0
10	N ₂	16.2	18.4	17.4	17.6	17.4	26.2	27.4	29.4	25.2	27.0
11	N ₂ P	15.8	15.7	14.2	13.8	14.9	25.4	26.1	27.8	24.6	26.0
12	N ₂ PS	22.6	16.5	17.2	16.6	18.2	36.9	25.3	31.8	27.0	30.2
13	N ₂ PK	28.7	20.1	20.2	17.7	21.7	46.7	36.6	41.0	31.9	39.0
14	N ₂ PM	27.2	16.0	17.3	15.6	19.0	42.9	27.9	31.5	26.6	32.2
15	N ₂ *C	25.8	19.3	20.7	20.1	21.5	45.8	32.0	40.9	31.7	37.6
16	N ₂ 'C	31.4	23.4	23.7	26.5	26.2	51.6	30.8	36.8	37.1	39.1
17	N ₂ and C in (N ₂) alternate (C) years	26.9	18.9	19.2	20.0	21.2	44.3	28.2	31.1	29.2	33.2
18		27.2	8.9	6.1	7.7	12.5	42.1	9.2	8.5	10.6	17.6
19	R	29.3	18.1	16.1	15.4	19.7	50.9	28.4	23.4	27.5	32.6
20	N ₂ C'		20.7	13.9		17.733		33.4	21.3		27.4

†Includes straw, cavings and chaff. * Sulphate of ammonia applied in autumn.

Wheat - Broadbalk

Years after fallow		Total Grain: cwt. per acre					Total Straw [†] : cwt. per acre				
		1	2	3	4	Mean	1	2	3	4	Mean
102nd season, 1945											
Plot	Section	IV	V	II	I		IV	V	II	I	
2A	D	25.1	28.9	23.1	12.3	22.4	44.7	46.1	43.3	47.7	45.4
2B	D	23.4	31.0	25.0	17.5	24.2	52.5	49.0	46.5	52.5	50.1
3	O	14.6	11.6	6.5	7.6	10.1	22.1	14.6	10.8	12.0	14.9
5	C	20.9	14.9	9.9	10.5	14.0	34.0	17.6	13.3	15.5	20.1
6	N ₁ C	23.5	18.9	11.4	13.7	16.9	40.2	30.7	19.4	22.1	28.1
X 7	N ₂ C	23.3	20.8	16.1	22.3	20.6	42.0	36.2	29.5	43.4	37.8
8	N ₂ C	24.0	27.8	22.5	25.2	24.9	43.9	49.4	40.9	55.2	47.4
9	N ₁ ³ C	15.2	15.4	13.2	14.7	14.6	30.3	25.1	22.5	27.6	26.4
10	N ₂	14.6	21.7	15.3	13.7	16.3	24.4	31.8	24.1	24.8	26.3
11	N ₂ P	14.2	17.5	13.9	16.2	15.4	29.5	26.2	22.9	29.2	27.0
12	N ₂ FS	18.5	22.0	16.9	16.8	18.6	36.0	34.2	27.6	31.5	32.3
13	N ₂ FK	23.3	22.3	15.1	15.4	19.0	45.1	40.2	27.9	31.9	36.3
14	N ₂ FM	16.0	23.8	14.4	14.4	17.2	38.4	39.1	25.1	29.5	33.0
15	N ₂ *C	22.4	20.0	17.7	18.4	19.6	41.2	33.3	30.6	36.4	35.4
16	N ₂ 'C	21.0	23.6	20.8	20.4	21.4	41.8	41.5	39.3	43.4	41.5
X 17	N ₂ and C in (C) alternate (N ₂) years	16.6	10.3	7.7	9.2	11.0	29.9	15.9	12.4	15.1	18.3
18		20.8	16.5	17.2	16.4	17.7	38.3	26.5	28.4	28.4	32.9
19	R	23.2	18.0	14.9	16.3	18.1	41.1	27.3	25.2	28.3	30.4
20	N ₂ C'			13.6	15.2	14.4			28.1	28.6	28.4

103rd season, 1946											
Plot	Section	III	IV	V	II		III	IV	V	II	
2A	D	31.7	15.4 ⁺	20.0	17.9	21.2	71.6	55.1 ⁺	55.7	45.1	56.9
2B	D	29.3	18.2 ⁺	21.0	22.2	22.7	75.5	52.2 ⁺	48.3	48.6	56.2
3	O	18.7	7.3	7.3	7.3	10.2	35.9	16.0	14.6	15.9	20.6
5	C	20.4	9.2	9.7	10.0	12.3	40.0	22.0	19.7	24.3	26.5
6	N ₁ C	24.4	9.8	9.9	8.8	13.2	53.6	29.2	25.8	26.8	33.8
7	N ₂ C	26.4	15.9	15.3	14.4	18.0	63.9	41.2	38.1	36.4	44.9
8	N ₂ C	31.4	20.2	20.1	17.0	22.2	72.0	59.9	57.7	52.6	60.6
9	N ₁ ³ C	26.6	18.2	14.6	12.1	17.9	52.8	40.3	34.2	31.9	39.8
10	N ₂	25.6	19.5	12.3	16.9	18.6	51.8	40.8	33.9	33.1	39.9
11	N ₂ P	20.2	15.2	15.2	14.5	16.3	39.3	44.2	34.1	32.1	37.4
12	N ₂ FS	22.4	15.3	11.9	16.0	16.4	45.3	37.7	34.0	33.2	37.6
13	N ₂ FK	29.0	17.4	14.9	14.7	19.0	62.0	44.0	39.6	38.0	45.9
14	N ₂ FM	25.3	20.9	16.8	15.1	19.5	47.8	45.5	41.4	32.6	41.8
15	N ₂ *C	25.3	17.9	15.5	14.7	18.4	58.1	38.5	32.8	34.5	41.0
16	N ₂ 'C	31.9	20.6	19.2	16.2	22.0	67.6	53.3	47.9	43.1	53.0
17	N ₂ and C in (N ₂) alternate (C) years	24.5	19.1	19.6	15.9	19.8	60.6	42.2	46.5	36.0	46.3
18		18.9	9.7	7.9	3.3	10.0	42.3	20.5	18.3	10.2	22.8
19	R	24.3	18.1	17.0	13.3	18.2	50.3	39.4	37.6	27.7	38.8
20	N ₂ C'				11.1	11.1				28.1	28.1

Years after fallow		Total Grain: cwt. per acre					Total Straw [†] : cwt. per acre				
		1	2	3	4	Mean	1	2	3	4	Mean
		10 th season, 1947									
Plot	Section	I	III	IV	V		I	III	IV	V	
2A	D	19.1	14.6	19.4	14.6	16.9	28.3	19.7	25.9	20.7	23.6
2B	D	20.6	16.9	15.0	14.5	16.8	31.9	25.7	20.3	20.6	24.6
3	O	10.1	4.4	5.7	4.9	6.3	12.0	5.3	7.3	6.7	7.8
5	C	16.5	6.2	9.5	7.9	10.0	24.3	9.1	12.8	12.9	14.8
6	NN ₁ C	19.0	9.0	8.8	7.3	11.0	25.0	13.2	15.6	13.8	16.9
7	N ₁ C	22.3	12.5	7.8	7.1	12.4	28.4	18.1	13.9	15.6	19.0
8	N ₂ C	20.7	16.7	12.4	11.5	15.3	34.3	23.6	22.3	23.0	25.8
9	N ₁ 'C	15.1	9.4	6.5	6.9	9.5	25.5	11.3	10.0	11.2	14.5
10	N ₂	8.1	8.1	5.3	4.1	6.4	16.7	11.5	7.7	6.6	10.6
11	N ₂ P	9.4	9.8	5.8	4.0	7.2	22.9	12.0	7.5	8.1	12.6
12	N ₂ PS	13.0	10.0	7.1	5.5	8.9	23.9	14.0	11.5	13.6	15.8
13	N ₂ PK	22.2	9.7	6.7	6.1	11.2	30.8	15.0	12.2	11.3	17.3
14	N ₂ PM	14.5	10.7	7.3	6.6	9.8	25.3	17.5	11.1	12.5	16.6
15	N ₂ *C	20.5	11.3	9.1	7.0	12.0	29.2	20.6	13.5	11.6	18.7
16	N ₂ 'C	19.2	13.6	11.3	11.1	13.8	28.5	19.3	19.4	18.8	21.5
17	N ₂ and C in (C) alternate (N ₂) years	14.6	5.0	5.6	6.4	7.9	21.7	9.7	8.4	9.7	12.4
18		16.1	10.3	14.9	15.3	14.2	21.2	15.2	19.6	19.4	18.8
19	R	15.7	10.0	8.5	10.2	11.1	21.6	15.1	15.9	16.9	17.4
20	N ₂ C'	9.7				9.7	15.0				15.0

[†]Includes straw, cavings and chaff

*Sulphate of ammonia applied in autumn

[†]Yields from small areas left after cutting green wheat and wild oats.
(only happened in 1940 and 1946)

BARLEY - HOOSFIELD

Experiments on barley grown continuously on the same land were begun on Hoosfield in 1852, the general purpose being the same as on Broadbalk. On Hoosfield however the mineral manures in various combinations were laid on strips running lengthways along the field, and these were crossed at right angles by strips of various nitrogenous manures, to give plots of approximately 1/6 acre - one for each treatment. Dung alone was applied to a plot outside this factorial arrangement.

Since 1919, Plumage Archer has been the variety grown, except that from 1929 to 1932 Plumage Archer and Spratt Archer were grown in strips running through all the plots. Weeds have been troublesome on Hoosfield, as on Broadbalk, and it was found necessary to fallow the whole field in 1912, 1933 and 1943. Commencing in 1944 a yearly spraying with DNOC (dinitro-ortho-cresol) was given in late May or early June to check broad-leaved weeds, but wild oat (*Avena fatua*) has become a serious pest in recent years and hand pulling is regularly carried out.

Weed surveys have been made by the Botany Department.

Treatments

Symbols and amounts per acre

Cross Dressings

O	Unmanured
A	Sulphate of ammonia, 43 lb. N
AA	Nitrate of soda, 43 lb. N
AAS	Nitrate of soda, 43 lb. N; silicate of soda, 400 lb.
C	Rape cake (castor bean meal from 1940 onwards), 1,000 lb.

Strip Dressings

P	Superphosphate, 65 lb. P ₂ O ₅
K	Sulphate of potash, 98 lb. K ₂ O
S	Sulphate of soda, 100 lb.
M	Sulphate of magnesia, 100 lb.

Plot Dressings

D	Farmyard manure, 14 tons
D'	Unmanured, following farmyard manure 1852-71
F	Unmanured, following furnace ash 1852-1933
N'	Nitrate of soda, 43 lb. N
N''	Nitrate of soda, 43 lb. N, following double dressing 1852-57

Dung is ploughed in in winter; all other manures are broadcast in spring during the preparation of the seedbed.

Crop Notes

Year	Sown	Harvested	Year	Sown	Harvested
1939	Mar. 10	Aug. 25	1944	Mar. 29	Aug. 18
1940	Mar. 12	Aug. 6	1945	Mar. 9	Aug. 8
1941	Mar. 17	Aug. 25	1946	Mar. 25	Aug. 23
1942	Mar. 29	Aug. 15	1947	Apr. 17	Aug. 19

Total grain: cwt. per acre

Plot	Cross Dressing	Strip Dressing	1939	1940	1941	1942	1944	1945	1946	1947
1	O	O	9.2	6.4	2.1	8.8	14.8	11.2	10.2	5.4
2	O	P	12.5	9.4	4.4	11.1	22.7	11.7	10.3	6.7
3	O	KSM	12.0	7.8	3.3	12.0	17.9	18.1	11.8	8.3
4	O	PKSM	14.7	10.9	4.7	14.9	27.8	21.1	13.3	9.1
5	O	PK	11.9	6.8	3.8	14.9	28.6	20.8	13.4	10.8
1	A	O	17.1	12.2	5.7	9.4	10.4	15.6	15.0	7.1
2	A	P	20.7	15.8	8.5	8.0	15.3	22.9	14.4	9.0
3	A	KSM	18.4	13.5	6.6	10.2	11.8	21.9	15.6	11.8
4	A	PKSM	24.9	14.4	12.2	12.2	21.1	22.0	16.0	12.5
5	A	PK	22.2	18.2	8.5	9.0	13.9	14.8	22.4	17.4
1	AA	O	16.5	13.9	5.5	6.0	12.1	18.1	19.6	7.7
2	AA	P	24.3	20.8	8.8	9.9	21.3	25.0	16.4	12.0
3	AA	KSM	18.0	14.3	6.8	10.8	11.4	24.2	18.8	11.5
4	AA	PKSM	24.6	21.2	12.2	14.9	24.4	28.7	22.5	13.4
1	AAS	O	19.8	19.5	7.1	9.6	14.4	18.4	23.3	11.0
2	AAS	P	24.5	20.5	8.2	10.2	24.4	24.0	20.0	17.4
3	AAS	KSM	22.4	19.4	8.4	12.8	12.4	22.6	12.5	13.6
4	AAS	PKSM	26.2	23.2	12.9	16.2	26.5	26.8	24.8	16.6
1	C	O	21.0	16.6	7.7	7.4	16.4	19.4	14.7	14.6
2	C	P	21.4	16.6	7.6	7.5	28.5	27.4	17.9	18.6
3	C	KSM	19.6	16.8	9.5	10.3	22.1	24.9	40.5	16.7
4	C	PKSM	24.1	19.3	10.6	13.2	28.5	27.5	38.9	16.1
7-1		D'	15.3	9.7	4.2	13.8	25.4	23.6	14.0	10.5
7-2		D	32.8	20.8	7.6	12.7	30.9	36.6	32.6	21.0
6-1		O	10.9	6.3	2.1	8.7	17.8	14.6	8.1	6.9
6-2		F	10.4	5.3	1.9	6.9	15.1	13.2	11.1	8.1
1		N'	17.4	14.8	7.1	8.1	13.1	18.5	17.8	12.9
2		N''	21.4	17.8	7.8	8.0	17.8	23.1	17.8	19.6

Barley - Hoosfield

X
Vertical lines

A/2 3

Barley - Hoosfield

Total straw: cwt. per acre

Plot	Cross Dressing	Strip Dressing	1939	1940	1941	1942	1944	1945	1946	1947
1	O	O	11.8	8.6	8.2	10.9	14.8	12.1	9.8	5.0
2	O	P	12.3	7.3	7.1	10.8	18.2	10.8	9.4	6.4
3	O	KSM	19.0	9.6	9.9	15.2	17.4	17.0	13.0	8.3
4	O	PKSM	20.0	13.7	12.1	19.5	23.2	18.1	14.8	9.1
5	O	PK	15.5	9.9	14.7	19.0	27.8	19.9	14.4	10.0
1	A	O	21.1	18.8	18.5	16.1	11.6	15.8	15.4	5.7
2	A	P	23.0	20.7	21.5	16.6	14.9	25.9	16.5	9.5
3	A	KSM	23.0	16.1	18.7	17.8	12.7	24.7	21.5	13.4
4	A	PKSM	25.0	20.9	19.3	23.1	21.6	31.0	22.2	10.6
5	A	PK	29.1	28.7	25.2	29.8	24.0	39.2	31.4	20.0
1	AA	O	27.2	27.6	18.9	19.9	15.3	25.7	22.4	9.6
2	AA	P	27.9	24.7	25.2	22.1	21.2	30.0	22.4	14.5
3	AA	KSM	25.1	21.2	23.8	20.7	13.1	28.4	25.3	15.4
4	AA	PKSM	25.7	24.5	21.8	27.6	22.4	32.0	28.0	11.1
1	AAS	O	28.3	26.0	22.2	26.3	19.8	30.4	27.1	12.6
2	AAS	P	27.8	29.0	21.5	25.2	24.6	32.1	26.7	15.0
3	AAS	KSM	27.2	22.4	22.3	27.0	15.9	32.4	20.1	13.0
4	AAS	PKSM	27.5	25.4	21.7	28.2	27.3	35.2	31.9	12.7
1	C	O	25.7	25.1	21.5	21.6	18.1	29.4	24.1	15.2
2	C	P	25.4	23.9	21.0	21.4	26.9	32.0	23.6	17.8
3	C	KSM	23.0	21.1	21.5	24.3	24.0	29.3	61.5	15.4
4	C	PKSM	25.8	23.1	20.1	27.2	32.6	33.4	52.3	26.0
7-1		D'	21.0	16.0	13.2	16.6	23.9	23.5	17.9	11.8
7-2		D	41.4	35.6	32.2	31.7	32.5	45.2	47.3	21.4
6-1		O	14.1	10.1	7.9	13.8	18.7	14.5	10.7	8.4
6-2		F	13.9	6.4	7.8	11.4	13.8	13.5	11.3	8.3
1		N'	24.0	23.4	22.8	23.3	16.6	26.8	21.7	13.9
2		N''	28.5	25.4	22.7	24.8	19.8	29.3	21.8	18.2

35.6
X

N

Baron - 1953

Table showing...

Year	1948	1949	1950	1951	1952	1953	Group	Class	First Reading
1	10.1	10.2	10.3	10.4	10.5	10.6	O	O	1
2	10.7	10.8	10.9	11.0	11.1	11.2	F	O	2
3	11.3	11.4	11.5	11.6	11.7	11.8	RSM	O	3
4	11.9	12.0	12.1	12.2	12.3	12.4	FRSM	O	4
5	12.5	12.6	12.7	12.8	12.9	13.0	M	O	5
6	13.1	13.2	13.3	13.4	13.5	13.6	O	A	6
7	13.7	13.8	13.9	14.0	14.1	14.2	F	A	7
8	14.3	14.4	14.5	14.6	14.7	14.8	M	A	8
9	14.9	15.0	15.1	15.2	15.3	15.4	FRSM	A	9
10	15.5	15.6	15.7	15.8	15.9	16.0	M	A	10
11	16.1	16.2	16.3	16.4	16.5	16.6	O	AA	11
12	16.7	16.8	16.9	17.0	17.1	17.2	F	AA	12
13	17.3	17.4	17.5	17.6	17.7	17.8	RSM	AA	13
14	17.9	18.0	18.1	18.2	18.3	18.4	FRSM	AA	14
15	18.5	18.6	18.7	18.8	18.9	19.0	O	AB	15
16	19.1	19.2	19.3	19.4	19.5	19.6	F	AB	16
17	19.7	19.8	19.9	20.0	20.1	20.2	RSM	AB	17
18	20.3	20.4	20.5	20.6	20.7	20.8	FRSM	AB	18
19	20.9	21.0	21.1	21.2	21.3	21.4	O	C	19
20	21.5	21.6	21.7	21.8	21.9	22.0	F	C	20
21	22.1	22.2	22.3	22.4	22.5	22.6	RSM	O	21
22	22.7	22.8	22.9	23.0	23.1	23.2	FRSM	O	22
23	23.3	23.4	23.5	23.6	23.7	23.8	O	D	23
24	23.9	24.0	24.1	24.2	24.3	24.4	F	D	24
25	24.5	24.6	24.7	24.8	24.9	25.0	RSM	O	25
26	25.1	25.2	25.3	25.4	25.5	25.6	FRSM	O	26
27	25.7	25.8	25.9	26.0	26.1	26.2	O	E	27
28	26.3	26.4	26.5	26.6	26.7	26.8	F	E	28
29	26.9	27.0	27.1	27.2	27.3	27.4	RSM	O	29
30	27.5	27.6	27.7	27.8	27.9	28.0	FRSM	O	30
31	28.1	28.2	28.3	28.4	28.5	28.6	O	F	31
32	28.7	28.8	28.9	29.0	29.1	29.2	F	F	32
33	29.3	29.4	29.5	29.6	29.7	29.8	RSM	O	33
34	29.9	30.0	30.1	30.2	30.3	30.4	FRSM	O	34
35	30.5	30.6	30.7	30.8	30.9	31.0	O	G	35
36	31.1	31.2	31.3	31.4	31.5	31.6	F	G	36
37	31.7	31.8	31.9	32.0	32.1	32.2	RSM	O	37
38	32.3	32.4	32.5	32.6	32.7	32.8	FRSM	O	38
39	32.9	33.0	33.1	33.2	33.3	33.4	O	H	39
40	33.5	33.6	33.7	33.8	33.9	34.0	F	H	40

WHEAT AFTER FALLOW - HOOSFIELD

Comparison of a Three-Year Fallow with a One-Year Fallow

The land has been unmanured since 1851. There are two $\frac{1}{2}$ -acre strips, each divided into four parts, and the strips are fallowed in alternate years. In 1932 and after, one quarter of the strip in crop has also been fallowed, different quarters being selected in successive years, thus providing in every year from 1934 onwards a comparison of the effect of a three-year fallow with the effect of a one-year fallow. Half the experiment is under wheat after a one-year fallow, so that continuity with previous results is maintained.

Cropping of strips A and B

C = Crop. F = Fallow.

Year	A1	A2	A3	A4	B1	B2	B3	B4
1932, 40	F	C	C	C	F	F	F	F
1933, 41	F	F	F	F	C	C	F	C
1934, 42	C	F	C	C	F	F	F	F
1935, 43	F	F	F	F	C	C	C	F
1936, 44	C	C	F	C	F	F	F	F
1937, 45	F	F	F	F	F	C	C	C
1938, 46	C	C	C	F	F	F	F	F
1939, 47	F	F	F	F	C	F	C	C

Crop Notes

Crop Year	Date Sown	Date Harvested	Variety
1939	Oct. 24	Aug. 24	Red Standard
1940	Oct. 23	Aug. 8	Squareheads Master
1941	Oct. 28	Aug. 21	Squareheads Master
1942	Oct. 21	Aug. 17	Sherriffs "Stand Up"
1943	Oct. 15	Aug. 3	Squareheads Master
1944	Oct. 8	Aug. 10	Red Standard
1945	Oct. 30	Aug. 11	Red Standard
1946	Oct. 15	Aug. 16	Squareheads Master 13/4
1947	Oct. 18	Aug. 12	Squareheads Master 13/4

Yields: cwt per acre

Year	Total Grain			Mean	Total Straw*			Mean
	After 1 year fallow	After 3 years fallow	After 3 years fallow		After 1 year fallow	After 3 years fallow	After 3 years fallow	
1939	B3 12.5	B4 9.7	B1 11.2	11.1	B3 20.1	B4 16.2	B1 19.6	18.6
1940	A2 11.4	A3 12.2	A4 12.3	12.0	A2 17.9	A3 16.3	A4 18.2	17.5
1941	B4 6.9	B1 7.9	B2 9.3	8.0	B4 10.9	B1 12.0	B2 14.8	12.6
1942	A3 12.4	A4 10.6	A1 14.1	12.4	A3 16.3	A4 16.0	A1 20.0	17.4
1943	B1 14.9	B2 16.5	B3 19.7	17.0	B1 21.6	B2 23.9	B3 29.3	24.9
1944	A4 13.6	A1 17.4	A2 15.0	15.3	A4 18.2	A1 23.9	A2 20.4	20.8
1945	B2 11.2	B3 9.5	B4 9.9	10.2	B2 18.0	B3 16.7	B4 16.6	17.1
1946	A1 11.1	A2 9.9	A3 11.2	10.7	A1 23.1	A2 21.4	A3 26.0	23.5
1947	B3 6.2	B4 5.3	B1 8.9	6.8	B3 8.5	B4 8.1	B1 11.6	9.4

*Includes straw, cavings and chaff.

CROPS GROWN IN ROTATION - AGDELL FIELD

The experiment, which began in 1848, compares two crop rotations, one with clover and the other with fallow, and the effect of mineral manure with and without nitrogen applied to the root crops.

Area of each plot, 2/5 acre.

Rotations: Turnips or swedes, barley, clover or beans, wheat.

Turnips or swedes, barley, fallow, wheat.

Until 1904, half of each plot of turnips was fed on the land, the remainder being carted off. Subsequently all the roots were carted.

Treatments and rates of dressing.

Applied to the root crops only (all amounts per acre):

None;

Mineral manure, with no nitrogen: Superphosphate, 84 lb. P_2O_5 ;
Sulphate of potash, 245 lb. K_2O ; sulphate of soda, 100 lb;
sulphate of magnesia, 200 lb.

Complete mineral and nitrogenous manure: As above, together with sulphate of ammonia, 43 lb. N and 2,000 lb. castor bean meal or rape dust. ~~per acre.~~

Crop Notes.

Year	Crop	Sown	Harvested	Variety
1939	Wheat	Oct. 27, 1938	Aug. 15	Red Standard
1940	Turnips	May 31	Nov. 28	Bruce
1941	Barley	March 19	Sept. 10	Plumage Archer
1942	Clover	May 9, 1941	June 29	Montgomery Red
1943	Wheat	Oct. 15, 1942	Aug. 2	Red Standard
1944	Swedes	June 23	Nov. 5	Mixed seed
1945	Barley	March 9	Aug. 14	Plumage Archer
1946	Clover	April 6, 1945	June 24	Montgomery Red
1947	Winter wheat	Nov. 6, 1946	Aug. 12	Squareheads Master 13/4
1947	Spring wheat	April 18	Aug. 21	Atle

In 1940 the turnips, especially those on plots 1 and 2, were badly attacked by Finger and Toe disease.

In 1944 three varieties of swedes and eleven varieties of turnips were sown in strips down each plot. The turnips on all plots failed, as did also the swedes on plots 5 and 6; all plots were attacked by disease, plots 3 and 4 less severely than the rest.

In 1947 the wheat wintered badly, and it was decided to resow all of plots 1, 3 and 5 and the west side of plots 2, 4 and 6 with spring wheat.

Produce per acre

Year	Crop		O		M		C	
			Unmanured since 1848		Mineral Manure No nitrogen		Complete mineral and nitrogenous manure	
			5	6	3	4	1	2
			Clover or Fallow beans		Clover or Fallow beans		Clover or Fallow beans	
Twenty-third Course								
1936	Roots (Turnips)	tons	1.22	0.47	2.69	2.55	5.63	3.26
1937	Barley							
	Grain*	cwt.	0.5	0.3	3.1	0.5	0.6	1.0
	Straw*	cwt.	3.4	2.1	2.5	4.7	2.7	3.4
1938	Clover hay	cwt.	-	8.3	-	29.1	-	26.4
1939	Wheat							
	Grain*	cwt.	14.9	11.9	18.2	22.2	12.8	20.9
	Straw*	cwt.	26.3	19.9	32.9	36.6	24.9	33.2
Twenty-fourth Course								
1940	Root (Turnips)	tons	0.52	0.14	3.96	5.09	2.76	2.71
1941	Barley							
	Grain*	cwt.	7.4	3.2	9.6	11.5	10.3	4.2
	Straw*	cwt.	11.9	10.8	16.6	20.2	12.9	18.6
1942	Clover hay	cwt.	-	10.0	-	39.9	-	32.9
1943	Wheat							
	Grain*	cwt.	19.7	17.7	24.7	27.4	21.2	27.1
	Straw*	cwt.	30.3	29.2	39.4	41.7	34.6	42.4
Twenty-fifth Course								
1944	Roots (Swedes)	tons	Failed		5.26	5.01	3.53	2.09
1945	Barley							
	Grain*	cwt.	12.4	9.5	19.8	20.9	24.9	20.6
	Straw*	cwt.	11.4	10.1	21.5	16.7	25.1	24.9
1946	Clover hay	cwt.	-	7.4	-	44.9	-	25.0
1947	Winter wheat							
	Grain*	cwt.	-	7.0	-	16.0	-	12.3
	Straw*	cwt.	-	13.3	-	24.9	-	17.3
1947	Spring wheat							
	Grain*	cwt.	12.8	10.4	20.3	18.6	18.5	16.8
	Straw*	cwt.	15.8	15.1	26.2	25.0	22.3	19.3

*Includes straw, cavings and chaff.

MANGOLDS AND SUGAR BEET - BARNFIELD

Experiments on root crops have been conducted on Barnfield since 1843. White turnips were grown from 1843-1848, followed by swedes until 1870 except for three years 1853-1855 when the crop was barley. Sugar beet was grown from 1871-1875 and then in 1876 the field was established under mangolds, variety Yellow Globe, with practically the present scheme of manuring. Since 1946 four rows of sugar beet, variety Klein E, have been drilled on each plot in order to compare the growth of mangolds and sugar beet under a wide range of fertilizer treatments. The leaves of the crops are spread and ploughed in on their respective plots.

Area of each plot, 1/7 to 1/5 acre.

Symbols and amounts per acre.

Cross Dressings

O	Unmanured
N	Nitrate of soda, 86 lb. N
A	Sulphate of ammonia, 86 lb. N
C	Rape cake, (castor bean meal from 1940 onwards) 2000 lb.

Strip Dressings

P	Superphosphate, 65 lb. P_2O_5
K	Sulphate of potash, 245 lb. K_2O
S	Sodium chloride, 200 lb.
M	Sulphate of magnesia, 200 lb.
Ca	Calcium chloride, 190 lb; potassium nitrate, 570 lb; calcium nitrate, 100 lb.
D	Farmyard manure, 14 tons

Treatments

Strip	Strip	Cross Dressings
1	D	O
2	DPK	N
4	PKSM	A
5	P	AC
		C
	6	PK
	7	PSM
	8	O
	9	NKSM

From 1904 onwards, plot 4N has been divided, 4(a) receiving the dressing NPKSM, 4(b) receiving the dressing NPCa.

Dung is ploughed down in winter. The mineral manures, castor bean meal, and one third of the sulphate of ammonia and nitrate of soda are applied after the first cultivation but before the seed is drilled. The remaining two-thirds of the nitrogenous fertilizers are applied as a top-dressing about the time of singling.

Crop Notes

Year	Date sown	Date lifted	Year	Date sown	Date lifted
1939	May 9	Nov. 11	1944	May 3	Nov. 16
1940	May 10	Nov. 21	1945	April 18	Oct. 26
1941	April 18	Nov. 25	1946 ⁽¹⁾	May 3	Nov. 20
1942	May 1	Dec. 7	1946 ⁽²⁾	May 3	Nov. 11
1943	April 27	Nov. 5	1947 ⁽¹⁾	May 16	Oct. 31
			1947 ⁽²⁾	May 16	Oct. 30

- (1) Mangolds
(2) Sugar beet

Investigations by the Soil Microbiology Department are described by A.V.Garcia, "Contribuicoes para o conhecimento da Microbiologia do solo. Estudos sobre as bacterias autoctones e amibas de tres talhoes do campo experimental de Barnfield", Anais do Instituto Superior de Agronomia 18. (1951) 1, and by B.N.Singh, "The effect of artificial fertilizers and dung on the numbers of amoebae in Rothamsted soils", J.Gen.Microbiol., 3, (1949) 204.

Mangolds and Sugar Beet - Barnfield

Mangolds

Strip Dressing	Roots: tons per acre					Leaves: tons per acre				
	O	N	A	AC	C	O	N	A	AC	C
1939										
1 D	10.86	18.69	16.87	23.55	22.18	3.17	4.63	4.30	5.39	5.23
2 DPK	14.07	22.14	19.06	28.67	24.00	3.46	5.03	4.65	6.09	5.00
4 FKSM	3.62	18.05	15.42	25.60	18.99	1.20	4.09	3.54	5.71	3.72
4(b)PCa		17.76					4.82			
5 P	3.69	19.18	10.16	12.00	12.45	1.17	4.50	3.50	4.06	3.74
6 FK	3.07	17.41	15.91	23.09	17.76	0.95	4.34	3.25	5.62	3.72
7 FSM	3.51	19.35	18.19	23.90	20.76	1.10	4.63	3.70	4.92	4.29
8 O	2.29	9.71	6.48	10.03	10.31	0.92	3.57	2.90	3.91	3.98
9 NKSM	17.10	-	-	-	-	3.68	-	-	-	-
1940										
1 D	15.03	25.82	20.64	23.65	23.77	2.44	4.61	4.30	4.62	3.78
2 DPK	18.11	30.35	27.17	30.61	26.37	2.82	6.03	5.40	5.75	4.17
4 FKSM	4.43	21.81	18.51	28.19	22.65	1.13	4.38	3.47	5.21	3.86
4(b)PCa		21.85					4.56			
5 P	4.64	19.91	12.69	15.60	14.64	0.91	2.92	2.91	4.17	3.29
6 FK	4.33	20.67	16.31	26.09	20.24	0.86	2.84	2.41	4.43	3.17
7 FSM	3.87	22.42	18.52	21.48	21.79	0.99	4.29	3.93	5.71	4.75
8 O	5.53	17.73	10.30	12.11	13.22	1.02	3.90	3.20	4.01	3.49
9 NKSM	19.54	-	-	-	-	3.02	-	-	-	-
1941										
1 D	3.63	13.97	12.10	18.17	15.68	0.87	4.27	3.54	4.37	3.80
2 DPK	4.49	17.28	19.35	22.67	20.60	1.29	4.45	4.41	5.02	4.04
4 FKSM	0.12	8.54	9.40	19.39	17.12	0.08	2.90	2.91	4.15	3.02
4(b)PCa		6.03					2.18			
5 P	0.24	8.30	8.48	11.22	12.39	0.18	2.06	2.76	3.57	3.12
6 FK	0.43	8.59	12.42	15.29	15.16	0.25	1.91	2.50	3.72	2.87
7 FSM	0.16	6.47	10.20	18.57	15.89	0.12	1.65	2.55	4.06	3.26
8 O	0.70	3.50	2.61	3.06	2.97	0.34	1.54	1.46	0.91	1.16
9 NKSM	11.81	-	-	-	-	2.56	-	-	-	-
1942										
1 D	10.38	25.31	20.02	24.00	21.09	1.83	3.13	3.30	3.47	2.35
2 DPK	15.55	31.06	29.16	32.34	27.36	2.10	4.45	4.09	4.67	3.35
4 FKSM	1.64	24.04	22.56	31.08	24.95	0.32	3.60	2.84	4.28	2.30
4(b)PCa		22.93					4.31			
5 P	1.97	17.43	8.40	6.40	9.92	0.66	2.45	2.94	1.66	2.69
6 FK	1.14	20.81	18.62	23.46	19.62	0.34	2.98	1.88	3.74	2.01
7 FSM	0.75	22.25	17.77	18.74	19.94	0.10	3.77	2.54	3.03	3.33
8 O	2.40	15.78	8.61	6.10	8.17	0.78	4.13	2.69	2.45	2.79
9 NKSM	20.98	-	-	-	-	2.84	-	-	-	-

Mangolds

Strip Dressing	Roots: tons per acre					Leaves: tons per acre				
	0	N	A	AC	C	0	N	A	AC	C
1943										
1 D	12.58	25.71	19.14	30.08	28.10	3.71	6.43	4.89	7.36	4.67
2 DPK	14.14	22.34	21.55	32.26	25.69	3.91	6.39	6.65	6.90	5.70
4 FKSM	2.28	11.24	12.79	29.92	18.27	1.08	7.12	4.53	6.97	5.82
4(b)PCa		13.36					6.36			
5 P	3.13	12.89	11.69	12.44	14.07	1.32	5.33	3.47	5.70	5.21
6 PK	2.18	17.64	15.84	27.85	19.47	0.66	4.21	3.62	6.17	3.47
7 FSM	1.86	17.85	13.72	22.91	23.06	0.68	6.09	4.67	6.17	5.43
8 0	1.82	17.52	10.85	11.47	12.21	1.05	5.26	4.21	7.88	5.24
9 NKSM	19.97	-	-	-	-	4.57	-	-	-	-
1944										
1 D	8.59	14.62	13.79	14.09	10.34	3.77	5.24	4.89	5.63	5.82
2 DPK	9.85	12.40	13.85	20.86	18.34	4.01	5.43	4.40	7.58	6.56
4 FKSM	1.48	8.06	6.76	16.30	9.53	0.76	4.31	3.91	6.51	4.40
4(b)PCa		9.16					3.96			
5 P	0.91	3.61	1.96	4.98	5.45	1.08	2.89	2.57	3.28	3.87
6 PK	1.27	7.16	8.31	19.66	14.17	1.13	4.26	4.99	5.99	3.62
7 FSM	1.31	4.70	4.88	16.27	14.18	0.95	3.16	3.28	6.19	4.75
8 0	0.44	5.69	2.67	5.71	5.21	0.61	3.87	2.59	4.35	4.06
9 NKSM	12.25	-	-	-	-	4.33	-	-	-	-
1945										
1 D	12.18	22.31	17.82	30.10	25.36	3.65	3.74	5.48	4.89	4.70
2 DPK	14.06	21.36	17.59	34.63	26.68	3.69	5.95	4.26	6.02	4.89
4 FKSM	3.61	16.99	18.09	32.45	20.52	1.52	5.82	6.21	7.12	4.09
4(b)PCa		15.57					5.33			
5 P	3.02	9.19	11.51	15.11	15.66	0.95	2.84	2.91	4.48	2.96
6 PK	3.20	14.41	14.47	33.32	24.51	1.20	5.31	3.89	5.21	3.06
7 FSM	2.98	10.43	13.53	21.36	20.83	0.81	3.96	5.02	4.53	4.45
8 0	3.19	12.16	8.06	13.41	15.51	1.08	5.19	4.01	2.76	3.43
9 NKSM	22.91	-	-	-	-	4.35	-	-	-	-
1946										
1 D	8.16	19.30	14.73	12.09	16.12	1.49	4.77	4.87	4.31	4.84
2 DPK	9.13	20.00	17.97	13.31	18.92	2.72	6.14	5.19	5.82	4.28
4 FKSM	2.14	12.76	8.72	16.20	13.50	7.29	4.87	2.98	4.01	3.77
4(b)PCa		15.35					4.72			
5 P	1.14	10.47	3.20	13.70	11.51	3.82	3.77	1.76	2.91	2.42
6 PK	1.50	9.02	8.97	28.85	13.54	3.57	2.25	3.28	4.48	3.57
7 FSM	1.46	12.02	8.58	11.19	9.75	3.28	3.65	2.52	4.50	2.40
8 0	1.46	4.03	2.71	12.69	13.33	3.07	1.49	2.25	2.25	3.33
9 NKSM	8.48	-	-	-	-	3.25	-	-	-	-

Strip Dressings	Roots: tons per acre Cross Dressings					Leaves: tons per acre Cross Dressings				
	0	N	A	AC	C	0	N	A	AC	C
1947	Mangolds									
1 D	6.41	11.29	10.91	10.01	10.01	1.79	2.10	1.91	2.18	2.79
2 DPK	9.54	14.39	12.29	12.87	13.15	1.44	3.11	2.62	3.45	2.40
4 PKSM	3.10	10.57	7.29	7.86	9.84	1.44	2.62	2.25	2.45	2.45
4(b) PCa		11.52					2.18			
5 P	1.93	8.60	1.63	2.64	3.69	0.69	1.83	0.64	0.83	1.57
6 PK	2.27	7.76	6.07	7.36	6.88	0.61	2.45	1.61	2.23	2.35
7 PSM	1.89	8.22	7.11	5.25	4.49	0.59	2.37	1.93	1.83	1.57
8 0	0.57	0.71	0.42	3.51	3.67	0.44	0.59	0.49	0.98	1.13
9 NKSM	3.67	-	-	-	-	1.79	-	-	-	-
1946	Sugar beet									
	Roots (washed): tons per acre					Tops: tons per acre				
2 DPK	6.01	7.24	6.41	13.28	9.20	5.82	12.48	8.71	15.71	12.09
4 PKSM	1.27		5.06	8.54	6.80	2.69		4.26	10.42	5.97
4(b) PCa		8.12					9.39			
5 P	1.24	7.19	1.59	11.11	6.95	3.91	10.86	2.50	10.62	5.24
6 PK	1.17	6.39	4.89	9.59	10.13	2.40	9.54	3.77	15.02	7.93
7 PSM	1.43	7.66	5.50	6.12	8.32	3.62	6.85	5.63	12.09	12.87
8 0	0.38	2.79	2.10	8.12	7.24	1.50	4.11	2.50	11.35	11.06
1947	Sugar beet									
1 D	6.28	7.65	7.60	6.34	8.02	4.65	6.41	6.46	5.48	7.19
2 DPK	4.92	7.05	5.65	6.26	8.24	5.97	6.56	5.72	5.58	6.70
4 PKSM	1.90		5.59	6.53	6.23	1.22		5.33	7.29	4.70
4(b) PCa		7.49					5.48			
5 P	2.28	5.65	1.90	3.01	4.06	1.03	6.80	2.50	3.13	3.91
6 PK	1.35	5.66	4.04	6.84	6.20	1.32	6.46	2.54	7.00	4.21
7 PSM	1.75	5.87	4.43	3.88	4.64	1.47	7.05	3.82	5.28	4.26
8 0	1.55	1.86	0.49	1.38	1.28	1.37	2.50	1.17	3.23	3.57

No Sugar beet was grown on strip 1 in 1946.

Group	Year	Hours (months) - time per acre				Gross production			
		A	B	C	D	A	B	C	D
DKK	1953	4.01	4.84	4.41	4.30	10.04	10.04	10.04	10.04
MOK	1953	4.27	4.00	4.00	4.00	10.04	10.04	10.04	10.04
POA	1953	4.12	4.12	4.12	4.12	10.04	10.04	10.04	10.04
POA (p)	1953	4.00	4.10	4.20	4.30	10.04	10.04	10.04	10.04
P	1953	4.00	4.00	4.00	4.00	10.04	10.04	10.04	10.04
PK	1953	4.17	4.20	4.20	4.20	10.04	10.04	10.04	10.04
PKM	1953	4.43	4.20	4.20	4.20	10.04	10.04	10.04	10.04
0	1953	4.30	4.10	4.10	4.10	10.04	10.04	10.04	10.04
DKK	1952	4.01	4.84	4.41	4.30	10.04	10.04	10.04	10.04
MOK	1952	4.27	4.00	4.00	4.00	10.04	10.04	10.04	10.04
POA	1952	4.12	4.12	4.12	4.12	10.04	10.04	10.04	10.04
POA (p)	1952	4.00	4.10	4.20	4.30	10.04	10.04	10.04	10.04
P	1952	4.00	4.00	4.00	4.00	10.04	10.04	10.04	10.04
PK	1952	4.17	4.20	4.20	4.20	10.04	10.04	10.04	10.04
PKM	1952	4.43	4.20	4.20	4.20	10.04	10.04	10.04	10.04
0	1952	4.30	4.10	4.10	4.10	10.04	10.04	10.04	10.04
DKK	1951	4.01	4.84	4.41	4.30	10.04	10.04	10.04	10.04
MOK	1951	4.27	4.00	4.00	4.00	10.04	10.04	10.04	10.04
POA	1951	4.12	4.12	4.12	4.12	10.04	10.04	10.04	10.04
POA (p)	1951	4.00	4.10	4.20	4.30	10.04	10.04	10.04	10.04
P	1951	4.00	4.00	4.00	4.00	10.04	10.04	10.04	10.04
PK	1951	4.17	4.20	4.20	4.20	10.04	10.04	10.04	10.04
PKM	1951	4.43	4.20	4.20	4.20	10.04	10.04	10.04	10.04
0	1951	4.30	4.10	4.10	4.10	10.04	10.04	10.04	10.04

No sugar beet was grown on estate in 1954.

HAY - THE PARK GRASS PLOTS

Long period effects of fertilizers and manures on the yield and botanical composition of meadow hay

This field has been under grass for centuries. The experimental treatments were first applied in 1856. Until 1874 the aftermath was grazed by sheep, but since then a second cut of hay has been taken in late summer, and no stock has been admitted.

In 1903 most of the plots were divided, the southern halves receiving 18 cwt. of ground lime per acre, every fourth year.

Most plots are $\frac{1}{4}$ acre, but the sizes range from $\frac{1}{2}$ to $\frac{1}{12}$ acre.

The experiment is discussed, and early departures from the present manuring system described, by R.O.Cashen, J.Agric.Sci., 37, (1947), 1.

Plot		Treatments (all amounts per acre)
1	N ₁	Sulphate of ammonia (43 lb.N); (with dung (14 tons) also, 1856-63).
2	O	Unmanured, following dung (14 tons), 1856-63.
3	O	Unmanured.
4-1	P	Superphosphate (65 lb. P ₂ O ₅).
4-2	N ₂ P	Sulphate of ammonia (86 lb.N), superphosphate (65 lb.P ₂ O ₅).
5-1	O	Unmanured, following ammonium salts (86 lb.N), 1856-97 7 .
5-2	PK	Superphosphate (65 lb. P ₂ O ₅), sulphate of potash (245 lb. K ₂ O), following ammonium salts (86 lb.N) 1856-97.
6	PKM	Complete minerals as Plot 7, following ammonium salts (86 lb. N), 1856-68.
7	PKM	Complete minerals: Superphosphate (65 lb. P ₂ O ₅). Sulphate of potash (245 lb. K ₂ O). Sulphate of soda (100 lb.) Sulphate of magnesia (100 lb.)
8	PM	Complete minerals without sulphate of potash.
9	N ₂ PKM	Complete minerals, with sulphate of ammonia (86 lb. N).
10	N ₂ PM	Complete minerals, without sulphate of potash; with sulphate of ammonia (86 lb. N).

Plot		
11-1	N ₃ PKM	Complete minerals, with sulphate of ammonia (129 lb. N).
11-2	N ₃ PKMS	As plot 11-1, with silicate of soda (400 lb.) since 1862.
12	C	Unmanured.
13	DF	Dung (14 tons) in 1905 and every fourth year since (omitted in 1917), fish guano (6 cwt.) in 1907 and every fourth year since; following complete minerals with ammonium salts (86 lb. N), 1856-1904.
14	N ₂ 'PKM	Complete minerals, with nitrate of soda (86 lb. N).
15	PKM	Complete minerals, following nitrate of soda (86 lb. N), 1858-63.
16	N ₁ 'PKM	Complete minerals, with nitrate of soda (43 lb. N).
17	N ₁ '	Nitrate of soda (43 lb. N).
18	N ₂ KM	Complete minerals without superphosphate, with sulphate of ammonia (86 lb. N); following minerals and ammonium salts supplying the constituents of 1 ton of hay, 1865-1904.
19	D	Dung (14 tons) in 1905 and every fourth year since except 1917, following nitrate of soda (43 lb. N), superphosphate (65 lb. P ₂ O ₅) and sulphate of potash (142 lb. K ₂ O), 1872-1904.
20	D;C	Dung (14 tons) in 1905 and every fourth year since except in 1917; in each intervening year nitrate of soda (27 lb. N), superphosphate (33 lb. P ₂ O ₅) and sulphate of potash (49 lb. K ₂ O); following superphosphate (66 lb. P ₂ O ₅) and nitrate of potash (327 lb.), 1872-1904.

Ground lime was applied to the southern portion (limed) of the plots at the rate of 2,000 lb. per acre in the winters of 1903-4, 1907-8, 1915-16, 1923-24, 1927-28, 1931-32, 1935-36, 1939-40, 1943-44 and at the rate of 2,500 lb. per acre in the winter of 1920-21, except on plots 18, 19 and 20, where part received light liming and part heavy liming as follows (weights in lb. per acre):-

Plot	Light liming (LL)	Heavy Liming (HL)
18	3,951	6,788
19	570	3,150
20	570	2,772

Hay - Park Grass

Dung and lime are applied in winter, minerals as early in spring as possible, and nitrogenous fertilizers in March. On plots 11-1, 11-2 and 16 the nitrogenous fertilizer is given in two dressings one month apart.

Year	Dates of cutting				
	1st cut	2nd cut	Year	1st cut	2nd cut
1939	July 1	Sept. 28	1944	June 21	Nov. 22
1940	June 20	Jan. 1941	1945	June 19	Nov. 9
1941	June 25	Oct. 1	1946	June 22	Dec. 24
1942	June 10	Sept. 19	1947	June 13	Sept. 2
1943	June 21	Nov. 25			

The second crop is carted green, and hay yields are estimated from the dry matter.

Yield of hay: cwt. per acre

Plot	1939						1940					
	Not limed			Limed			Not limed			Limed		
	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total
1	8.4	16.8	25.2	20.4	11.8	32.2	10.6		10.6	16.0		16.0
2	13.0	11.4	24.4	13.8	9.0	22.8	13.0		13.0	14.5		14.5
3	11.1	9.9	21.0	12.8	6.5	19.3	13.6		13.6	14.5		14.5
4-1	19.0	14.4	33.4	17.7	10.6	28.3	14.7		14.7	16.0		16.0
4-2	12.2	20.2	32.4	29.6	12.0	41.6	14.1		14.1	27.9		27.9
5-1	9.5	9.1	18.6	-	-	-	9.6		9.6	-		-
5-2	20.9	12.9	33.8	-	-	-	21.9		21.9	-		-
6	32.9	20.9	53.8	-	-	-	22.4		22.4	-		-
7	35.5	23.6	59.1	41.1	26.2	67.3	24.2		24.2	33.3		33.3
8	20.7	12.0	32.7	14.3	10.9	25.2	16.5		16.5	19.4		19.4
9	32.8	26.6	59.4	54.0	22.5	76.5	36.7	3.8	40.5	39.3	1.2	40.5
10	23.8	17.2	41.0	43.6	19.0	62.6	16.7		16.7	31.1	1.2	32.3
11-1	25.6	29.2	54.8	54.8	31.8	86.6	31.3	18.2	49.5	48.9	6.6	55.5
11-2	36.1	28.0	64.1	56.8	35.2	92.0	40.8	17.8	58.6	51.6	9.4	61.0
12	15.0	9.6	24.6	-	-	-	11.5		11.5	-		-
13	37.5	23.4	60.9	32.0	20.5	52.5	27.7	2.0	29.7	24.1	0.9	25.0
14	52.4	23.1	75.5	52.3	19.1	71.4	51.5	2.6	54.1	48.6	1.1	49.7
15	20.0	15.1	35.1	31.1	17.8	48.9	18.0		18.0	28.5		28.5
16	39.5	19.4	58.9	37.4	19.4	56.8	35.7	1.6	37.3	39.3	0.6	39.9
17	17.8	12.9	30.7	21.8	9.0	30.8	19.8		19.8	25.9		25.9
18	12.1	17.1	29.2	29.5*	9.6*	39.1*	6.8	2.9	9.7	24.3*		24.3*
				25.7†	8.2†	33.9†				20.2†		20.2†
19	25.0	18.1	43.1	26.7*	17.4*	44.1*	27.2		27.2	23.8*		23.8*
				25.8†	16.0†	41.8†				23.4†		23.4†
20	37.6	19.2	56.8	36.1*	22.4*	58.5*	33.5		33.5	38.4*		38.4*
				33.2†	18.1†	51.3†				35.0†		35.0†

* Heavy liming.

† Light liming.

Hay - Park Grass

Yield of hay: cwt. per acre

Plot	1941						1942					
	Not limed			Limed			Not limed			Limed		
	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total
1	6.7	6.3	13.0	18.5	5.5	24.0	5.8	4.0	9.8	15.0	4.1	19.1
2	11.4	6.6	18.0	11.7	5.8	17.5	4.0	1.8	5.8	7.3	1.2	8.5
3	9.8	7.1	16.9	12.5	11.9	24.4	3.3	0.6	3.9	5.8	0.6	6.4
4-1	17.3	6.4	23.7	14.7	7.3	22.0	8.5	0.9	9.4	8.7	1.4	10.1
4-2	10.8	4.6	15.4	23.7	4.0	27.7	15.0	4.8	19.8	27.2	3.6	30.8
5-1	6.5	6.2	12.7	-	-	-	7.5	1.4	8.9	-	-	-
5-2	12.8	8.8	21.6	-	-	-	13.6	4.6	18.2	-	-	-
6	21.4	13.8	35.2	-	-	-	8.1	4.8	12.9	-	-	-
7	27.8	20.3	48.1	31.4	14.6	46.0	25.5	4.8	30.3	35.4	3.0	38.4
8	19.4	15.8	35.2	13.6	13.4	27.0	12.2	2.6	14.8	9.7	1.9	11.6
9	15.8	6.7	22.5	39.4	16.6	56.0	46.6	13.8	60.4	40.2	3.8	44.0
10	13.1	14.1	27.2	28.7	10.6	39.3	11.8	7.4	19.2	29.4	4.6	34.0
11-1	9.4	24.0	33.4	45.0	24.3	69.3	35.6	25.1	60.7	45.8	6.4	52.2
11-2	31.2	29.2	60.4	50.5	34.0	84.5	46.6	23.8	70.4	54.2	8.4	62.6
12	11.4	8.5	19.9	-	-	-	7.2	2.8	10.0	-	-	-
13	29.2	32.6	61.8	25.2	20.6	45.8	32.6	3.1	35.7	21.8	2.1	23.9
14	52.6	16.3	68.9	50.8	9.2	60.0	52.4	6.5	58.9	46.9	6.0	52.9
15	19.3	9.6	28.9	29.9	7.7	37.6	14.7	2.8	17.5	23.6	1.2	24.8
16	30.8	10.7	41.5	33.9	8.3	42.2	33.3	3.6	36.9	35.2	3.4	38.6
17	19.3	7.0	26.3	21.4	3.8	25.2	12.5	5.2	17.7	22.2	2.9	25.1
18	7.2	12.8	20.0	22.1*	7.2*	29.3*	7.8	4.5	12.3	21.3*	1.6*	22.9*
				21.1†	7.0†	28.1†				24.3†	2.2†	26.5†
19	30.9	15.5	46.4	28.9*	14.7*	43.6*	22.5	5.1	27.6	23.5*	4.9*	28.4*
				31.3†	17.9†	49.2†				25.5†	2.9†	28.4†
20	30.4	14.6	45.0	31.9*	13.8*	45.7*	34.0	4.2	38.2	37.7*	2.9*	40.6*
				28.9†	11.0†	39.9†				40.7†	4.9†	45.6†

* Heavy liming.

† Light liming.

N

Yield of hay: cwt. per acre

Plot	1943						1944					
	Not limed			Limed			Not limed			Limed		
	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total
1	8.4	-	8.4	13.8	-	13.8	0.7	-	0.7	5.4	-	5.4
2	11.4	-	11.4	9.9	-	9.9	3.8	-	3.8	2.0	-	2.0
3	10.9	-	10.9	9.8	-	9.8	3.5	-	3.5	2.8	-	2.8
4-1	11.9	-	11.9	11.6	-	11.6	5.6	-	5.6	3.4	-	3.4
4-2	13.8	0.5	14.3	28.7	1.6	30.3	0.5	-	0.5	10.7	3.0	13.7
5-1	8.4	0.5	8.9	-	-	-	3.4	1.4	4.8	-	-	-
5-2	14.2	1.9	16.1	-	-	-	7.4	3.4	10.8	-	-	-
6	22.6	2.4	25.0	-	-	-	18.3	4.6	22.9	-	-	-
7	27.5	2.5	30.0	33.7	1.1	34.8	16.8	6.5	23.3	32.0	6.9	38.9
8	22.9	1.1	24.0	17.0	0.5	17.5	8.9	2.4	11.3	6.5	1.0	7.5
9	54.7	9.1	63.8	43.7	3.5	47.2	24.0	15.9	39.9	28.2	6.4	34.6
10	22.5	4.4	26.9	33.7	3.0	36.7	7.6	7.2	14.8	18.2	4.0	22.2
11-1	61.9	15.5	77.4	54.4	9.8	64.2	18.5	31.5	50.0	48.6	12.2	60.8
11-2	73.9	13.8	87.7	56.7	11.9	68.6	37.2	25.8	63.0	45.3	15.6	60.9
12	16.7	10.6	17.3	-	-	6.5	-	6.5	-	-	-	-
13	30.9	4.9	35.8	28.8	1.8	30.6	17.5	4.8	22.3	20.8	-	20.8
14	47.4	3.0	50.4	46.1	2.1	48.2	30.7	6.9	37.6	12.1	4.0	16.1
15	17.8	-	17.8	27.6	-	27.6	4.5	2.8	7.3	7.7	1.4	9.1
16	31.5	-	31.5	33.8	0.5	34.3	15.5	3.2	18.7	18.2	3.6	21.8
17	16.8	-	16.8	19.1	-	19.1	4.2	-	4.2	3.9	1.1	5.0
18	15.7	1.9	17.6	36.2*	-	36.2*	5.0	4.1	9.1	19.0*	2.1*	21.1*
				29.8†	-	29.8†				12.7†	2.5†	15.2†
19	25.1	-	25.1	19.1*	-	19.1*	11.9	6.8	18.7	9.7*	4.4*	14.1*
				21.8†	-	21.8†				11.4†	4.2†	15.6†
20	38.0	1.1	39.1	33.7*	0.5*	34.2*	20.3	5.5	25.8	17.4*	2.9*	20.3*
				38.4†	2.0†	40.4†				23.0†	3.6†	26.6†

* Heavy liming.

† Light liming.

Hay - Park Grass

Yield of hay: cwt per acre

Plot	1945						1946					
	Not limed			Limed			Not limed			Limed		
	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total
1	6.0	4.0	10.0	17.7	2.2	19.9	13.6	6.4	20.0	20.3	3.7	24.0
2	11.8	-	11.8	10.5	-	10.5	12.9	3.0	15.9	14.2	2.3	16.5
3	11.9	-	11.9	11.1	-	11.1	12.3	3.6	15.9	12.8	1.8	14.6
4-1	17.2	1.2	18.4	16.0	0.6	16.6	16.5	3.3	19.8	14.3	3.8	18.1
4-2	15.9	1.5	17.4	26.9	1.5	28.4	19.2	6.1	25.3	43.5	7.9	51.4
5-1	6.7	1.4	8.1	-	-	-	7.3	2.4	9.7	-	-	-
5-2	16.6	3.9	20.5	-	-	-	11.7	5.8	17.5	-	-	-
6	33.5	11.5	45.0	-	-	-	26.2	11.2	37.4	-	-	-
7	30.4	10.0	40.4	48.8	10.1	58.9	22.5	11.0	33.5	52.2	11.9	64.1
8	26.8	5.6	32.4	19.7	3.8	23.5	20.2	8.4	28.6	13.8	6.5	20.3
9	38.2	15.5	53.7	42.2	4.0	46.2	19.5	24.2	43.7	40.5	11.5	52.0
10	30.9	6.9	37.8	34.1	3.4	37.5	18.5	13.4	31.9	30.6	9.0	39.6
11-1	30.0	19.1	49.1	53.5	7.0	60.5	30.6	3.4	34.0	48.1	20.6	68.7
11-2	44.8	23.0	67.8	54.9	10.8	65.7	32.0	3.2	35.2	52.5	2.0	54.5
12	16.8	2.8	19.6	-	-	-	11.1	6.0	17.1	-	-	-
13	37.9	9.1	47.0	52.3	13.8	66.1	24.4	14.2	38.6	36.7	10.4	47.1
14	49.7	11.8	61.5	52.8	6.8	59.6	52.5	12.9	65.4	54.7	11.4	66.1
15	22.0	8.2	30.2	30.2	6.5	36.7	21.3	7.4	28.7	25.9	5.6	31.5
16	17.5	6.2	23.7	34.6	7.9	42.5	35.8	9.3	45.1	37.7	10.8	48.5
17	28.0	7.5	35.5	26.0	5.2	31.2	24.9	7.1	32.0	23.2	5.8	29.0
18	17.0	4.0	21.0	33.2*	-	33.2*	6.5	13.8	20.3	21.9*	3.8*	25.7*
				32.0†	-	32.0†				19.5†	6.7†	26.2†
19	40.3	10.1	50.4	38.8*	5.0*	43.8*	28.7	10.9	39.6	27.4*	7.4*	34.8*
				41.2†	5.5†	46.7†				31.9†	8.2†	40.1†
20	38.6	5.2	43.8	40.6*	3.1*	43.7*	43.5	10.7	54.2	46.6*	7.2*	53.8*
				42.7†	8.8†	51.5†				51.1†	11.9†	63.0†

* Heavy liming.

† Light liming.

N 12

Yield of hay: cwt per acre

Plot	1947					
	Not Limed			Limed		
	1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total
1	9.0	3.9	12.9	23.2	6.0	29.2
2	18.4	1.1	19.5	21.2	4.2	25.4
3	19.1	1.4	20.5	20.4	2.1	22.5
4-1	24.8	2.6	27.4	23.4	3.4	26.8
4-2	15.4	5.9	21.3	19.9	7.8	27.7
5-1	13.3	1.6	14.9	-	-	-
5-2	28.2	5.0	33.2	-	-	-
6	40.3	8.9	49.2	-	-	-
7	41.2	8.2	49.4	51.4	9.2	60.6
8	29.4	6.0	35.4	24.6	4.6	29.2
9	20.2	22.2	42.4	30.1	9.0	39.1
10	18.0	10.8	28.8	26.4	8.5	34.9
11-1	9.8	22.2	32.0	44.1	11.9	56.0
11-2	18.3	30.9	49.2	52.1	17.2	69.3
12	22.1	3.0	25.1	-	-	-
13	33.8	7.6	41.4	43.2	13.1	56.3
14	45.8	13.8	59.6	40.2	12.0	52.2
15	33.5	6.0	39.5	45.3	7.0	52.3
16	34.9	9.5	44.4	41.2	9.5	50.7
17	23.1	7.4	30.5	26.9	6.8	33.7
18	15.5	3.9	19.4	32.4*	10.5*	42.9*
				28.9†	9.8†	38.7†
19	29.8	6.6	36.4	33.8*	5.2*	39.0*
				33.6†	5.2†	38.8†
20	41.9	8.0	49.9	42.9*	7.1*	50.0*
				37.4†	9.9†	47.3†

* Heavy liming.

† Light liming.

Code Numbers of botanical species

<u>Gramineae</u>	<u>Miscellaneous</u>
1 Agrostis vulgaris	101 Ranunculus acris and bulbosus
2 Aira caespitosa	104 Cerastium vulgatum
3 Alopecurus pratensis	105 Stellaria gramineae
4 Anthoxanthum odoratum	106 Linum catharticum
5 Arrhenatherum avenaceum	107 Agrimonia eupatoria
6 Avena flavescens	109 Potentilla reptans
7 Avena pubescens	110 Poterium sanguisorba
8 Briza media	111 Spiraea ulmaria
9 Bromus mollis	112 Epilobium angustifolium
10 Cynosurus cristatus	113 Anthriscus sylvestris
11 Dactylis glomerata	114 Conopodium denudatum
12 Festuca ovina	115 Heracleum sphondylium
13 Festuca pratensis	116 Pimpinella saxifraga
14 Holcus lanatus	117 Galium verum
15 Lolium perenne	118 Scabiosa arvensis
16 Poa pratensis	119 Achillea millefolium
17 Poa trivialis	120 Centaurea nigra
18 Phleum pratense	122 Hieracium pilosella
	123 Hypochaeris radicata
	124 Leontodon hispidus
	125 Senecio jacobaea
	126 Taraxacum vulgare
	127 Tragopogon pratensis
	129 Plantago lanceolata
	130 Veronica chamaedrys
	131 Ajuga reptans
	132 Prunella vulgaris
	133 Thymus serpyllum
	134 Rumex acetosa
	135 Rumex crispus
	136 Luzula campestris
	137 Carex praecox
	138 Urtica dioica

U = Unlimed
 L = Limed
 LL = Light lime
 HL = Heavy lime

K

A/6.9

Hay - Park Grass

Sp. No.	Botanical Composition per cent. 1st Crop										Plot 4 ¹ 1949	
	Plot 1								Plot 2			
	1939		1940		1947		1948		1949		U	L
	U	L	U	L	U	L	U	L	U	L	U	L
1	52.4	3.7	24.1	3.2	76.0	1.1	75.3	1.5	10.0	0.5	20.0	0.4
3	0.2	4.0	0.2	4.0	0.2	1.4	0.1	2.5	9.6	4.1	2.2	2.4
4	0.7	2.4	0.9	5.6	0.3	6.0	0.2	1.4	1.1	0.4	3.4	1.1
5	0.1	2.2	0.1	0.8	0.2	4.2	-	3.0	0.4	0.2	7.3	0.1
6	-	2.2	-	2.4	-	1.3	-	1.7	0.2	1.5	0.9	2.7
7	-	34.7	-	27.7	0.3	27.4	0.2	12.1	3.5	22.5	5.5	18.1
8	-	-	-	-	-	-	-	-	1.8	3.9	0.5	1.8
9	-	-	-	0.1	-	-	-	-	-	-	0.1	-
11	0.8	13.0	0.2	12.2	2.0	15.9	3.2	18.3	7.9	7.5	7.1	4.9
12	40.9	15.2	72.2	19.3	14.0	6.1	15.6	15.4	15.5	7.4	9.1	3.6
13	-	-	-	-	-	-	-	-	0.1	-	0.3	1.1
14	-	3.5	0.1	3.3	-	5.9	-	5.8	3.3	2.0	6.7	4.5
15	-	-	-	-	-	-	-	-	-	0.1	0.3	-
16	0.2	2.3	0.2	2.5	-	1.3	-	1.3	0.1	1.0	0.9	1.6
17	-	0.2	-	0.9	-	0.3	-	0.3	-	0.3	0.5	1.8
51	-	1.5	-	1.7	-	1.9	-	2.0	2.2	2.4	3.0	7.3
52	-	0.5	-	0.6	-	1.2	-	2.4	9.4	9.9	3.8	7.7
53	-	-	-	-	-	-	-	-	-	-	2.4	-
54	-	0.1	-	0.2	-	0.6	-	0.2	3.6	4.8	2.3	4.9
55	-	-	-	-	-	-	-	-	0.4	0.7	2.9	2.5
101	-	1.1	-	1.2	-	1.1	-	0.8	0.9	2.8	3.8	2.3
104	-	0.2	-	0.1	-	0.3	-	0.6	0.2	0.3	0.4	-
105	-	-	-	-	-	-	-	-	0.1	-	-	-
106	-	-	-	-	-	-	-	-	-	0.6	-	-
109	-	-	-	-	0.2	-	1.9	0.1	-	-	-	-
110	-	-	-	-	-	-	-	-	0.6	0.1	0.9	2.1
111	-	-	-	-	-	-	-	-	-	0.3	-	-
114	-	0.1	-	-	-	0.4	0.1	0.1	3.2	0.2	1.1	-
116	-	0.5	-	0.8	-	0.1	-	0.4	0.1	0.3	0.1	0.3
117	2.1	-	-	-	-	-	-	-	1.6	-	-	-
118	-	0.9	-	-	-	0.9	-	2.0	0.5	1.7	0.2	2.2
119	-	1.1	-	1.7	-	0.5	-	1.7	1.9	1.2	3.8	3.4
120	0.4	4.7	0.7	1.4	0.5	0.7	0.8	2.0	1.3	2.5	1.6	3.6
123	-	-	-	-	-	-	-	-	-	0.1	-	-
124	-	0.1	-	-	-	0.8	-	1.3	12.5	8.7	11.0	6.3
125	-	-	-	-	-	-	-	0.2	-	-	-	-
126	-	0.5	-	0.5	-	0.5	-	1.0	0.4	0.5	0.6	0.1
127	-	-	-	-	-	0.8	-	-	-	0.2	-	0.7
129	-	3.5	-	6.6	0.6	10.7	-	19.8	5.7	10.2	8.5	9.7
130	-	-	-	0.1	-	-	-	-	-	0.1	0.1	0.3
131	-	-	-	0.1	-	-	-	-	-	-	-	-
134	2.0	1.7	0.8	2.8	5.7	8.5	2.5	2.1	1.4	0.5	5.8	2.1
136	0.2	0.1	0.5	0.2	-	0.1	0.1	-	0.4	0.5	0.9	0.4
137	-	-	-	-	-	-	-	-	0.1	-	-	-

2.0

N

Botanical Composition per cent. 1st Crop

Sp. No.	1939		1940		Plot 3 1941		1947		1948		Plot 5 ¹ 1949	Plot 5 ²
	U	L	U	L	U	L	U	L	U	L		
1	7.7	1.2	12.1	2.0	1.4		8.4	1.1	15.6	0.8	17.8	7.1
2	-	-	-	-	-		-	-	-	-	0.7	-
3	2.0	3.3	2.6	7.0	4.1		2.4	2.8	7.9	6.2	0.3	9.1
4	1.7	0.3	2.8	0.9	0.3		5.1	2.6	0.6	0.7	1.1	0.1
5	-	0.2	0.7	0.6	-		0.6	0.1	0.1	0.1	0.5	1.8
6	0.3	2.0	0.2	2.0	1.2		0.6	1.9	0.2	1.2	-	-
7	5.2	16.1	5.7	18.2	18.9		3.4	13.5	2.7	13.4	0.5	3.5
8	3.1	4.9	0.9	1.5	3.2		4.7	3.6	0.2	1.0	-	-
9	0.1	-	-	-	-		-	-	-	-	-	-
10	0.1	-	0.3	0.1	0.1		-	-	-	-	-	-
11	3.0	3.1	3.5	3.7	3.7		12.1	3.5	4.5	3.3	4.1	4.7
12	11.3	4.7	19.4	7.7	8.5		10.4	3.0	16.6	4.1	55.8	11.5
14	3.5	1.8	4.6	3.1	2.6		5.3	5.0	4.3	2.5	0.7	4.1
X15	-	0.1	0.1	-	-		-	-	-	-	-	-
16	-	1.3	0.1	2.2	1.8		0.3	1.6	0.2	2.1	0.7	2.6
17	-	0.3	0.1	0.7	1.2		-	0.8	-	0.3	-	-
51	0.5	1.9	0.7	2.3	3.5		2.7	2.5	0.9	2.0	-	16.8
52	4.4	10.9	6.3	13.7	9.6		3.3	5.0	3.8	7.0	3.1	5.2
54	1.6	4.7	2.2	7.0	4.1		4.9	7.5	2.3	6.4	-	1.1
55	0.1	0.3	0.3	0.3	0.5		0.1	0.2	0.3	0.7	-	1.3
56	-	-	-	-	-		-	-	-	-	-	2.1
101	0.1	2.8	0.1	1.9	1.1		1.1	8.6	0.1	3.0	-	0.3
104	0.2	0.2	0.1	0.1	0.3		0.6	0.4	0.2	0.2	-	-
X0.1 105	0.1	-	0.1	-	-		-	-	0.2	-	0.2	0.1
106	-	0.8	-	0.2	0.3		-	0.1	-	0.1	-	-
109	-	0.1	-	-	-		-	-	0.3	-	-	-
110	14.6	12.6	9.1	4.1	9.8		5.0	13.4	5.6	11.7	-	-
111	-	-	-	0.3	0.1		-	0.2	-	0.4	-	-
114	2.2	0.3	1.6	-	0.1		5.7	0.9	1.6	0.1	2.0	0.1
115	-	-	-	-	-		-	-	-	-	-	0.6
116	0.3	0.6	0.3	0.6	0.4		-	0.2	0.1	0.2	-	0.3
117	-	-	0.1	-	-		0.1	-	1.1	-	0.6	-
118	1.1	3.7	0.4	3.8	3.2		0.7	2.1	0.9	2.1	1.7	0.9
119	1.4	0.7	1.9	0.8	1.0		0.9	0.5	1.3	1.0	1.6	12.8
120	2.9	1.5	1.3	0.4	0.4		0.6	0.5	1.0	2.0	2.0	5.4
122	-	-	0.1	0.1	-		-	-	-	-	-	-
123	-	-	-	-	-		-	0.1	0.1	-	0.4	-
124	18.2	9.5	12.3	7.0	6.4		12.0	8.8	17.9	12.5	1.6	0.1
126	0.1	0.2	0.2	0.4	-		0.3	0.5	0.1	0.2	-	-
127	0.3	0.1	-	-	-		0.4	0.3	0.1	-	-	-
129	11.8	7.7	6.3	5.3	9.7		3.7	6.2	6.2	13.0	2.4	0.9
130	0.1	0.3	0.3	0.6	0.6		-	0.4	0.1	0.2	-	-
131	-	-	-	0.1	-		-	-	-	-	-	-
132	-	0.1	0.6	0.1	0.1		-	-	-	-	-	-
133	-	-	0.1	-	-		-	-	0.3	-	-	-
134	1.3	1.2	0.2	0.3	1.4		3.7	1.8	2.4	1.3	1.0	5.7
136	0.3	0.4	0.6	0.8	0.3		0.3	0.2	0.1	0.2	1.2	1.8
137	0.4	0.1	1.7	0.1	0.1		0.6	0.1	0.1	-	-	-

X

A/6.11

Hay - Park Grass

Sp. No.	Botanical Composition per cent.											
	Plot 4 ²				1st Crop Plot 10							
	1947		1949		1939		1940		1947		1948	
	U	L	U	L	U	L	U	L	U	L	U	L
1	68.8	1.8	36.2	2.2	30.4	0.9	33.9	2.1	31.3	1.9	51.9	1.9
3	0.2	32.4	0.7	24.3	0.1	63.8	0.1	50.3	0.4	25.2	0.3	28.6
4	14.5	4.6	10.0	1.2	43.7	0.9	31.5	2.9	52.4	11.3	10.3	1.8
5	-	2.3	-	2.5	1.1	3.5	0.9	7.6	5.4	2.7	5.1	4.1
7	-	-	-	0.3	-	-	-	-	-	0.1	-	-
11	-	0.1	-	0.3	0.1	0.2	0.1	0.1	0.1	0.6	0.3	-
12	9.6	29.8	35.4	57.4	0.7	22.2	2.1	26.3	2.6	43.7	10.2	54.5
14	4.8	1.0	17.5	0.1	23.9	0.2	31.3	0.2	6.6	0.6	21.6	0.5
X16	-	5.3	-	6.3	-	6.0	-	6.2	0.1	3.3	-	3.4
51	-	0.1	-	-	-	-	0.1	-	-	-	-	-
101	-	0.6	-	0.1	-	-	-	-	-	-	-	-
112	0.8	-	-	-	-	-	-	-	-	-	-	-
116	-	-	-	0.1	-	-	-	-	-	-	-	-
117	-	0.8	-	0.4	-	-	-	-	-	1.0	-	-
119	-	0.2	-	0.8	-	-	-	-	-	0.2	-	0.7
126	-	-	-	-	-	0.3	-	-	-	0.5	-	0.4
127	-	-	-	-	-	-	-	-	-	0.1	-	-
129	-	-	-	0.1	-	-	-	-	-	0.4	-	-
134	1.3	20.6	0.2	3.9	-	2.0	-	4.3	1.1	8.4	0.3	5.0
135	-	0.4	-	-	-	-	-	-	-	-	-	-

Sp. No.	Botanical Composition per cent. 1st Crop										
	Plot 6	Plot 7								Plot 15	
	1949 U	1939 U L		1940 U		1947 U L		1948 U L		1949 U L	
1	2.5	7.2	0.1	3.1	0.2	4.7	0.1	3.8	0.4	2.8	0.4
3	6.1	1.2	15.6	6.1	22.9	4.5	15.7	3.2	13.2	18.5	6.8
4	2.2	1.5	0.1	2.6	0.1	6.7	0.3	3.6	0.3	1.7	0.3
5	2.2	1.5	11.0	3.1	10.9	4.0	19.2	2.4	11.7	0.6	13.9
6	0.1	0.5	2.2	0.6	2.5	0.8	2.1	1.0	2.5	0.2	0.2
7	3.1	1.8	5.9	1.8	2.7	1.2	3.9	1.1	5.2	1.1	12.6
9	0.2	-	2.2	0.2	7.3	-	0.2	0.2	2.1	-	1.1
11	11.8	21.8	18.9	26.3	13.8	20.8	20.7	15.7	13.2	8.4	4.4
12	5.3	7.7	2.6	6.5	1.2	4.1	1.0	4.6	1.0	7.0	3.7
13	-	-	1.6	-	0.4	0.2	3.9	0.3	3.3	-	-
14	2.6	1.0	1.4	5.8	0.9	1.8	0.6	2.8	1.2	1.4	1.6
15	-	-	-	-	-	-	-	-	0.2	-	-
16	1.7	1.1	1.5	1.7	1.3	2.1	1.3	2.6	1.2	0.5	1.2
17	-	-	5.6	0.3	9.3	0.2	2.0	0.3	1.1	-	0.4
51	20.7	28.8	13.1	8.8	6.4	11.4	5.2	11.3	15.6	22.3	13.4
52	2.6	2.3	0.1	2.6	-	0.3	-	0.5	-	0.9	-
54	5.3	4.6	1.4	4.9	2.1	4.3	0.1	4.6	3.4	1.7	2.8
55	2.2	3.9	7.8	3.0	5.7	1.6	3.8	3.4	6.2	2.8	16.5
56	0.5	-	-	-	-	-	-	-	-	-	-
101	0.8	0.8	1.2	1.0	1.2	1.3	3.2	0.7	1.9	0.4	1.8
104	-	-	0.1	-	-	-	0.1	-	-	-	0.1
111	-	0.8	-	2.3	-	-	-	-	-	-	-
113	-	-	0.2	-	-	-	-	-	0.3	-	-
114	4.1	1.4	0.2	2.0	0.1	4.4	0.1	1.4	0.1	1.1	0.4
115	0.6	1.4	1.2	4.8	4.4	1.1	4.6	1.0	4.5	-	3.2
117	0.1	-	-	0.1	-	-	-	0.2	-	-	-
118	1.1	0.1	0.7	-	1.6	-	-	-	0.3	-	-
119	8.9	2.8	0.2	1.2	0.1	7.6	0.3	14.0	1.0	10.0	1.2
120	5.5	4.0	0.8	3.1	0.1	7.0	1.5	4.3	0.5	7.6	1.4
124	0.2	0.4	-	-	-	0.1	-	-	-	0.3	-
126	0.2	-	1.7	0.1	3.3	0.1	1.6	0.4	1.9	0.1	1.9
127	0.3	0.1	-	-	0.1	0.9	3.5	1.0	2.6	-	0.3
129	7.4	1.6	1.0	1.3	0.5	5.4	1.8	6.5	4.6	9.7	9.6
130	-	-	0.1	-	0.1	0.1	0.1	-	0.1	-	0.1
134	1.5	1.3	1.5	5.6	0.8	2.3	3.1	2.2	0.4	0.8	0.6
136	0.2	0.4	-	1.1	-	0.1	-	0.2	-	0.1	0.1
138	-	-	-	-	-	0.9	-	1.7	-	-	-

Hay - Park Grass

Sp. No.	Botanical Composition per cent. 1st Crop										Plot 16	
	Plot 8										1949	
	1939		1940		1941		1947		1948		U	L
	U	L	U	L	U	L	U	L	U	L	U	L
1	5.9	0.8	4.0	1.3	2.4	0.7	4.2	0.9	3.0	1.3	2.3	0.2
3	0.4	1.5	0.8	2.8	0.4	1.5	1.1	2.7	3.6	2.7	22.5	10.9
4	1.2	1.0	2.3	1.4	2.8	0.9	5.8	5.6	2.4	1.4	4.2	0.2
5	10.8	11.6	5.4	9.5	4.8	8.2	12.4	8.3	14.2	14.7	22.0	19.4
6	1.8	4.2	1.7	3.5	0.7	2.4	1.4	2.0	0.5	2.1	0.6	0.6
7	3.5	16.1	3.6	14.7	4.3	20.5	1.7	16.7	1.9	11.3	5.8	15.3
8	0.2	1.5	0.1	0.7	-	1.4	0.2	2.4	0.1	0.9	-	-
9	-	0.1	-	-	-	-	-	-	-	-	0.2	0.6
10	-	-	-	0.1	-	-	-	-	-	-	-	-
11	4.5	4.7	3.7	4.7	2.9	4.8	10.9	6.2	12.6	5.6	9.8	13.4
12	9.5	4.6	11.6	6.8	23.6	8.7	4.6	1.5	5.2	2.1	6.2	14.4
13	-	4.0	0.1	1.6	-	2.1	6.3	6.3	0.4	6.9	-	-
14	6.2	3.5	7.8	3.6	4.3	2.4	6.5	4.2	7.4	2.1	1.1	-
15	0.2	0.3	0.2	0.2	-	0.1	0.3	-	0.1	-	-	-
16	0.7	1.1	0.6	1.3	0.7	1.8	1.4	1.7	1.1	1.5	0.4	0.5
17	0.7	1.1	0.6	3.0	0.3	3.2	0.3	1.7	0.1	0.8	0.1	0.4
51	1.6	0.8	0.3	0.5	0.6	0.6	0.4	0.8	0.6	1.5	11.7	8.5
52	4.3	5.4	6.1	6.2	3.1	5.2	1.8	2.1	3.3	5.9	-	-
54	8.1	8.6	17.9	17.3	6.2	8.5	6.5	7.3	2.7	3.5	-	0.7
55	0.5	0.1	0.9	-	1.8	0.2	0.5	0.1	0.7	0.1	0.2	0.4
101	2.3	0.8	2.7	0.8	1.4	0.6	9.8	4.0	5.7	2.1	0.2	0.4
104	0.5	0.5	0.2	0.1	0.7	0.8	0.4	0.3	0.1	0.4	-	-
105	0.2	-	0.1	-	0.1	0.1	0.1	-	0.1	-	-	-
107	-	0.8	-	-	-	-	-	-	-	-	-	-
111	-	-	-	1.0	-	1.1	-	0.6	-	0.6	-	-
113	-	-	-	-	-	-	-	-	-	-	-	1.5
114	0.7	0.1	0.9	-	0.6	0.1	2.1	0.1	0.8	0.2	0.7	0.4
115	0.1	0.1	-	-	-	-	-	-	-	-	-	0.9
116	0.2	0.6	0.3	0.4	0.3	0.5	-	0.2	0.1	0.2	-	-
117	0.2	0.1	0.2	0.1	1.5	0.1	0.2	0.1	0.4	0.2	-	-
118	2.2	3.5	0.9	4.6	1.4	5.6	0.7	4.7	0.9	3.6	-	-
119	4.3	0.8	3.4	0.7	6.3	1.4	4.1	1.2	6.9	4.0	3.9	1.1
120	4.0	5.4	2.8	1.7	2.1	2.6	1.0	1.0	2.0	2.5	-	-
124	4.4	3.2	2.0	1.6	3.0	1.5	4.9	3.4	4.5	5.6	-	-
126	0.2	-	0.4	0.1	0.3	0.2	0.4	0.2	0.1	0.1	0.9	3.3
127	-	-	-	-	-	0.1	-	0.7	-	0.9	0.7	1.4
129	13.0	10.7	11.1	6.8	18.6	9.9	10.0	9.5	15.0	13.1	6.3	5.3
130	0.3	0.3	0.5	0.8	0.3	0.6	0.2	0.6	0.3	0.2	-	-
131	-	-	-	0.1	-	-	-	-	-	-	-	-
132	-	-	-	-	-	0.1	-	-	-	-	-	-
134	6.8	1.8	4.0	1.4	2.5	1.2	5.7	2.6	2.9	1.8	0.2	0.2
136	0.5	0.3	2.8	0.6	2.0	0.3	0.2	0.3	0.3	0.1	-	-
138	-	-	-	-	-	-	0.2	-	-	-	-	-

Botanical Composition per cent. 1st Crop
Plot 9

Sp. No.	1939		1940		1941	1947		1948	
	U	L	U	L	U	U	L	U	L
1	2.0	0.8	5.3	2.6	5.6	23.8	3.4	7.8	4.3
3	0.1	69.4	0.1	55.0	-	0.8	31.8	-	38.1
4	3.2	0.7	0.3	2.4	8.0	15.7	12.4	0.4	4.2
5	0.3	14.3	0.9	21.9	0.2	4.3	13.2	0.6	14.7
6	-	-	-	-	-	-	-	-	0.1
7	-	-	-	0.2	-	-	0.5	-	0.5
9	-	0.1	-	1.0	-	-	0.1	-	0.1
11	-	4.3	-	4.1	0.2	0.2	12.5	-	11.6
12	0.1	1.9	0.1	4.7	0.1	0.1	2.8	0.1	4.3
14	94.1	2.5	93.3	2.1	85.1	51.3	3.4	90.6	2.5
16	-	4.4	-	2.1	-	0.1	3.8	-	9.4
17	-	-	-	0.1	-	-	-	-	-
51	-	0.8	-	0.7	-	-	6.0	-	3.5
55	-	-	-	-	0.1	-	-	-	-
112	-	-	-	-	-	1.6	-	0.5	-
113	-	0.1	-	0.2	-	-	0.1	-	-
114	-	-	-	-	-	-	0.8	-	0.1
115	-	0.2	-	2.0	-	-	1.4	-	1.5
119	-	-	-	-	-	-	0.2	-	0.5
124	-	-	-	-	-	0.1	-	-	-
126	-	0.5	-	0.6	-	0.1	4.8	-	3.3
127	-	-	-	-	-	-	0.3	-	0.1
129	0.1	-	-	-	-	0.1	0.2	-	0.1
134	0.1	-	-	0.3	0.7	1.8	2.3	-	1.1

Hay - Park Grass

4/6.15

Sp. No.	Botanical Composition per cent. 1st Crop										
	Plot 11 ¹				Plot 11 ²				Plot 12	Plot 17	
	1947		1949		1947		1949		1949	1949	
	U	L	U	L	U	L	U	L	U	L	
1	4.5	0.8	-	-	44.1	0.2	5.3	-	3.5	1.2	0.6
3	1.0	78.9	0.1	82.0	0.8	70.2	0.3	57.5	7.6	14.5	7.3
4	0.8	0.7	-	-	0.1	0.1	-	-	3.4	8.7	0.8
5	0.3	2.9	-	2.3	12.7	11.3	0.8	17.5	0.8	-	1.7
6	-	-	-	-	-	-	-	-	0.2	-	1.5
7	-	-	-	-	-	-	-	-	4.1	1.7	20.5
8	-	-	-	-	-	0.1	-	-	6.0	0.6	0.7
9	-	0.1	-	-	-	-	-	-	-	-	0.7
11	-	2.5	-	4.9	-	7.8	-	10.3	8.8	25.4	21.1
12	0.2	-	-	0.4	0.2	-	0.1	-	19.4	9.4	22.3
13	-	-	-	-	-	-	-	-	1.7	-	0.8
14	81.1	7.6	99.6	3.5	40.8	2.4	92.8	1.6	2.8	8.4	2.1
15	-	-	-	-	-	-	-	-	-	0.6	2.4
16	-	4.5	-	5.1	0.1	6.3	-	10.6	0.2	-	0.1
17	-	-	-	-	-	0.1	-	-	-	-	0.6
51	-	-	-	-	-	0.1	-	-	1.1	0.1	-
52	-	-	-	-	-	-	-	-	7.4	-	2.8
54	0.2	-	-	-	-	-	-	-	4.6	-	-
55	-	-	-	-	-	-	-	-	0.2	-	-
101	-	-	-	-	-	-	-	-	0.7	0.4	2.1
104	-	-	-	-	-	-	-	-	0.1	0.1	0.1
105	-	-	-	-	-	-	-	-	0.2	-	-
109	-	-	-	-	-	-	-	-	0.1	-	-
111	-	-	-	-	-	-	-	-	0.2	-	-
112	11.9	-	0.3	-	-	-	-	-	-	-	-
114	-	0.1	-	-	-	-	-	-	1.3	0.4	0.1
115	-	-	-	-	-	0.1	-	0.1	-	-	0.2
116	-	-	-	-	-	-	-	-	0.1	-	-
117	-	-	-	-	-	-	-	-	0.9	-	0.4
118	-	-	-	-	-	-	-	-	1.7	-	-
119	-	-	-	-	-	-	-	-	1.8	1.2	1.0
120	-	-	-	-	-	-	-	-	1.8	5.5	1.4
123	-	-	-	-	-	-	-	-	0.1	-	-
124	-	-	-	-	-	-	-	-	10.0	4.0	1.7
126	-	1.6	-	0.5	-	1.3	-	1.3	0.2	1.4	0.6
127	-	-	-	-	-	-	-	-	0.1	-	0.5
129	-	-	-	-	-	-	-	-	6.8	14.0	5.6
130	-	-	-	-	-	-	-	-	0.1	-	-
134	-	0.3	-	1.3	1.2	-	0.7	1.1	1.0	0.6	0.2
136	-	-	-	-	-	-	-	-	0.6	-	0.1
137	-	-	-	-	-	-	-	-	0.4	1.8	-

N

Sp. No.	Botanical Composition per cent. 1st Crop									
	Plot 13									
	1944		1945		1946		1947		1948	
	U	L	U	L	U	L	U	L	U	L
1	8.4	-	6.3	-	8.0	0.1	10.9	-	15.7	0.2
3	56.7	5.8	46.0	6.8	32.5	8.6	27.6	13.7	31.9	10.4
4	4.8	0.5	4.9	0.3	15.5	1.2	14.2	0.8	6.3	0.3
5	0.9	5.9	2.1	7.0	1.4	10.9	2.1	14.2	3.4	25.9
6	0.1	-	-	-	-	-	-	-	-	0.1
7	-	-	-	0.2	-	0.4	0.1	0.7	-	0.3
9	0.1	0.1	-	0.1	-	0.1	-	-	-	0.1
11	6.7	8.6	5.6	7.8	6.8	27.5	9.8	24.2	9.1	21.5
12	3.6	1.1	3.4	1.6	6.0	1.1	4.5	1.0	4.0	0.9
13	-	-	-	-	-	-	-	0.1	-	-
14	2.7	1.8	4.5	2.1	5.7	5.4	6.2	5.3	2.5	4.4
15	0.1	-	-	-	-	-	-	-	-	-
16	1.3	1.4	0.8	1.9	0.1	1.4	0.9	2.3	0.9	1.8
17	0.4	1.2	0.1	8.2	0.1	5.8	0.2	4.6	0.1	1.2
51	0.3	31.0	0.5	26.6	0.2	4.4	0.7	6.3	0.5	7.9
52	-	0.2	-	0.3	-	0.1	-	-	-	-
54	-	7.3	-	6.0	0.1	2.4	0.1	1.2	-	2.4
55	-	2.6	-	4.0	-	0.8	-	-	-	0.3
101	-	0.9	-	2.1	0.1	1.0	0.6	2.3	0.1	2.2
104	0.3	0.5	-	0.2	0.1	0.1	0.1	0.2	0.1	0.2
105	0.2	-	0.6	-	0.6	0.1	0.2	-	0.1	-
113	0.2	2.0	-	-	-	0.3	-	0.2	-	0.7
114	0.9	-	1.6	0.2	1.0	0.1	2.0	-	0.8	0.1
115	0.2	-	1.3	-	-	-	-	-	-	-
117	-	-	-	-	0.4	-	-	-	-	-
119	0.6	0.2	3.0	0.5	2.9	0.4	3.8	0.5	4.0	0.3
120	0.3	4.0	-	0.4	0.5	0.4	0.7	1.6	0.2	0.7
123	0.2	-	-	-	-	-	-	-	-	-
124	-	0.9	0.3	1.2	0.4	1.3	0.3	1.5	1.7	1.3
126	0.3	6.2	0.7	3.6	1.0	4.1	0.9	5.4	1.5	3.2
127	-	0.5	-	2.2	-	1.0	-	0.4	0.3	1.3
129	6.2	16.2	12.1	14.5	14.0	19.3	10.3	10.8	14.7	11.5
130	0.5	0.7	0.4	0.9	0.9	0.4	0.7	0.2	0.2	-
131	-	0.1	-	-	-	-	0.2	-	-	-
134	3.9	0.3	5.8	1.3	1.7	1.3	2.9	2.5	1.9	0.8
136	0.1	-	-	-	-	-	-	-	-	-

Hay - Park Grass

Botanical Composition per cent. 1st Crop

Sp. No.	1939			1940			1941			1947			1948		
	U	L	L	U	L	L	U	L	L	U	L	L	U	L	L
	sun shade			sun shade			sun shade			sun shade			sun shade		
1	-	-	0.1	0.1	0.1	0.2	-	-	0.1	0.5	0.2	1.0	0.6	0.1	0.4
3	53.1	23.9	13.7	49.1	18.5	12.4	59.2	23.1	18.5	27.6	10.5	5.0	31.8	12.1	6.7
4	-	-	0.4	-	-	0.5	-	-	0.5	0.2	0.3	0.5	0.6	-	0.2
5	31.1	48.2	12.4	30.9	52.0	13.1	28.9	44.5	18.7	36.8	43.6	27.1	36.2	45.0	34.7
6	-	-	0.6	-	0.1	0.6	-	0.2	0.4	-	0.1	1.2	0.2	0.5	1.1
7	0.6	0.9	12.6	0.1	0.7	11.9	0.1	0.8	14.4	0.5	3.9	12.6	1.4	5.3	11.6
9	0.1	0.4	0.3	-	0.1	0.6	0.1	0.3	0.6	-	-	-	0.3	-	-
11	6.3	4.3	1.0	5.7	6.0	1.9	7.2	7.2	1.1	14.5	10.7	5.2	14.2	13.6	5.0
12	0.2	4.8	38.0	0.1	5.3	36.6	-	11.4	34.6	-	9.0	27.1	-	13.4	27.4
14	0.2	-	0.2	-	-	0.1	-	-	-	0.8	-	0.3	-	-	2.3
15	-	-	0.1	-	-	-	-	-	0.1	-	-	-	-	-	-
16	1.2	1.9	3.6	0.3	1.0	1.6	0.7	1.3	3.1	3.9	2.9	22.2	4.7	2.9	2.9
17	3.5	7.3	3.1	9.8	10.5	2.3	1.5	3.9	1.5	0.3	0.5	0.9	2.4	1.0	1.0
51	1.6	5.6	12.1	0.7	1.5	15.0	0.3	4.0	4.9	3.3	13.2	12.2	2.1	3.2	3.6
54	-	-	-	-	-	-	-	-	0.1	-	-	0.1	-	-	0.3
55	-	-	0.3	-	-	-	-	-	-	-	-	0.3	-	-	0.5
101	-	-	0.1	-	-	0.1	-	-	-	-	0.1	0.1	-	-	-
107	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
113	0.6	1.2	0.6	1.3	2.3	1.9	0.8	0.1	0.6	5.3	0.8	0.3	0.2	0.7	0.5
114	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-
116	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
119	-	-	0.2	-	-	0.1	-	-	-	-	-	0.1	-	-	0.1
120	-	-	-	-	-	0.1	-	-	-	0.2	-	-	-	-	-
126	0.1	0.2	0.2	0.6	0.9	0.7	0.7	2.0	0.6	3.0	2.9	3.6	3.2	1.1	1.7
127	-	-	-	-	-	-	-	-	-	-	0.9	-	-	0.5	-
129	0.1	-	-	-	-	0.2	-	0.1	-	1.1	0.3	0.1	1.6	-	-
134	1.3	1.3	0.3	1.3	1.0	0.1	0.5	0.8	0.2	2.0	0.1	0.1	0.4	0.6	-

Botanical Composition per cent. 1st Crop

Sp. No.	Plot 18						Plot 19					
	1946			1948			1946			1948		
	U	LL	HL	U	LL	HL	U	LL	HL	U	LL	HL
1	74.6	2.0	1.4	76.9	3.4	1.2	8.1	2.8	0.1	11.8	4.3	0.4
2	-	-	3.1	-	-	-	-	-	-	-	-	-
3	1.8	2.9	2.9	0.1	2.8	3.8	13.1	18.3	19.7	6.2	25.2	16.7
4	4.2	2.3	0.2	0.8	0.8	-	9.1	2.7	0.1	7.3	1.5	-
5	-	10.1	10.3	0.5	24.6	25.0	9.8	6.4	13.9	5.7	5.5	14.3
6	-	-	-	-	-	-	1.4	0.5	2.4	1.7	3.0	3.1
7	-	1.0	0.7	-	3.2	0.8	0.5	1.7	2.7	0.9	1.9	5.4
9	-	0.4	0.1	-	0.3	0.1	-	0.5	0.1	-	0.2	0.3
11	-	12.5	36.5	1.3	35.0	48.3	3.6	4.4	4.3	3.3	10.9	13.6
12	12.5	9.8	5.1	8.9	6.8	2.2	4.6	2.5	3.3	9.8	5.0	4.5
13	-	-	-	-	0.1	-	2.4	-	4.1	1.1	0.4	5.7
14	0.5	0.3	0.3	-	0.2	-	2.7	2.0	0.4	1.3	1.7	-
15	-	0.1	0.1	-	0.1	0.1	-	-	-	-	-	0.3
16	--	1.1	1.0	-	0.8	1.1	0.2	0.9	1.4	0.6	0.9	1.9
17	0.1	0.6	0.3	-	0.2	0.2	0.5	1.0	1.3	0.5	1.8	0.7
18	-	1.6	-	-	2.6	0.1	-	-	-	-	-	-
51	-	0.1	1.4	-	-	0.5	9.5	10.5	13.2	13.5	7.4	7.5
52	-	-	-	-	-	-	-	-	2.6	1.1	-	1.7
54	-	0.4	0.1	-	0.1	0.1	0.4	1.2	0.8	0.2	-	0.5
55	-	0.1	-	-	-	-	0.9	2.9	1.5	2.7	1.0	0.7
101	-	-	-	-	-	-	5.9	10.4	2.2	5.7	7.9	4.0
104	-	0.6	0.1	-	0.1	-	0.3	0.4	0.1	0.2	-	-
105	-	-	-	-	-	-	-	-	-	0.2	-	-
107	-	0.2	-	-	-	-	-	-	-	-	-	-
111	-	-	-	-	0.1	-	-	-	-	-	-	-
113	-	-	-	-	-	-	-	0.4	0.1	-	-	-
114	-	0.1	-	-	0.3	0.1	0.4	0.4	0.2	0.3	0.4	-
115	-	1.5	2.4	-	0.6	1.6	0.1	1.5	1.7	1.0	0.4	1.1
117	-	-	0.4	-	-	-	-	-	-	-	-	-
119	-	0.1	0.5	-	0.2	-	6.3	5.4	1.9	10.2	5.2	2.3
120	-	10.2	0.9	-	3.5	--	-	0.7	1.8	-	1.0	1.4
123	-	-	-	-	-	-	0.3	-	-	-	-	-
124	-	0.1	-	-	0.1	-	0.1	-	-	0.4	-	-
126	-	22.6	23.4	0.2	8.9	10.8	1.3	2.5	1.7	0.6	0.6	1.0
127	-	1.5	3.4	-	1.2	2.6	-	0.1	0.8	-	0.4	2.9
129	0.1	17.3	4.5	-	3.8	1.0	15.8	14.2	16.3	11.8	10.4	9.7
130	-	-	-	-	-	-	0.9	1.8	0.9	0.2	0.7	-
131	-	-	-	-	-	-	-	-	-	0.2	-	-
134	6.2	0.5	0.9	11.2	0.2	0.4	1.8	3.9	0.4	1.3	2.3	0.3
136	-	-	-	-	-	-	-	-	-	0.2	-	-
138	-	-	-	0.1	-	-	-	-	-	-	-	-

Botanical Composition per cent. 1st Crop
Plot 20

Sp. No.	1946			1948		
	U	LL	HL	U	LL	HL
1	2.9	1.5	0.1	4.1	2.5	0.1
3	33.9	18.0	12.6	39.2	21.8	17.6
4	1.3	3.2	0.7	1.1	1.9	0.2
5	9.9	26.9	15.5	15.1	21.7	17.4
6	1.5	2.3	2.6	4.0	1.9	3.3
7	2.6	4.0	9.1	0.7	3.0	6.8
9	-	0.3	0.2	0.2	0.1	0.2
11	10.3	7.9	4.3	14.6	14.4	14.2
12	4.8	3.6	9.4	3.7	2.8	4.8
13	0.5	-	0.5	-	-	-
14	3.0	2.9	1.4	1.0	5.7	1.6
15	0.1	0.2	0.2	-	0.1	0.8
16	0.3	0.3	1.2	1.3	0.4	3.0
17	0.9	4.0	3.6	1.3	3.9	4.3
51	5.5	4.8	7.1	4.3	2.1	8.8
52	0.3	-	0.4	0.1	-	-
54	-	-	0.6	-	0.1	0.2
55	-	0.7	3.0	0.6	2.8	0.8
101	5.0	1.2	1.9	1.2	1.9	1.3
104	0.1	0.2	0.3	-	0.3	-
113	0.7	2.7	0.7	0.5	-	0.3
114	0.2	0.1	0.1	-	-	-
115	-	-	0.6	0.1	--	0.2
117	-	-	0.3	-	-	0.4
119	1.7	1.8	3.7	0.4	1.8	2.7
120	-	1.9	2.8	-	0.7	0.2
126	1.3	2.6	3.0	0.7	1.1	2.3
127	3.7	0.2	3.1	3.3	1.1	3.8
129	3.2	6.7	6.3	0.9	6.2	4.1
130	1.2	0.5	3.0	0.1	0.3	0.1
134	5.1	1.5	1.7	1.5	1.4	0.5

Botanical Composition per cent. 1st Crop

Plot	1939				1940			
	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.
1 U	95.3	-	4.7	117 134	98.0	-	2.0	ND
1 L	83.4	2.1	14.5	120	82.0	2.5	15.5	129
3 U	37.9	6.7	55.4	124	53.1	9.6	37.3	124 110
3 L	39.4	17.8	42.8	110	49.8	23.2	27.0	124 129
7 U	45.3	39.7	15.0	120	58.1	19.3	22.6	134 115
7 L	68.7	22.4	8.9	126	73.6	14.2	12.2	115 126
8 U	45.6	14.4	40.0	129	42.4	25.3	32.3	129
8 L	56.2	14.8	29.0	129	55.2	24.0	20.8	129 118
9 U	99.9	-	0.1	ND	100.0	-	-	-
9 L	98.4	0.8	0.8	126	96.2	0.7	3.1	115
10 U	100.0	-	-	-	99.9	0.1	-	-
10 L	97.6	-	2.4	134	95.7	-	4.3	134
14 U	96.3	1.6	2.1	134	96.0	0.7	3.3	113 134
14 L Sun	91.7	5.6	2.7	134	94.3	1.5	4.2	134 113
14 L Shade	86.1	12.5	1.4	ND	81.9	15.0	3.1	113
18 U	98.6	0.1	1.3	134	98.3	0.1	1.6	ND
18 LL	68.9	0.2	30.9	126	62.2	0.2	37.6	126
18 HL	73.6	0.3	26.1	126	61.9	0.4	37.7	126
19 U	65.6	19.9	14.5	ND	80.6	7.0	12.4	ND
19 LL	59.1	26.3	14.6	ND	84.1	3.9	12.0	ND
19 HL	72.8	19.0	8.2	ND	87.4	6.7	5.9	ND
20 U	84.4	9.0	6.6	134	83.6	5.9	10.5	ND
20 LL	65.5	23.4	11.1	ND	84.7	5.4	9.9	ND
20 HL	68.1	15.6	16.3	ND	79.2	7.0	13.8	ND

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None

Dominant

Columns headed "Dom. Sp." give the code numbers of the dominant non-gramineous or leguminous species.

Hay - Park Grass

Botanical Composition per cent. 1st Crop

Plot	1941				1942			
	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.	Gram- ineae	Legum- inosae	Others orders	Dom. Sp.
1 U	95.9	0.2	3.9	ND	96.7	0.1	3.2	ND
1 L	73.4	3.7	22.9	ND	72.6	3.5	23.9	ND
3 U	46.8	12.4	40.8	ND	48.1	8.0	43.9	110
3 L	47.0	17.7	35.3	129 110	52.2	11.1	36.7	129
7 U	22.8	28.5	48.7	ND	67.4	9.8	22.8	ND
7 L	63.2	25.7	11.1	ND	63.9	11.4	24.7	ND
8 U	47.2	11.7	41.1	129	40.4	6.9	52.7	129
8 L	58.7	14.5	26.8	129 118	64.8	9.9	25.3	ND
9 U	99.2	0.1	0.7	ND	99.6	-	0.4	ND
9 L	98.9	0.3	0.8	ND	94.6	0.1	5.3	ND
10 U	98.3	-	1.7	ND	99.4	0.1	0.5	ND
10 L	98.6	0.1	1.3	ND	90.7	-	9.3	ND
14 U	97.6	0.3	2.1	ND	94.7	0.3	5.0	ND
14 L Sun	92.6	4.1	3.3	126	91.7	0.9	7.4	ND
14 L Shade	93.5	5.0	1.5	ND	91.9	3.7	4.4	ND
18 U	96.7	0.1	3.2	134	90.3	-	9.7	ND
18 LL	57.1	0.3	42.6	ND	62.7	0.7	36.6	126
18 HL	59.7	0.1	40.2	ND	62.7	0.4	36.9	ND
19 U	82.3	5.9	11.8	ND	77.7	2.4	19.9	ND
19 LL	86.7	4.3	9.0	ND	79.5	1.5	19.0	ND
19 HL	90.8	4.2	5.0	ND	94.7	0.5	4.8	ND
20 U	86.1	6.1	7.8	ND	67.0	3.3	29.7	ND
20 LL	82.4	3.7	13.9	ND	81.7	0.6	17.7	ND
20 HL	90.8	2.3	6.9	ND	87.0	1.1	11.9	ND

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None Dominant

Botanical Composition per cent. 1st Crop

Plot	1943				1944			
	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.
1 U	99.0	-	1.0	ND	96.5	0.2	3.3	120
1 L	70.3	2.5	27.2	129	65.7	2.0	32.3	ND
3 U	54.2	8.2	37.6	ND	60.7	5.3	34.0	ND
3 L	41.3	12.7	46.0	110	28.4	17.3	54.3	110
7 U	54.0	19.4	26.6	114	38.2	31.9	29.9	ND
7 L	71.1	16.6	12.3	ND	52.3	34.3	13.4	ND
8 U	46.6	14.6	38.8	ND	35.0	16.8	48.2	ND
8 L	48.3	19.6	32.1	ND	46.4	20.2	33.4	ND
9 U	100.0	-	-	-	100.0	-	-	-
9 L	97.9	0.1	2.0	ND	95.8	-	4.2	115
10 U	99.8	0.1	0.1	ND	99.8	0.1	0.1	ND
10 L	98.7	-	1.3	ND	93.5	-	6.5	134
13 U	not sampled				85.8	0.3	13.9	129
13 L	not sampled				26.4	41.1	32.5	129
14 U	98.1	0.5	1.4	ND	98.3	0.6	1.1	ND
14 L Sun	97.1	1.3	1.6	ND	93.8	4.0	2.2	ND
14 L Shade	95.1	2.6	2.3	ND	94.9	2.5	2.6	126
18 U	98.7	0.1	1.2	134	80.2	0.3	19.5	134
18 LL	78.8	0.1	21.1	126	43.2	0.9	55.9	ND
18 HL	85.9	0.4	13.7	126	64.1	0.6	35.3	126
19 U	75.5	7.7	16.8	ND	62.4	8.0	29.6	ND
19 LL	79.7	4.5	15.8	ND	67.6	10.7	21.7	ND
19 HL	79.0	9.3	11.7	ND	76.7	5.6	17.7	ND
20 U	91.7	2.3	6.0	ND	88.6	2.8	8.6	ND
20 LL	90.1	1.4	8.5	115	84.0	1.1	14.9	ND
20 HL	83.8	1.5	14.7	ND	78.4	2.7	18.9	ND

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None Dominant

Hay - Park Grass

Botanical Composition per cent. 1st Crop

Plot	1945				1946			
	Gram- inae	Legum- incsa	Others orders	Dom. Sp.	Gram- inae	Legum- incsa	Other orders	Dom. Sp.
1 U	95.1	0.1	4.8	109	98.5	-	1.5	ND
1 L	53.2	6.9	39.9	129	64.8	6.2	29.0	ND
3 U	52.8	12.4	34.8	110 124	45.6	14.0	40.4	124
3 L	28.3	20.9	50.8	ND	27.2	21.0	51.8	124
7 U	26.1	40.1	33.8	120	28.6	25.9	45.5	ND
7 L	60.7	20.4	18.9	ND	65.4	15.5	19.1	127
8 U	31.7	17.5	50.8	129. 124 120	27.3	16.0	56.7	124
8 L	33.2	24.2	42.6	ND	33.0	24.0	43.0	124 129
9 U	100.0	-	-	-	99.6	-	0.4	ND
9 L	89.7	3.4	6.9	115	95.6	0.2	4.2	ND
10 U	100.0	-	-	-	99.6	0.1	0.3	134
10 L	97.5	-	2.5	134	93.3	-	6.7	134
13 U	73.7	0.5	25.8	129	76.0	0.3	23.6	129
13 L	36.1	36.9	27.0	129	62.5	7.7	29.8	129
14 U	97.7	1.6	0.7	126	92.5	2.1	5.4	113 126
14 L	90.2	6.6	3.2	126	87.6	9.2	3.2	126
14 L	92.4	4.4	3.2	126	89.8	7.4	2.8	126
18 U	83.9	-	16.1	134	93.7	-	6.3	134
18 LL	52.4	0.1	47.5	126 129	44.7	0.6	54.7	126
18 HL	62.3	1.2	36.5	126 127	61.9	1.5	36.6	126
19 L	52.9	16.3	30.8	ND	56.0	10.8	33.2	129
19 LL	50.2	22.5	27.3	129	43.7	14.6	41.7	129
19 HL	70.0	15.4	14.6	ND	53.9	18.0	28.1	129
20 L	65.4	18.4	16.2	119	72.1	5.7	22.2	134
20 LL	65.3	12.5	22.2	119	74.9	5.6	19.5	129
20 HL	57.3	13.1	29.6	119	61.5	11.1	27.4	129

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None Dominant

Botanical Composition per cent. 1st Crop

Plot	1947				Plot				
	Gram- ineae	Legum- inosae	Other orders	Dom. Sp.		Gram- ineae	Legum- inosae	Other orders	Dom. Sp.
1 U	93.1	-	6.9	134	2 U	58.0	10.7	31.3	124
1 L	70.9	3.7	25.4	129	2 L	58.6	15.4	26.0	ND
3 U	53.3	11.0	35.7	124	4 ¹ U	46.8	13.5	39.7	134
3 L	39.5	15.2	45.3	110	4 ¹ L	42.0	21.2	36.8	124
7 U	51.2	17.7	31.1	119	4 ² U	97.9	-	2.1	ND
7 L	71.0	9.1	19.9	120	4 ² L	77.4	0.1	22.5	134
8 U	50.8	9.2	40.0	129	5 ¹	72.8	1.1	26.1	ND
8 L	60.2	10.3	29.5	101	5 ²	49.1	11.0	39.9	119
9 U	96.4	-	3.6	129	6	59.6	16.3	24.1	119
9 L	83.9	6.0	10.1	126					
10 U	98.8	-	1.2	134	11 ¹ U	87.8	0.2	12.0	112
10 L	89.4	-	10.6	134	11 ¹ L	98.0	-	2.0	126
13 U	76.6	0.7	22.7	129	11 ² U	98.8	-	1.2	134
13 L	66.9	7.5	25.6	129	11 ² L	98.4	0.1	1.5	126
14 U	85.1	3.3	11.6	113	12	53.2	8.5	38.3	124
14 L Sun	81.6	13.2	5.2	126					
14 L Shade	83.2	12.6	4.2	126					
18 U	93.4	-	6.6	134	15 U	61.9	14.1	24.0	129
18 LL	65.3	0.7	34.0	126	15 L	62.1	11.6	26.3	129
18 HL	64.7	1.6	33.7	127					
19 U	50.7	17.0	32.3	129	16 U	68.2	13.0	18.8	ND
19 LL	51.2	9.9	38.9	ND	16 L	72.3	7.5	20.2	129
19 HL	60.5	13.5	26.0	129					
20 U	68.6	8.5	22.9	134	17 U	69.7	0.1	30.2	129
20 LL	70.2	4.4	25.4	129	17 L	76.3	2.7	21.0	119
20 HL	52.4	10.3	37.3	127					

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None Dominant

Botanical Composition per cent. 1st Crop

Plot	1948			Plot	1949		
	Gram- ineae	Legum- inosae	Other orders		Gram- ineae	Legum- inosae	Other orders
1 U	94.7	-	5.3	2 U	53.6	15.4	31.0
1 L	63.3	4.6	32.1	2 L	51.4	17.8	30.8
3 U	53.0	7.2	39.8	4 ¹ U	46.7	14.4	38.9
3 L	35.8	16.1	48.1	4 ¹ L	44.3	22.4	33.3
7 U	46.6	19.8	33.6	4 ² U	99.8	-	0.2
7 L	56.5	25.3	18.2	4 ² L	94.7	-	5.3
8 U	52.5	7.3	40.2	5 ¹	82.2	3.0	14.8
8 L	53.4	11.1	35.5	5 ²	44.6	26.5	28.9
9 U	99.5	-	0.5	6	37.7	31.3	31.0
9 L	89.9	3.5	6.6				
10 U	99.7	-	0.3	11 ¹ U	99.7	-	0.3
10 L	93.8	-	6.2	11 ¹ L	98.2	-	1.8
13 U	73.8	0.5	25.7	11 ² U	99.4	-	0.6
13 L	67.0	10.6	22.4	11 ² L	97.5	-	2.5
14 U	92.4	2.0	5.6	12	58.5	13.4	28.1
14 L Sun	93.8	3.2	2.9	1			
14 L Shade	93.4	4.3	2.3				
				15 U	42.2	27.8	30.0
				15 L	46.6	32.7	20.7
18 U	88.5	-	11.5	16 U	75.3	11.9	12.8
18 LL	80.9	0.1	19.0	16 L	76.0	9.6	14.4
18 HL	82.9	0.6	16.5				
19 U	50.3	17.4	32.3	17 U	70.6	0.1	29.3
19 LL	62.1	8.5	29.4	17 L	83.2	2.8	14.0
19 HL	66.9	10.4	22.7				
20 U	86.3	5.0	8.7				
20 LL	80.3	4.9	14.8				
20 HL	74.2	9.9	15.9				

These results have not been previously published. Sampling was discontinued in 1950.

U - Unlimed; L - Limed; LL - Light lime; HL - Heavy lime; ND - None Dominant

Year	Month	Day	Time	Location	Temperature	Humidity	Wind	Pressure
1911	Jan	1	10:00	...	...	...	...	...
1911	Jan	2	10:00	...	...	...	...	...
1911	Jan	3	10:00	...	...	...	...	...
1911	Jan	4	10:00	...	...	...	...	...
1911	Jan	5	10:00	...	...	...	...	...
1911	Jan	6	10:00	...	...	...	...	...
1911	Jan	7	10:00	...	...	...	...	...
1911	Jan	8	10:00	...	...	...	...	...
1911	Jan	9	10:00	...	...	...	...	...
1911	Jan	10	10:00	...	...	...	...	...
1911	Jan	11	10:00	...	...	...	...	...
1911	Jan	12	10:00	...	...	...	...	...
1911	Jan	13	10:00	...	...	...	...	...
1911	Jan	14	10:00	...	...	...	...	...
1911	Jan	15	10:00	...	...	...	...	...
1911	Jan	16	10:00	...	...	...	...	...
1911	Jan	17	10:00	...	...	...	...	...
1911	Jan	18	10:00	...	...	...	...	...
1911	Jan	19	10:00	...	...	...	...	...
1911	Jan	20	10:00	...	...	...	...	...
1911	Jan	21	10:00	...	...	...	...	...
1911	Jan	22	10:00	...	...	...	...	...
1911	Jan	23	10:00	...	...	...	...	...
1911	Jan	24	10:00	...	...	...	...	...
1911	Jan	25	10:00	...	...	...	...	...
1911	Jan	26	10:00	...	...	...	...	...
1911	Jan	27	10:00	...	...	...	...	...
1911	Jan	28	10:00	...	...	...	...	...
1911	Jan	29	10:00	...	...	...	...	...
1911	Jan	30	10:00	...	...	...	...	...
1911	Jan	31	10:00	...	...	...	...	...

WHEAT AND BARLEY - WOBURN STACKYARD

These are two almost identical, but distinct experiments which were for many years carried out on similar lines to those on Broadbalk and Hoosfield at Rothamsted. The field was under continuous wheat and barley from 1877 to 1926, and the treatments and results for this period are given in the 1928 Station Report p.103. From 1927-1940 no manures were applied, wheat and barley being grown each year except 1927, 28, 34, 35 when the field was fallowed. Results for 1929 to 1938 are given annually in the Station Reports in the sections devoted to Woburn. In 1941 and 42 a top dressing of 2 cwt. sulphate of ammonia was applied.

In 1943 a new scheme was started. The plots were divided into sets of three according to their previous manurial treatments (omitting plots 2, 5 and 8 of each crop, which were so acid as to give negligible crops). In 1943 the wheat was so weedy that it was ploughed up and the land fallowed for the rest of the season. In 1947 and 1948 the field was fallowed and no treatments were applied.

Area of one whole plot, $\frac{1}{4}$ acre.

The experiments are discussed by H. H. Mann, "The influence of fallowing on the yield of wheat or barley on very exhausted land", J. Agric. Sci., 33, (1943), 207.

Treatments

In the present system of manuring, of each set of three plots one receives a top-dressing of nitrochalk at 2 cwt. per acre (N1), one at 4 cwt. (N2), and the third at 6 cwt. (N3). The dressings rotate in cyclical order.

Summary of treatments 1877-1926 (plots arranged in the present sets of three)

- Plot 1 Unmanured
 3 Nitrate of Soda; 3a, (2N) since 1877; 3b, (1N) since 1907 only.
 3aa, as 3a with lime in 1921; 3bb, as 3b with lime in 1921
 7 Unmanured
 4a Minerals; 4b, as 4a with lime in 1915
 6 Minerals and Nitrate of Soda, (1N)
 9a, 9b Minerals and, in alternate years, Nitrate of Soda (1N)
 10a Superphosphate and Nitrate of Soda (1N)
 10b Rape cake (1N)
 11a Sulphate of Potash and Nitrate of Soda (1N)
 11b Dung (4N)

- 2 Sulphate of Ammonia (1N); 2a unlimed, 2aa, limed in 1905, 09, 10, 11, 2b, limed in 1897 2bb limed in 1897 and 1905
- 5 Minerals and Sulphate of Ammonia (1N); 5a, unlimed 5aa, limed in 1905 and 1916 5b, limed in 1905
- 8 Minerals and, in alternate years, Sulphate of Ammonia (2N); 8a, 8b unlimed, 8aa and 8bb limed in 1905 and 1918

N provides 25 lb. per acre of Ammonia

Crop Notes

Wheat-Red Standard			Barley - Plumage Archer		
Year	Sown	Harvested	Year	Sown	Harvested
1939	17.10.38	Aug. 15	1939	Feb.27	Aug. 17
1940	2 .11.39	Aug. 17	1940	Mar. 9	Aug. 8
1941	15.10.40	Aug. 19	1941	Mar.18	Sept.10
1942	19.11.41	Aug. 17	1942	Apr.13	Sept. 4
1943		Ploughed in, May 6	1943	Mar.12	Aug. 27
1944	27.9.43	Aug. 15	1944	Mar. 8	Sept. 4
1945	23.10.44	Aug. 2	1945	Mar..6	Aug. 2
1946	2. 10.45	Aug. 22	1946	Mar.13	Aug. 15

Wheat and Barley - Woburn Stackyard

Yields of Wheat (lb. per acre)

Plot	Grain 1939	Straw	Grain 1940	Straw	Grain 1941	Straw	Grain 1942	Straw
1	450	976	294	609			213	680
2a	85	341	Nil	81	Nil	Nil	Nil	Nil
2aa	416	993	8	147	77	242	Nil	Nil
2b	263	847	98	214	113	255	Nil	Nil
2bb	337	674	278	459	528	1117	48	161
3a	289	632	447	721	935	1865	302	893
3b	155	386	239	506	641	1123	325	675
4	480	1124			975	2522	671	1396
5a	652	1362	201	423	258	610	79	417
5b	575	1030	217	602	1016	1815	171	364
6	435	1019	695	1362	1347	2246	797	2043
7	367	761	402	932	680	1909	334	901
8a	101	222	36	81	Nil	Nil	Nil	Nil
8aa	625	1117	355	649	69	177	67	419
8b	218	444	73	113	56	177	Nil	Nil
8bb	621	1194	218	452	278	661	173	706
9a	344	1052	544	1171	1115	2421	764	1929
9b	560	1194	474	919	919	1800	526	1339
10a	272	597	186	273			382	598
10b	289	554	231	446			371	888
11a	363	950	591	880	1197	2148	828	1516
11b	443	1312	918	1720	1211	2807	1168	2732

Yields of plots damaged by rabbits, or otherwise invalidated, are omitted.

Yields of Barley (lb. per acre)

Plot	Grain 1939	Straw	Grain 1940	Straw	Grain 1941	Straw	Grain 1942	Straw
1	385	1071	21	350	284	896	194	483
2a	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
2aa	367	1316	24	453	284	933	146	435
2b	341	877	24	325	442	1017	363	827
2bb	349	910	24	340	566	1200	151	384
3a	361	747	20	373	412	850	411	762
3aa	363	887	24	302	234	600	185	556
3b	593	1266	20	390	420	933	383	823
3bb	259	755	24	208	142	367	125	384
4a	337	976	12	234	691	1203	417	894
4b	228	929	12	226	304	1138	404	890
5a	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
5aa	175	774	Nil	Nil	Nil	Nil	323	762
5b	417	885	28	655	606	1057	560	947
6	717	1342	12	250	924	1484	1086	1384
7	368	1028	19	372	388	721	246	586
8a	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
8aa	435	1065	20	468	Taken with 8bb		658	1313
8b	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
8bb	577	1113	20	500	686	1242	483	1100
9a	727	1412	37	677	1006	1675	975	1600
9b	572	1417	79	744	862	1500	1281	1583
10a	345	932	17	280	297	744	204	504
10b	288	1212	17	280	192	686	136	620
11a	444	967	76	543	676	1496	915	1393
11b	668	1635	135	912	886	876	1405	1909

K

Wheat and Barley - Woburn Stackyard

X New system of Manuring - Yields, (lb. per acre).
Plots arranged in their groups of three.

Wheat

Plot	Grain 1944	Straw	Grain 1945	Straw	Grain 1946	Straw
1	N2 1980	4887	N1 737	1334	N3	
3	N1 2259	5411	N3 1466	2559	N2 469	1927
7	N3 2494	5794	N2 841	2140	N1	
4	N3 2104	4371	N2 664	1558	N1	
6	N1 2318	5539	N3 1377	2689	N2 379	1862
9	N2 3625	6782	N1 601	1229	N3 744	2205
10a	N2 2250	5645	N1 587	1151	N3 569	2446
10b	N3 2109	4960	N2 833	1635	N1	
11a	N1 2504	7917	N3 1693	3183	N2 425	2014
11b(1)	N3 1872	4829	N2 1451	2841	N1 372	1598
11b(2)	N1 2452	6079	N3 1591	3037	N2 585	2354
11b(3)	N2 1689	4421	N1 762	1524	N3 750	2384

Yield of plots damaged by rabbits, or otherwise invalidated, are omitted.

Barley

Plot	1943		1944		1945		1946	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
1	N1 87	311	N3 906	1766	N2 539	1839	N1 209	1123
3	N2 328	863	N1 529	1037	N3 908	2015	N2 419	1456
7	N3 458	977	N2 549	1115	N1 533	1594	N3 879	1958
4	N3 519	1051	N2 1343	1936	N1 676	2053	N3 862	1944
6	N1 551	1144	N3 821	1535	N2 1019	2717	N1 513	1683
9	N2 928	1661	N1 988	2152	N3 1020	2144	N2 1018	2686
10a	N3 107	422	N2 404	1122	N1 304	1393	N3 308	1447
10b	N1 99	1045	N3 635	1929	N2 519	2081	N1 226	1101
11a	N2 702	1764	N1 668	2227	N3 857	2143	N2 780	2195
11b(1)	N2 1237	2537	N1 896	2530	N3 1006	2959	N2 757	2482
11b(2)	N3 800	2075	N2 604	2067	N1 727	2285	N3 1253	3279
11b(3)	N1 606	2475	N3 1192	2545	N2 1087	2628	N1 1178	2586

N

Table 1. Yield and grain composition of wheat

Yield and grain composition of wheat (t/ha) in different years (1943-1957) in the experimental plots.

Year	1943		1944		1945		1946		1947	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
1	10.5	18.5	11.2	19.2	12.1	20.1	13.0	21.0	14.0	22.0
2	11.0	19.0	11.8	19.8	12.5	20.5	13.5	21.5	14.5	22.5
3	11.5	19.5	12.2	20.2	13.0	21.0	14.0	22.0	15.0	23.0
4	12.0	20.0	12.8	20.8	13.5	21.5	14.5	22.5	15.5	23.5
5	12.5	20.5	13.2	21.2	14.0	22.0	15.0	23.0	16.0	24.0
6	13.0	21.0	13.8	21.8	14.5	22.5	15.5	23.5	16.5	24.5
7	13.5	21.5	14.2	22.2	15.0	23.0	16.0	24.0	17.0	25.0
8	14.0	22.0	14.8	22.8	15.5	23.5	16.5	24.5	17.5	25.5
9	14.5	22.5	15.2	23.2	16.0	24.0	17.0	25.0	18.0	26.0
10	15.0	23.0	15.8	23.8	16.5	24.5	17.5	25.5	18.5	26.5
11	15.5	23.5	16.2	24.2	17.0	25.0	18.0	26.0	19.0	27.0
12	16.0	24.0	16.8	24.8	17.5	25.5	18.5	26.5	19.5	27.5
13	16.5	24.5	17.2	25.2	18.0	26.0	19.0	27.0	20.0	28.0
14	17.0	25.0	17.8	25.8	18.5	26.5	19.5	27.5	20.5	28.5
15	17.5	25.5	18.2	26.2	19.0	27.0	20.0	28.0	21.0	29.0
16	18.0	26.0	18.8	26.8	19.5	27.5	20.5	28.5	21.5	29.5
17	18.5	26.5	19.2	27.2	20.0	28.0	21.0	29.0	22.0	30.0
18	19.0	27.0	19.8	27.8	20.5	28.5	21.5	29.5	22.5	30.5
19	19.5	27.5	20.2	28.2	21.0	29.0	22.0	30.0	23.0	31.0
20	20.0	28.0	20.8	28.8	21.5	29.5	22.5	30.5	23.5	31.5

Yield of plots harvested by machine, or otherwise investigated, are omitted.

Year	1943		1944		1945		1946		1947	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
1	10.5	18.5	11.2	19.2	12.1	20.1	13.0	21.0	14.0	22.0
2	11.0	19.0	11.8	19.8	12.5	20.5	13.5	21.5	14.5	22.5
3	11.5	19.5	12.2	20.2	13.0	21.0	14.0	22.0	15.0	23.0
4	12.0	20.0	12.8	20.8	13.5	21.5	14.5	22.5	15.5	23.5
5	12.5	20.5	13.2	21.2	14.0	22.0	15.0	23.0	16.0	24.0
6	13.0	21.0	13.8	21.8	14.5	22.5	15.5	23.5	16.5	24.5
7	13.5	21.5	14.2	22.2	15.0	23.0	16.0	24.0	17.0	25.0
8	14.0	22.0	14.8	22.8	15.5	23.5	16.5	24.5	17.5	25.5
9	14.5	22.5	15.2	23.2	16.0	24.0	17.0	25.0	18.0	26.0
10	15.0	23.0	15.8	23.8	16.5	24.5	17.5	25.5	18.5	26.5
11	15.5	23.5	16.2	24.2	17.0	25.0	18.0	26.0	19.0	27.0
12	16.0	24.0	16.8	24.8	17.5	25.5	18.5	26.5	19.5	27.5
13	16.5	24.5	17.2	25.2	18.0	26.0	19.0	27.0	20.0	28.0
14	17.0	25.0	17.8	25.8	18.5	26.5	19.5	27.5	20.5	28.5
15	17.5	25.5	18.2	26.2	19.0	27.0	20.0	28.0	21.0	29.0
16	18.0	26.0	18.8	26.8	19.5	27.5	20.5	28.5	21.5	29.5
17	18.5	26.5	19.2	27.2	20.0	28.0	21.0	29.0	22.0	30.0
18	19.0	27.0	19.8	27.8	20.5	28.5	21.5	29.5	22.5	30.5
19	19.5	27.5	20.2	28.2	21.0	29.0	22.0	30.0	23.0	31.0
20	20.0	28.0	20.8	28.8	21.5	29.5	22.5	30.5	23.5	31.5

TWO COURSE ROTATION EXPERIMENT

Long Hoos (begun in 1942)Cumulative Effects of Agricultural Salt

The experiment was designed to test the cumulative effects of agricultural salt and muriate of potash, and to compare two methods of application of the salt.

The rotation is 1st year Sugar beet, 2nd year Barley.

There are 2 series (one for each crop in any particular year), each consisting of 4 blocks of 12 plots each. Area of each plot in acres:

Series	Total	Sugar Beet Harvested	Barley
1	0.0219	0.0190	0.0207
2	0.0200	0.0173	0.0189

Treatments: all combinations of

- (1) Agricultural salt (rates for sugar beet): None (0), $2\frac{1}{2}$ cwt. (Na 1), 5 cwt. (Na 2) and $7\frac{1}{2}$ cwt. (Na 3) per acre.
- (2) Muriate of potash: None (0), the equivalent of half the single dressing of salt (K1) (approximately 1 cwt. K_2O per acre), the equivalent of the double dressing of salt (K2), applied to sugar beet at sowing.
- (3) Time of application of salt: in seed bed before sowing (A), before ploughing during the winter (B).
- (4) Salt applied to sugar beet only (0), salt repeated at half rate on barley (R).

The following interactions are partially confounded with block differences:-

(A-B) x R; (3-2+1-0) Na x (A-B); (3-2+1-0) Na x R;
and the interactions of these with K.

Basal dressings, applied to all plots at sowing:

Barley:	0.3 cwt. N per acre as sulphate of ammonia
Sugar beet:	0.8 cwt. N per acre as sulphate of ammonia
	0.6 cwt. P_2O_5 per acre as superphosphate.

Crop Notes

	Sugar beet:	Klein E	Barley:	Plumage Archer
	Sown	Lifted	Sown	Harvested
1942	April 25	Dec. 2	(Series 2 grew preliminary wheat)	
1943	April 14	Nov. 12	March 13	Aug. 10
1944	April 22	Oct. 26, Nov. 23	March 8	Aug. 10
1945	April 12	Nov. 5	March 27	Aug. 8
1946	April 15	Nov. 22	March 21	Aug. 14
1947	April 25	Oct. 30	April 11	Aug. 11

In 1942, 1943, samples were taken at intervals from one end of each plot for physiological and chemical study. The yields given are corrected for the reduced area per plot. In 1944, 12 of the 48 plots of sugar beet were lifted Oct. 26th. This had an appreciable effect on tops and sugar percentage, which have been adjusted by means of a regression. There was no effect on the other results.

Two Course Rotation Experiment

		Sugar Beet						
				Year				
Salt cwt.		1942	1943	1944	1945	1946	1947	
		Roots (washed): tons per acre						
Muriate of potash K ₂ O cwt. per acre	0	14.98	15.46	8.51	16.18	15.34	5.92	
	2.5	16.95	17.60	10.96	17.96	17.71	9.04	
	0.0	5.0 (a)	17.12	17.63	10.61	17.15	16.86	9.33
	7.5	16.72	16.68	9.69	16.86	16.32	9.23	
	Mean (b)	16.44	16.84	9.94	17.04	16.56	8.38	
1.0	0	14.73	16.97	8.04	16.97	15.19	7.48	
	2.5	16.08	17.03	11.25	16.88	17.08	8.50	
	5.0 (a)	16.86	17.12	10.53	17.34	17.61	9.99	
	7.5	17.61	16.08	11.34	16.39	17.16	9.74	
	Mean (b)	16.32	16.80	10.29	16.90	16.76	8.93	
2.0	0	15.68	16.87	9.34	16.57	16.93	7.54	
	2.5	16.28	16.45	10.96	17.12	17.56	8.72	
	5.0 (a)	16.65	16.91	10.28	17.55	17.21	9.26	
	7.5	17.28	16.87	11.24	16.21	17.02	10.20	
	Mean (b)	16.47	16.78	10.46	16.86	17.18	8.93	
Salt applied Winter	2.5	16.04	17.43	10.71	17.27	17.66	8.60	
	5.0 (d)	16.58	17.32	10.09	17.21	17.35	9.59	
	7.5	17.10	16.23	11.10	16.63	16.24	10.08	
	Mean (e)	16.57	16.99	10.63	17.04	17.08	9.42	
	In seed bed	2.5	16.83	16.62	11.40	17.37	17.24	8.91
5.0 (d)		17.17	17.12	10.86	17.48	17.11	9.47	
7.5		17.31	16.86	10.41	16.35	17.43	9.36	
Mean (e)		17.10	16.87	10.89	17.07	17.26	9.25	
Mean		0	15.13	16.43	8.63	16.57	15.82	6.98
	2.5	16.44	17.03	11.06	17.32	17.45	8.75	
	5.0 (c)	16.88	17.22	10.47	17.35	17.23	9.53	
	7.5	17.20	16.54	10.76	16.49	16.83	9.72	
	Mean	16.41	16.81	10.23	16.93	16.83	8.74	
Standard errors (28 d.f. in 1942, 22 d.f. in other years)	(a)	0.517	0.577	0.503	0.384	0.427		
	(b)	0.259	0.289	0.251	0.192	0.213		
	(c)	0.299	0.333	0.290	0.222	0.247		
	(d)	0.395	0.441	0.384	0.294	0.326		
	(e)	0.239	0.266	0.232	0.177	0.197		
	Per plot	1.035	1.154	1.005	0.769	0.854		
	%age	6.3	6.9	9.8	4.5	5.1		

Sugar Beet

	Salt cwt. per acre	Year					
		1942	1943	1944	1945	1946	1947
		Sugar Percentage					
Muriate of potash K ₂ O cwt. per acre	0	18.19	18.44	16.24	18.03	17.04	19.34
0.0	2.5	18.02	18.84	16.93	18.47	17.04	20.42
	5.0 (a)	18.54	18.85	17.02	18.81	17.14	21.07
	7.5	18.31	18.81	16.60	18.57	17.18	20.40
	Mean (b)	18.27	18.74	16.70	18.47	17.10	20.31
	0	18.19	18.48	16.62	18.49	16.96	20.86
1.0	2.5	18.30	18.97	16.84	18.46	16.79	20.48
	5.0 (a)	18.16	18.72	16.76	18.38	17.29	20.58
	7.5	17.98	18.60	16.66	18.64	17.16	20.54
	Mean (b)	18.16	18.69	16.72	18.49	17.05	20.62
	0	18.26	18.78	16.68	18.57	17.49	20.48
2.0	2.5	18.53	18.83	16.92	18.83	17.38	20.76
	5.0 (a)	18.38	18.84	16.78	18.58	17.21	20.43
	7.5	18.26	18.60	16.89	18.70	16.98	21.03
	Mean (b)	18.35	18.76	16.82	18.67	17.26	20.68
Salt applied Winter	2.5	18.30	19.00	16.85	18.64	17.08	20.33
	5.0 (d)	18.34	18.85	16.72	18.53	17.10	20.76
	7.5	18.08	18.61	16.83	18.63	17.10	20.94
	Mean (e)	18.24	18.82	16.80	18.60	17.09	20.68
In seed bed	2.5	18.27	18.76	16.94	18.53	17.05	20.78
	5.0 (d)	18.37	18.76	16.98	18.65	17.33	20.63
	7.5	18.28	18.73	16.60	18.65	17.12	20.38
	Mean (e)	18.31	18.75	16.84	18.61	17.17	20.60
Mean	0	18.21	18.57	16.51	18.36	17.16	20.23
	2.5	18.28	18.88	16.90	18.59	17.07	20.55
	5.0 (c)	18.36	18.80	16.85	18.59	17.21	20.69
	7.5	18.18	18.67	16.72	18.64	17.11	20.66
	Mean	18.26	18.73	16.74	18.54	17.14	20.54
Standard errors (28 d.f. in 1942, 21 d.f. in 1944, 22 d.f. in other years)	(a)	0.180		0.220	0.165	0.262	
	(b)	0.090		0.110	0.082	0.131	
	(c)	0.104		0.127	0.095	0.151	
	(d)	0.137		0.168	0.126	0.200	
	(e)	0.083		0.102	0.076	0.121	
	Per plot	0.360		0.441	0.329	0.524	

Two Course Rotation Experiment

		Sugar Beet						
		Salt	Year					
		cwt. per acre	1942	1943	1944	1945	1946	1947
Muriate of potash			Total sugar:					cwt. per acre
K_2O cwt. per acre								
	0		54.5	57.0	27.2	58.3	52.3	23.7
	2.5		61.1	66.3	36.6	66.3	60.2	37.2
0.0	5.0 (a)		63.5	66.5	36.1	64.5	57.9	39.5
	7.5		61.2	62.7	32.2	62.7	56.0	37.9
	Mean (b)		60.1	63.1	33.0	63.0	56.6	34.6
	0		53.6	62.7	27.1	62.8	51.5	31.3
	2.5		58.8	64.6	37.4	62.3	57.5	35.1
1.0	5.0 (a)		61.2	64.1	35.8	63.8	60.9	41.1
	7.5		63.3	59.8	37.7	61.1	58.8	40.4
	Mean (b)		59.2	62.8	34.5	62.5	57.2	37.0
	0		57.3	63.3	31.6	61.5	59.2	31.1
	2.5		60.4	62.0	37.1	64.4	61.0	36.5
2.0	5.0 (a)		61.1	63.9	34.5	65.2	59.2	38.4
	7.5		63.1	62.8	37.9	60.6	57.8	42.9
	Mean (b)		60.5	63.0	35.3	62.9	59.3	37.2
Salt applied	2.5		58.6	66.2	35.8	64.3	60.3	35.4
Winter	5.0 (d)		60.8	65.3	34.1	63.9	59.4	40.0
	7.5		61.8	60.3	37.3	61.7	55.5	42.5
	Mean (c)		60.4	63.9	35.7	63.3	58.4	39.3
	2.5		61.6	62.4	38.3	64.4	58.9	37.2
In seed bed	5.0 (d)		63.1	64.3	36.9	65.1	59.3	39.4
	7.5		63.3	63.2	34.6	61.3	59.7	38.3
	Mean (e)		62.6	63.3	36.6	63.6	59.3	38.3
Mean	0		55.1	61.0	28.6	60.9	54.3	28.7
	2.5		60.1	64.3	37.0	64.3	59.6	36.3
	5.0 (c)		61.9	64.8	35.5	64.5	59.3	39.7
	7.5		62.5	61.8	35.9	61.5	57.5	40.4
	Mean		59.9	63.0	34.3	62.8	57.7	36.3
Standard errors	(a)		1.85	2.17	1.74	1.52	1.91	2.50
(28 d.f. in 1942,	(b)		0.92	1.08	0.87	0.76	0.96	1.25
22 d.f. in other	(c)		1.07	1.25	1.00	0.87	1.10	1.44
years)	(d)		1.41	1.66	1.32	1.16	1.46	1.91
	(e)		0.85	1.00	0.80	0.71	0.88	1.15
	Per plot		3.69	4.34	3.47	3.03	3.82	5.00
	%age		6.2	6.9	10.1	4.8	6.6	13.8

Sugar Beet

	Salt cwt. per acre	1942	1943	1944	1945	1946	1947
Muriate of potash K ₂ O cwt. per acre		Tops: tons per acre					
0.0	0	10.06	9.55	10.69	12.20	17.05	4.59
	2.5	11.23	10.76	13.20	11.82	18.01	6.94
	5.0 (a)	10.56	11.55	13.01	11.80	17.71	7.23
	7.5	11.42	11.60	12.52	12.74	17.21	7.01
	Mean (b)	10.82	10.86	12.36	12.14	17.50	6.44
1.0	0	10.41	10.62	12.40	11.89	17.73	5.81
	2.5	12.19	11.10	13.80	13.58	17.73	6.40
	5.0 (a)	10.20	10.50	11.98	12.43	16.65	7.66
	7.5	13.30	10.74	14.27	12.20	18.13	7.26
	Mean (b)	11.53	10.74	13.11	12.52	17.57	6.78
2.0	0	10.43	10.24	11.70	11.76	17.31	5.83
	2.5	11.74	10.17	12.06	12.05	16.93	6.59
	5.0 (a)	11.42	10.34	11.49	11.49	17.07	7.30
	7.5	11.77	11.12	12.63	11.45	16.49	7.48
	Mean (b)	11.34	10.47	11.97	11.69	16.95	6.80
Salt applied Winter	2.5	11.55	10.49	12.69	12.08	17.83	6.63
	5.0 (d)	10.58	10.80	12.47	11.62	17.54	7.52
	7.5	12.17	11.06	13.89	11.91	17.48	7.62
	Mean (e)	11.43	10.78	13.02	11.87	17.62	7.26
In seed bed	2.5	11.88	10.87	13.34	12.89	17.29	6.65
	5.0 (d)	10.87	10.79	11.86	12.19	16.75	7.27
	7.5	12.17	11.25	12.39	12.35	17.10	6.88
	Mean (e)	11.64	10.97	12.53	12.48	17.05	6.93
Mean	0	10.30	10.14	11.59	11.95	17.36	5.41
	2.5 (c)	11.72	10.68	13.02	12.48	17.56	6.64
	5.0	10.73	10.80	12.16	11.91	17.14	7.40
	7.5	12.17	11.15	13.14	12.13	17.29	7.25
	Mean	11.23	10.69	12.48	12.12	17.34	6.68
Standard errors (28 d.f. in 1942, 21 d.f. in 1944, 22 d.f. in other years)	(a)	0.569	0.600	0.680	0.382	0.813	0.353
	(b)	0.334	0.300	0.340	0.191	0.407	0.177
	(c)	0.386	0.346	0.392	0.221	0.470	0.204
	(d)	0.511	0.458	0.519	0.292	0.621	0.270
	(e)	0.309	0.277	0.314	0.176	0.375	0.163
	Per plot %age	1.338	1.200	1.359	0.764	1.627	0.707
		11.9	11.2	10.9	6.3	9.4	10.6



		Sugar Beet						
Salt cwt. per acre		1942	1943	1944	1945	1946 [‡]	1947	
		Plant Number: thousands per acre						
Muriate of potash K ₂ O cwt. per acre	0	25.9	23.5	27.7	27.6		16.3	
	0.0	2.5	25.3	25.6	29.1	28.5		19.5
		5.0 (a)	26.0	25.3	27.8	28.4		19.1
		7.5	26.3	24.5	24.6	28.1		19.1
		Mean (b)	25.9	24.7	27.3	28.2		18.5
		0	25.2	23.9	27.9	28.3		19.2
	1.0	2.5	23.4	24.5	27.7	27.7		19.7
		5.0 (a)	27.4	24.1	29.2	28.6		21.2
		7.5	27.3	22.6	26.7	27.9		20.6
		Mean (b)	25.8	23.8	27.9	28.1		20.2
	2.0	0	24.8	25.1	27.8	28.2		18.1
		2.5	24.5	22.7	27.7	27.9		18.8
		5.0 (a)	27.1	24.0	28.5	27.6		19.7
		7.5	26.5	23.5	27.7	27.0		22.1
		Mean (b)	25.7	23.8	27.9	27.7		19.7
	Salt applied Winter	2.5	24.8	24.1	28.3	27.8		18.8
5.0 (d)		27.3	24.3	28.7	27.8		19.6	
7.5		26.5	23.8	26.2	27.9		21.4	
Mean (e)		26.2	24.1	27.7	27.8		19.9	
In seed bed	2.5	24.0	24.4	28.0	28.3		19.8	
	5.0 (d)	26.3	24.6	28.4	28.6		20.4	
	7.5	26.9	23.2	26.4	27.4		19.8	
	Mean (e)	25.7	24.1	27.6	28.1		20.0	
Mean	0	25.3	24.1	27.8	28.0		17.9	
	2.5	24.4	24.3	28.2	28.0		19.3	
	5.0 (c)	26.8	24.5	28.5	28.2		20.0	
	7.5	26.7	23.5	26.3	27.7		20.6	
	Mean	25.8	24.1	27.7	28.0		19.5	
In seed bed	2.5	24.0	24.4	28.0	28.3		19.8	
	5.0 (d)	26.3	24.6	28.4	28.6		20.4	
	7.5	26.9	23.2	26.4	27.4		19.8	
	Mean (e)	25.7	24.1	27.6	28.1		20.0	
Standard errors (28 d.f. in 1942, 22 d.f. in other years)	(a)	0.93	1.00	0.94	0.56			
	(b)	0.46	0.50	0.47	0.28			
	(c)	0.54	0.58	0.55	0.32			
	(d)	0.71	0.76	0.72	0.43			
	(e)	0.43	0.46	0.44	0.26			
	Per plot %age	1.86 7.2	2.00 8.3	1.89 6.8	1.12 4.0			

‡ The plant numbers were not counted in 1946.



Barley

		Salt applied in previous year	1943	1944	1945	1946	1947
		cwt. per acre					
Muriate of potash applied in previous year K ₂ O cwt. per acre	0.0	0	24.0	30.0	27.1	32.6	23.1
		2.5	24.9	31.1	27.8	31.9	23.9
		5.0 (a)	23.8	30.2	27.5	33.0	22.1
		7.5	23.7	29.8	26.5	32.0	21.7
		Mean (b)	24.1	30.3	27.2	32.4	22.7
	1.0	0	22.5	30.3	26.4	34.3	23.0
		2.5	26.9	29.6	29.4	32.7	26.3
		5.0 (a)	22.7	30.5	26.6	35.5	22.4
		7.5	26.6	30.1	29.5	32.4	24.7
		Mean (b)	24.7	30.1	28.0	33.7	24.1
	2.0	0	23.3	29.4	26.1	32.8	23.7
		2.5	25.7	30.7	28.0	33.0	24.1
5.0 (a)		23.9	29.4	27.2	33.3	22.7	
7.5		26.4	30.7	29.3	31.9	23.6	
Mean (b)		24.8	30.0	27.6	32.8	23.5	
Salt in current year	None	2.5	24.4	30.8	27.6	33.2	23.4
		5.0 (c)	22.7	30.0	26.4	33.4	22.7
		7.5	26.1	29.8	28.7	31.3	24.5
		Mean (d)	24.4	30.2	27.6	32.6	23.5
	Half Rate	2.5	27.3	30.1	29.1	31.9	26.2
		5.0 (c)	24.2	30.1	27.8	34.5	22.0
		7.5	25.1	30.5	28.2	32.9	22.2
		Mean (d)	25.5	30.2	28.4	33.1	23.5
	Salt applied Winter	2.5	25.1	30.0	27.9	32.7	25.4
		5.0 (c)	23.2	30.0	26.8	34.3	22.4
7.5		27.2	30.5	29.5	32.4	21.7	
Mean (d)		25.2	30.2	28.1	33.1	23.2	
Winter	2.5	26.6	31.0	28.9	32.4	24.2	
	5.0 (c)	23.8	30.1	27.4	33.5	22.3	
	7.5	23.9	29.8	27.4	31.8	25.0	
	Mean (d)	24.8	30.3	27.9	32.6	23.8	
In seed bed	0	23.3	29.9	26.5	33.2	23.3	
	2.5	25.8	30.5	28.4	32.5	24.8	
	5.0 (e)	23.5	30.0	27.1	33.9	22.4	
	7.5	25.6	30.2	28.4	32.1	23.3	
	Mean	24.5	30.1	27.6	32.9	23.4	
Standard errors (22 d.f.)	(a)	0.92	0.68	0.66	1.43	0.82	
	(b)	0.46	0.34	0.33	0.72	0.41	
	(c)	0.71	0.52	0.50	1.09	0.63	
	(d)	0.43	0.32	0.31	0.66	0.38	
	(e)	0.53	0.40	0.38	0.83	0.47	
	Per plot %age	1.85 7.5	1.37 4.6	1.31 4.8	2.86 8.7	1.64 7.0	

Barley

		Salt applied in previous year	Year				
		cwt. per acre	1943	1944	1945	1946	1947
Muriate of potash applied in previous year K ₂ O cwt. per acre	0.0	0	27.9	28.9	31.7	36.5	21.2
		2.5	25.7	28.9	33.0	36.6	22.0
		5.0 (a)	25.8	27.3	32.7	36.3	21.1
		7.5	24.6	28.4	30.2	37.5	20.9
		Mean (b)	26.0	28.4	31.9	36.7	21.3
	1.0	0	23.9	28.9	32.2	36.2	22.2
		2.5	29.4	28.4	34.3	38.3	24.4
		5.0 (a)	24.3	28.4	32.2	39.0	21.8
		7.5	27.6	29.2	34.8	37.3	24.3
		Mean (b)	26.3	28.7	33.4	37.7	23.2
	2.0	0	24.8	27.4	31.0	38.0	22.1
		2.5	27.1	29.0	32.9	37.8	22.7
5.0 (a)		25.4	27.6	32.8	37.7	21.5	
7.5		27.8	27.6	34.5	38.6	23.0	
Mean (b)		26.3	27.9	32.8	38.0	22.3	
Salt in current year	None	2.5	25.7	29.1	32.6	37.9	22.2
		5.0 (c)	24.5	28.3	32.4	37.9	22.0
		7.5	27.2	28.3	34.1	37.7	23.8
		Mean (d)	25.8	28.6	33.0	37.8	22.7
Half rate	None	2.5	29.1	28.5	34.1	37.3	23.8
		5.0 (c)	25.8	27.3	32.7	37.4	21.0
		7.5	26.2	28.5	32.2	37.8	21.6
		Mean (d)	27.0	28.1	33.0	37.5	22.1
Salt applied Winter	Winter	2.5	26.9	28.4	33.1	37.2	23.0
		5.0 (c)	24.8	28.2	32.5	38.6	22.1
		7.5	27.8	29.0	34.4	38.5	20.5
		Mean (d)	26.5	28.5	33.4	38.1	21.9
In seed bed	Winter	2.5	27.9	29.2	33.7	37.9	23.1
		5.0 (c)	25.5	27.4	32.6	36.7	20.8
		7.5	25.6	27.8	31.9	37.1	24.9
		Mean (d)	26.4	28.1	32.7	37.2	22.9
Mean	0	25.5	28.4	31.6	36.9	21.8	
	2.5	27.4	28.8	33.4	37.6	23.0	
	5.0 (e)	25.2	27.8	32.6	37.7	21.5	
	7.5	26.7	28.4	33.2	37.8	22.7	
	Mean	26.2	28.4	32.7	37.5	22.3	

Standard errors (22 d.f.)	(a)	0.80	1.25
	(b)	0.39	0.62
	(c)	0.61	0.95
	(d)	0.37	0.58
	(e)	0.46	0.72
	Per plot	1.61	2.50
	%age	4.9	6.7

N

Table 1

Year	Soil Nitrogen (ppm)		Soil Phosphorus (ppm)		Rate of fertilizer applied (lb/acre)	Rate of manure applied (tons/acre)
	1947	1948	1947	1948		
0	27.8	27.8	27.8	27.8	0	0
2.5 (a)	27.8	27.8	27.8	27.8	2.5	0
5.0 (b)	27.8	27.8	27.8	27.8	5.0	0
7.5 (c)	27.8	27.8	27.8	27.8	7.5	0
10.0 (d)	27.8	27.8	27.8	27.8	10.0	0
12.5 (e)	27.8	27.8	27.8	27.8	12.5	0
15.0 (f)	27.8	27.8	27.8	27.8	15.0	0
17.5 (g)	27.8	27.8	27.8	27.8	17.5	0
20.0 (h)	27.8	27.8	27.8	27.8	20.0	0
22.5 (i)	27.8	27.8	27.8	27.8	22.5	0
25.0 (j)	27.8	27.8	27.8	27.8	25.0	0
27.5 (k)	27.8	27.8	27.8	27.8	27.5	0
30.0 (l)	27.8	27.8	27.8	27.8	30.0	0
32.5 (m)	27.8	27.8	27.8	27.8	32.5	0
35.0 (n)	27.8	27.8	27.8	27.8	35.0	0
37.5 (o)	27.8	27.8	27.8	27.8	37.5	0
40.0 (p)	27.8	27.8	27.8	27.8	40.0	0
42.5 (q)	27.8	27.8	27.8	27.8	42.5	0
45.0 (r)	27.8	27.8	27.8	27.8	45.0	0
47.5 (s)	27.8	27.8	27.8	27.8	47.5	0
50.0 (t)	27.8	27.8	27.8	27.8	50.0	0
52.5 (u)	27.8	27.8	27.8	27.8	52.5	0
55.0 (v)	27.8	27.8	27.8	27.8	55.0	0
57.5 (w)	27.8	27.8	27.8	27.8	57.5	0
60.0 (x)	27.8	27.8	27.8	27.8	60.0	0
62.5 (y)	27.8	27.8	27.8	27.8	62.5	0
65.0 (z)	27.8	27.8	27.8	27.8	65.0	0

Soil Nitrogen and Phosphorus (ppm) in 1947 and 1948. Fertilizer applied (lb/acre) and manure applied (tons/acre) are shown in parentheses. Error (S.E.D.) is shown in parentheses.

THREE COURSE ROTATION EXPERIMENT

Long Hoos (begun in 1933)The effects of straw compost, of straw ploughed in with fertilizers, and of magnesium sulphate

There are three series each of 24 plots, and the three crops of the rotation, potatoes, barley and sugar beet rotate on each series. The plots receive the same dressings every other year so that the direct and residual effects of manures can be measured. Area of each plot, 0.02 acre.

Treatments and rates of dressing (per acre)

	Straw tons	Compost tons	Sulphate of Ammonia cwt.	Super- phosphate cwt.	Muriate of potash cwt.
No organic manure (Art.)	-	-	2.0	2.2	0.8
Compost in Autumn (Adco)	-	5.0	-	-	0.8
Straw, ploughed in in autumn, artificials in spring (St ₁)	2.5	-	2.0	2.2	0.8
Straw, ploughed in in autumn, artificials half in autumn, half in spring (St ₂)	2.5	-	2.0 ¹	2.2	0.8 ²

1. For sugar beet the half-dressing applied in spring is 1.3 cwt. Nitrate of Soda;
2. Until 1946 the spring half-dressing to potatoes was 0.4 cwt. Sulphate of potash.

These four treatments are applied to three plots of each crop each year.

Magnesium Sulphate: 2.5 cwt. per acre applied to one of three replicate plots of each treatment in each crop section.

In addition to the above dressings, the potatoes receive a basal dressing of 2 cwt. sulphate of ammonia, 2.2 cwt. superphosphate and 0.8 cwt. muriate of potash. The sugar beet receive 1.3 cwt. nitrate of soda, 1.1 cwt. superphosphate and 0.4 cwt. muriate of potash.

Details of the experiment are as given in the 1933 Station Report, pp.118-119 except that no comparisons of winter green manuring crops are now made and that commencing in 1943, a yearly dressing of magnesium sulphate has been applied as detailed above. Results for 18 years are discussed in the Station Report for 1951, p.135.

Crop Notes

Potatoes (after Sugar beet). Barley (after Potatoes). Sugar beet (after Barley)

	Variety	Planted	Lifted	Variety	Sown	Harvested	Variety	Sown	Lifted
1939	Ally	Apr. 17	Sept. 18	Plumage	Mar. 7	Aug. 18	Kuhn	Apr. 24	Oct. 25
				Archer					
1940	"	Apr. 26	Sept. 24	"	Mar. 9	Aug. 5	"	May 3	Oct. 17
1941	"	Apr. 28	Oct. 3	"	Mar. 25	Sept. 2	"	Apr. 30	Oct. 25
1942	Majestic	" 21	Oct. 3	"	Mar. 25	Aug. 17	Klein E	Apr. 24	Oct. 26
1943	"	Apr. 8	Sept. 17	"	Mar. 3	Aug. 7	"	Apr. 14	Oct. 14
1944	"	Mar. 28	Sept. 28	"	Mar. 7	Aug. 12	"	Apr. 22	Oct. 24
1945	"	Mar. 30	Sept. 24	"	Mar. 26	Aug. 11	"	Apr. 12	Oct. 19
1946	"	Apr. 1	Oct. 3	"	Mar. 21	Aug. 21	"	Apr. 15	Oct. 22
1947	"	Apr. 30	Sept. 27	"	Apr. 11	Aug. 11	"	Apr. 26	Oct. 17

Potatoes. Total tubers: tons per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	11.02	10.14	12.41	11.03	11.15	8.87	8.55	10.32	10.51	9.56
		±0.439			±0.219		±0.439			±0.219
1940	8.05	7.32	8.37	8.23	7.99	6.14	6.91	6.96	6.92	6.73
		±0.183			±0.092		±0.183			±0.092
1941	11.08	9.16	12.33	11.16	10.93	8.68	10.31	9.48	10.50	9.74
		±0.652			±0.326		±0.652			±0.326
1942	9.66	8.48	10.21	9.71	9.52	6.79	7.20	8.80	8.52	7.83
		±0.324			±0.162		±0.324			±0.162
1943	8.20	7.05	8.53	8.93	8.18	5.56	5.79	6.93	6.80	6.27
		±0.188			±0.094		±0.188			±0.094
1944	10.10	9.92	10.74	10.55	10.33	8.68	9.15	9.62	9.81	9.32
		±0.502			±0.251		±0.502			±0.251
1945	11.21	10.05	11.67	11.69	11.16	9.14	8.91	10.83	10.24	9.78
		±0.467			±0.234		±0.467			±0.234
1946	10.88	10.10	12.43	12.27	11.42	8.45	8.65	9.95	9.64	9.17
		±0.367			±0.183		±0.367			±0.183
1947	7.56	6.07	7.33	7.07	7.01	5.51	6.45	5.78	6.29	6.01
		±0.562			±0.281		±0.562			±0.281

Responses to Magnesium Sulphate

1943	-0.04	0.42	-1.31	0.17	-0.19	0.22	-1.03	-1.09	-0.34	-0.56
		±0.399			±0.200		±0.399			±0.200
1944	1.70	-0.62	-0.22	0.68	0.38	-0.66	-1.28	1.20	1.00	0.06
		±1.06			±0.532		±1.06			±0.532
1945	0.31	1.33	-0.06	0.51	0.52	-1.32	1.21	-0.38	0.13	0.09
		±0.992			±0.496		±0.992			±0.496
1946	-0.65	-0.98	2.18	-0.19	0.09	0.11	0.44	-0.55	-0.22	-0.06
		±0.778			±0.389		±0.778			±0.389
1947	0.20	0.34	0.38	-0.18	0.19	0.04	-0.23	-0.62	0.20	-0.15
		±1.19			±0.596		±1.19			±0.596

Standard errors per plot

		d. f.
1939	0.760 tons per acre or 7.3%	16
1940	0.318 tons per acre or 4.3%	16
1941	1.13 tons per acre or 10.9%	16
1942	0.561 tons per acre or 6.5%	16
1943	0.326 tons per acre or 4.5%	8
1944	0.869 tons per acre or 8.8%	8
1945	0.810 tons per acre or 7.7%	8
1946	0.635 tons per acre or 6.2%	8
1947	0.974 tons per acre or 15.0%	8

σ^2 between plots
 σ_e^2 plots x years

Barley Grain: cwt. per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	39.9	30.8	35.4	32.2	34.6	33.9	29.1	29.2	32.7	31.2
		±2.00			±1.00		±2.00			±1.00
1940	29.0	29.4	28.5	29.5	29.1	28.3	24.6	26.5	29.0	27.1
		±1.28			±0.640		±1.28			±0.640
1941	28.9	21.8	27.9	25.1	25.9	22.2	19.7	24.2	23.0	22.3
		±0.771			±0.385		±0.771			±0.385
1942	32.1	26.0	27.4	28.6	28.5	26.9	26.2	27.3	24.3	26.2
		±1.82			±0.909		±1.92			±0.909
1943	32.3	25.8	30.5	29.8	29.6	25.2	24.3	24.8	26.1	25.1
		±0.867			±0.434		±0.867			±0.434
1944	35.5	31.4	33.0	34.7	33.6	31.3	32.2	29.9	31.0	31.1
		±1.54			±0.769		±1.54			±0.769
1945	33.2	27.3	32.1	32.8	31.4	25.0	25.3	27.6	28.7	26.6
		±2.07			±1.03		±2.07			±1.03
1946	34.6	33.5	29.7	32.2	32.5	29.2	28.8	27.9	29.9	29.0
		±1.54			±0.768		±1.54			±0.768
1947	27.4	20.6	26.7	23.7	24.6	19.7	16.9	18.6	20.0	18.8
		±1.09			±0.546		±1.09			±0.546

Responses to Magnesium Sulphate

1943	1.1	4.8	0.1	0.2	1.6	-4.3	0.2	1.9	-2.5	-1.2
		±1.84			±0.920		±1.84			±0.920
1944	0.6	1.2	-0.6	1.9	0.8	-3.3	-2.9	0.8	2.2	-0.8
		±3.26			±1.63		±3.26			±1.63
1945	-2.2	-1.5	2.2	-2.2	-0.9	-0.5	-7.9	-0.8	-0.9	-2.5
		±4.39			±2.19		±4.39			±2.19
1946	0.9	-0.4	1.2	-2.1	0.3	2.3	4.9	-1.2	-2.1	1.0
		±3.26			±1.63		±3.26			±1.63
1947	-4.4	-2.3	-0.1	1.7	-1.3	2.4	1.4	-5.9	1.1	-0.3
		±2.31			±1.16		±2.31			±1.16

Standard errors per plot

d. f.

1939	3.47 cwt. per acre or 10.6%	16
1940	2.22 cwt. per acre or 7.9%	15*
1941	1.34 cwt. per acre or 5.5%	16
1942	3.15 cwt. per acre or 11.5%	16
1943	1.50 cwt. per acre or 5.5%	8
1944	2.66 cwt. per acre or 8.2%	8
1945	3.58 cwt. per acre or 12.4%	8
1946	2.66 cwt. per acre or 8.7%	8
1947	1.89 cwt. per acre or 8.7%	8

*One missing plot.

Three Course Rotation Experiment

Ba/2.5

Barley. Straw: cwt. per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	50.4	36.5	44.4	40.1	42.8	37.5	35.2	33.9	37.2	36.0
1940	38.4	31.8	33.4	31.6	33.8	30.3	26.5	27.4	30.0	28.6
1941	37.3	26.0	34.9	29.2	31.8	27.4	24.4	27.6	28.5	27.0
1942	35.7	26.0	29.9	30.0	30.4	26.5	26.8	27.0	25.0	26.3
1943	34.4	24.4	31.9	29.7	30.1	24.2	24.7	24.8	26.6	25.1
1944	33.5	29.0	29.7	31.6	31.0	29.8	30.1	28.8	29.7	29.6
1945	37.4	27.2	36.1	34.1	33.7	26.5	29.0	29.3	30.5	28.8
1946	40.4	37.5	38.0	36.9	38.2	29.4	30.7	31.7	32.8	31.2
1947	26.5	22.3	27.2	22.8	24.7	20.0	18.5	20.0	21.0	19.9

Responses to Magnesium Sulphate

1943	-0.1	3.6	3.5	0.3	1.8	-4.3	2.1	1.1	-4.8	-1.5
1944	0.5	0.8	-7.5	2.4	-1.0	-4.3	-2.5	-0.7	-0.7	-2.0
1945	-2.0	0.0	2.0	-2.9	-0.7	-1.3	-9.1	-2.7	1.3	-3.0
1946	0.8	0.5	1.7	-5.4	-0.6	-2.6	3.3	5.2	0.4	1.6
1947	-4.4	-4.5	-1.0	-0.1	-2.5	-0.2	2.7	-3.2	0.5	-0.1

Sugar Beet. Roots (washed): tons per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	14.00	12.21	13.01	13.63	13.21	12.11	11.36	11.93	13.07	12.12
1940	10.47	9.45	9.95	11.41	10.32	10.14	9.43	9.59	9.49	9.66
1941	11.53	10.43	10.86	11.61	11.11	10.09	10.36	10.24	10.63	10.33
1942	14.24	10.02	13.52	13.08	12.72	11.87	10.49	11.37	11.09	11.20
		±0.714			±0.357		±0.714			±0.357
1943	14.32	11.50	13.00	12.30	12.78	12.10	11.17	10.43	12.40	11.52
		±0.806			±0.403		±0.806			±0.403
1944	8.87	8.43	7.48	7.90	8.17	7.73	7.81	7.91	8.36	7.95
		±1.05			±0.525		±1.05			±0.525
1945	13.99	12.04	12.77	12.86	12.92	12.37	11.26	13.01	11.47	12.03
		±0.897			±0.448		±0.897			±0.448
1946	14.50	12.16	12.51	13.36	13.13	12.33	11.50	12.17	12.42	12.10
		±0.311			±0.156		±0.311			±0.156
1947	10.89	7.99	10.02	9.63	9.63	9.09	8.97	9.29	8.94	9.07
		±0.741			±0.370		±0.741			±0.370

Responses to Magnesium Sulphate

1943	-0.74	0.60	0.06	-1.14	-0.30	-0.17	0.26	-2.66	0.12	-0.61
		±1.71			±0.855		±1.71			±0.855
1944	3.00	-3.07	0.10	0.38	0.10	1.91	-1.06	1.02	-1.60	0.06
		±2.23			±1.11		±2.23			±1.11
1945	-0.46	-0.38	-0.23	-0.10	-0.29	-0.07	0.85	-0.22	2.11	0.24
		±1.90			±0.951		±1.90			±0.951
1946	-0.93	0.68	-0.11	0.85	0.11	0.39	0.47	0.17	-0.68	0.09
		±0.661			±0.330		±0.661			±0.330
1947	3.55	-2.61	-0.44	1.86	0.60	1.09	-0.97	-0.33	-0.48	-0.17
		±1.57			±0.786		±1.57			±0.786

Standard errors per plot

		d. f.
1942	1.24 tons per acre or 10.3%	16
1943	1.40 tons per acre or 11.5%	8
1944	1.82 tons per acre or 22.6%	8
1945	1.55 tons per acre or 12.5%	8
1946	0.539 tons per acre or 4.3%	8
1947	1.28 tons per acre or 13.7%	8

Sugar Beet. Total Sugar: cwt. per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	51.4	45.7	43.9	50.2	49.0	44.2	42.8	43.3	47.7	44.5
		±1.97			±0.987			±1.97		±0.987
1940	44.2	40.1	41.9	48.9	43.8	42.6	39.9	41.3	40.1	41.0
		±2.47			±1.23			±2.47		±1.23
1941	46.3	42.7	43.7	47.2	45.0	40.5	41.4	41.0	42.4	41.3
		±2.26			±1.13			±2.26		±1.13
1942	51.5	36.4	49.2	48.0	46.3	42.1	38.1	42.0	40.7	40.7
		±2.54			±1.27			±2.54		±1.27
1943	52.8	41.8	48.1	44.9	46.9	44.9	40.8	38.5	46.1	42.6
		±2.75			±1.38			±2.75		±1.38
1944	29.6	23.0	24.2	26.1	27.0	26.0	26.5	26.7	27.9	26.3
		±3.57			±1.79			±3.57		±1.79
1945	56.5	48.4	52.9	52.4	52.6	50.6	45.2	51.8	46.8	48.6
		±3.66			±1.83			±3.66		±1.83
1946	52.5	45.0	46.3	49.1	48.2	45.3	42.2	44.0	46.4	44.5
		±1.13			±0.566			±1.13		±0.566
1947	45.7	33.3	43.0	40.2	40.5	38.7	37.1	38.8	37.2	37.9
		±3.29			±1.64			±3.29		±1.64

Responses to Magnesium Sulphate

1943	-2.5	3.0	-0.9	-3.5	-1.0	-2.7	0.6	-9.4	0.5	-2.8
		±5.84			±2.92			±5.84		±2.92
1944	10.6	-11.8	-0.3	2.3	0.02	6.3	-4.6	2.7	2.3	0.17
		±7.57			±3.79			±7.57		±3.79
1945	-1.0	-0.1	-0.9	0.0	-0.5	1.0	6.7	-2.1	8.4	3.5
		±7.77			±3.88			±7.77		±3.88
1946	-3.2	2.8	-0.9	4.1	0.7	1.7	3.5	0.4	-2.2	0.8
		±2.40			±1.20			±2.40		±1.20
1947	14.9	-10.4	-1.8	7.8	2.6	6.0	-5.1	-3.7	-1.9	-1.2
		±6.97			±3.48			±6.97		±3.48

Standard errors per plot

		d. f.
1939	3.42 cwt. per acre or 7.3%	16
1940	4.27 cwt. per acre or 10.1%	16
1941	3.91 cwt. per acre or 9.0%	16
1942	4.40 cwt. per acre or 10.1%	16
1943	4.77 cwt. per acre or 10.7%	8
1944	6.18 cwt. per acre or 23.0%	8
1945	6.34 cwt. per acre or 12.5%	8
1946	1.96 cwt. per acre or 4.2%	8
1947	5.69 cwt. per acre or 14.5%	8

Sugar Beet. Sugar Percentage

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	18.35	18.71	18.78	18.38	18.56	18.27	18.83	18.12	18.25	18.37
1940	21.10	21.25	21.03	21.46	21.21	20.98	21.19	21.53	21.10	21.20
		±0.325			±0.162		±0.325			±0.162
1941	20.10	20.43	20.11	20.32	20.25	20.08	19.96	20.00	19.99	20.01
		±0.227			±0.113		±0.227			±0.113
1942	18.08	18.17	18.22	18.35	18.20	17.75	18.19	18.48	18.38	18.20
		±0.192			±0.096		±0.192			±0.096
1943	18.43	18.18	18.52	18.23	18.35	18.52	18.30	18.47	18.60	18.47
		±0.171			±0.036		±0.171			±0.036
1944	16.67	16.48	16.13	16.40	16.43	16.85	16.93	16.86	16.68	16.83
		±0.126			±0.063		±0.126			±0.063
1945	20.21	20.11	20.74	20.39	20.36	20.47	20.05	19.91	20.38	20.20
		±0.174			±0.087		±0.174			±0.087
1946	18.13	18.52	18.51	18.38	18.38	18.36	18.37	18.10	18.68	18.38
		±0.165			±0.082		±0.165			±0.082
1947	20.97	20.91	21.44	20.86	21.04	21.26	20.63	20.88	20.76	20.88

Responses to Magnesium Sulphate

1943	0.09	0.30	-0.43	0.27	0.06	-0.83	-0.23	0.21	0.01	-0.21
		±0.364			±0.182		±0.364			±0.182
1944	0.28	-1.14	-0.40	0.79	-0.12	-0.08	-0.70	-0.44	0.37	-0.21
		±0.268			±0.134		±0.268			±0.134
1945	0.25	0.60	-0.01	0.14	0.24	0.51	1.42	-0.46	-0.06	0.35
		±0.368			±0.184		±0.368			±0.184
1946	0.11	0.08	-0.20	0.39	0.10	0.12	0.80	-0.10	0.10	0.23
		±0.349			±0.175		±0.349			±0.175
1947	0.00	0.36	0.04	0.05	0.11	0.69	-0.61	-1.24	0.14	-0.25

Standard errors per plot

		d. f.
1940	0.562	16
1941	0.393	16
1942	0.333	16
1943	0.297	8
1944	0.219	8
1945	0.301	8
1946	0.285	8

Sugar Beet. Tops: tons per acre

	Treatments applied same year					Treatments applied previous year				
	Art	Adco	St ₁	St ₂	Mean	Art	Adco	St ₁	St ₂	Mean
Mean Yields										
1939	15.09	11.40	12.83	12.52	12.96	12.33	10.24	12.08	12.22	11.72
1940	8.16	6.46	7.35	8.06	7.51	6.80	6.74	6.32	6.42	6.57
		±0.491			±0.245		±0.491			±0.245
1941	11.91	8.64	9.32	10.87	10.18	8.26	9.57	8.47	9.15	8.86
		±0.675			±0.337		±0.675			±0.337
1942	11.39	7.32	10.14	9.79	9.66	8.87	7.93	8.35	7.80	8.24
		±0.663			±0.332		±0.663			±0.332
1943	11.52	8.43	8.74	8.74	9.36	7.72	8.27	6.25	8.15	7.60
		±1.02			±0.512		±1.02			±0.512
1944	10.35	9.08	8.57	9.17	9.29	8.09	7.77	7.20	9.07	8.03
		±0.693			±0.346		±0.693			±0.346
1945	9.42	6.47	7.70	6.64	7.56	6.31	6.13	7.30	6.98	6.68
		±0.315			±0.158		±0.315			±0.158
1946	13.84	10.54	11.39	11.96	11.93	10.80	11.03	9.16	10.49	10.37
		±1.17			±0.585		±1.17			±0.585
1947	6.12	4.38	5.56	5.83	5.47	4.44	4.96	4.87	5.05	4.83
		±0.280			±0.140		±0.280			±0.140

Responses to Magnesium Sulphate

1943	-1.40	0.68	-0.83	-0.32	-0.47	-0.06	-0.15	-0.81	-0.07	-0.27
		±2.17			±1.09		±2.17			±1.09
1944	1.22	-1.36	1.98	-1.44	0.10	2.05	0.16	0.16	-0.54	0.46
		±1.47			±0.735		±1.47			±0.735
1945	-2.07	-0.93	-1.17	-0.18	-1.09	-0.49	-0.02	2.51	0.65	0.66
		±0.668			±0.334		±0.668			±0.334
1946	-0.87	-1.00	-1.41	1.40	-0.47	-0.35	-0.47	-0.88	-0.60	-0.58
		±2.48			±1.24		±2.48			±1.24
1947	1.14	-0.71	-0.47	-0.31	-0.09	-0.10	0.54	0.49	-0.95	0.04
		±0.594			±0.297		±0.594			±0.297

Standard errors per plot

		d. f.
1939	1.13 tons per acre or 9.2%	16
1940	0.850 tons per acre or 12.1%	16
1941	1.17 tons per acre or 12.3%	16
1942	1.15 tons per acre or 12.8%	16
1943	1.77 tons per acre or 20.9%	8
1944	1.20 tons per acre or 13.8%	8
1945	0.546 tons per acre or 7.7%	3
1946	2.03 tons per acre or 18.2%	8
1947	0.485 tons per acre or 9.4%	8

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Table 1: Main data table with 11 columns and multiple rows of numerical data.										
1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01
1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01
1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01

Table 2: Second data table with 11 columns and multiple rows of numerical data.										
1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01
1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01
1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12
2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34
3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45
4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56
5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67
6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78
7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90	1.23	4.56	7.89
8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01	2.34	5.67	8.90
9.01	2.34	5.67	8.90	1.23	4.56	7.89	1.12	3.45	6.78	9.01

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FOUR COURSE ROTATION EXPERIMENT

Great Hoos (begun in 1930)Residual Values of Humic and Phosphatic Fertilizers

The five treatments compared in this experiment are dung, Adco compost, straw with artificials, superphosphate and rock phosphate (Gafsa), the cropping following a Norfolk Rotation (potatoes, barley, ryegrass, wheat). There are four series (one for each crop in any particular year), each consisting of twenty-five plots.

Dung and Adco each supply 50 cwt. per acre of organic matter. The quantity of straw applied is equal to that used in making the Adco. The nutrient content of the three humic fertilizers is equalized by adding sulphate of ammonia, muriate of potash and superphosphate, to raise the applications to 1.8 cwt. N per acre, 1.2 cwt. P_2O_5 per acre and 3.0 cwt. K_2O per acre. The phosphatic fertilizers are applied at the rate of 1.2 cwt. P_2O_5 per acre, together with sulphate of ammonia and muriate of potash at the above rates.

Any given plot receives always the same treatment, but the treatment is applied to the plot only once in five years (except that the sulphate of ammonia and muriate of potash accompanying the phosphatic fertilizers are applied one fifth annually.) Thus each treatment is applied to one plot of each series every year, according to a Latin square scheme. In this way the residual effects of fertilizers are measured in every crop, and the period of the manurial cycle differs from that of the crop rotation.

Area of each plot, 0.024 acre.

Details of the experiment are as given in the 1932 Report, pp. 127-8, with the following alterations:-

1. From 1935 onwards, clover ryegrass ley was replaced by ryegrass alone, sown in autumn after ploughing barley stubble, with fertilizers applied as on wheat.
2. From 1942 onwards, each plot of the potato crop was split, a random half of each receiving an additional 0.4.cwt. N per acre as sulphate of ammonia each year.

Nutrients provided by organic fertilizers: cwt. per acre

Year	Manure as F.Y.M.			Manure as Adco			Manure as Straw			
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	Organic Matter	N	P ₂ O ₅	K ₂ O
1939	1.782	1.344 [‡]	4.503	1.646	1.520 [‡]	1.189	123.75	0.862	0.480	2.652
1940	1.520	0.830	2.155	1.562	1.240 [‡]	1.330	139.88	1.008	0.520	2.699
1941	1.775	0.471	1.802	1.260	0.877	0.538	106.74	0.573	0.183	1.526
1942	1.410	0.700	2.373	1.378	0.890	0.506	118.96	9.615	0.208	1.229
1943	1.526	0.645	2.193	1.282	0.840	0.474	133.23	0.832	0.270	1.506
1944	1.202	0.409	1.925	1.313	0.706	0.572	100.00	0.657	0.178	0.765
1945	1.524	0.492	2.712	0.995	0.555	0.622	82.00	0.297	0.088	0.684
1946	1.802	0.710	2.418	1.461	1.031	0.892	124.90	0.683	0.379	1.447
1947	1.588	0.748	1.560	1.585	1.169	0.911	123.00	0.849	0.261	1.546

[‡] No application of artificials necessary.

Crop Notes

Crop year	1939	1940	1941	1942	1943	1944	1945	1946	1947
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Potatoes. Variety: 1939-41, Ally; 1942-47, Majestic. Previous crop: Wheat

Planted	Apr. 17	Apr. 26	Apr. 30	Apr. 21	Apr. 8	Mar. 25	Mar. 30	Mar. 30	Apr. 29
Harvested	Sept. 19	Sept. 24	Oct. 3	Oct. 3	Sept. 15	Sept. 28	Sept. 25	Oct. 4	Sept. 30

Barley. Variety: Plumage Archer. Previous crop: Potatoes

Sown	Mar. 7	Mar. 11	Mar. 18	Mar. 25	Mar. 2	Mar. 6	Mar. 27	Mar. 20	Apr. 12
Harvested	Aug. 23	Aug. 6	Sept. 2	Aug. 17	Aug. 7	Aug. 12	Aug. 14	Aug. 21	Aug. 14

Ryegrass. Variety: Western Wolths. Previous crop: Barley

Sown	Sept. 13	Apr. 13 ¹	Oct. 30	Nov. 1	Sept. 24	Sept. 30	Sept. 13	Sept. 17	Apr. 12 ³
Harvested	June 6	June 22	Failed ²	June 20	June 14	June 14	June 13	June 14	Aug. 21

Wheat. Variety: 1939-45 Ycoman. 1946⁷ Squareheads Master. Previous crop: Ryegrass

Sown	Oct. 24	Oct. 21	Oct. 29	Oct. 27	Oct. 10	Oct. 4	Oct. 26	Oct. 15	Oct. 24
Harvested	Aug. 14	Aug. 6	Aug. 22	Aug. 12	Aug. 3	Aug. 12	Aug. 13	Aug. 21	Aug. 18

- (1) First sowing of ryegrass failed.
- (2) Barley sown to replace ryegrass, which failed.
Sown: Apr 22. Cut for hay: July 23. Variety: Kenia.
- (3) Wet season prevented autumn sowing of ryegrass.

Potatoes. Total tubers: tons per acre

Manure	Year of	1939	1940	1941	1942	1943	1944	1945	1946	1947
	cycle									
Manure as F.Y.M.	1	5.28	4.95	3.02	9.08	6.90	10.68	9.60	7.29	6.13
	2	3.52	4.34	2.53	6.12	6.20	7.85	8.14	7.03	5.47
	3	4.03	3.01	2.69	6.56	5.48	11.69	7.27	5.54	5.84
	4	2.82	4.80	1.92	6.77	5.38	8.05	8.87	5.06	5.05
	5	4.16	3.79	2.42	3.82	5.46	8.97	6.11	6.38	4.30
Manure as Adco	1	4.14	4.87	1.86	7.77	8.34	12.49	11.82	9.24	6.05
	2	3.70	2.91	2.38	5.39	4.77	9.66	7.72	7.26	5.59
	3	2.25	2.91	2.04	4.28	4.72	8.55	6.80	6.60	4.56
	4	3.12	2.93	1.30	4.57	5.13	7.97	7.01	7.04	5.21
	5	2.46	2.05	1.75	5.15	5.26	9.63	7.08	6.18	5.13
Manure as Straw	1	3.59	7.18	4.42	10.22	7.13	12.60	12.83	9.13	6.57
	2	4.07	5.11	2.77	6.85	5.97	8.21	9.00	6.37	4.36
	3	4.23	3.45	3.00	7.93	6.62	6.88	8.43	7.20	4.55
	4	4.22	2.51	1.88	4.07	5.81	8.80	8.15	6.19	5.66
	5	3.48	3.50	2.76	6.73	4.92	10.02	7.79	6.64	5.07
Super- Phosphate	1	5.63	5.66	4.03	6.90	8.51	9.98	9.27	9.19	6.48
	2	5.72	4.58	4.14	4.46	6.29	10.86	9.45	7.58	5.63
	3	4.45	4.67	2.24	9.14	7.28	9.53	9.27	7.39	6.36
	4	3.98	3.56	2.76	7.23	8.40	11.06	9.84	8.41	5.98
	5	4.76	4.98	2.64	7.31	6.85	8.03	10.01	8.02	6.17
Gafsa Rock Phosphate	1	3.37	2.44	2.41	4.06	5.30	8.62	9.31	7.18	4.04
	2	2.22	3.37	2.26	5.57	6.58	9.60	7.67	6.41	5.41
	3	3.59	4.58	2.45	5.83	7.01	6.63	8.13	6.85	5.26
	4	3.81	2.29	2.85	4.13	5.88	8.72	7.93	6.24	5.47
	5	2.90	3.28	1.93	7.52	5.55	5.27	8.48	8.35	4.90

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1942			N Effect	1943			N Effect
		Additional N Without	With	Mean		Additional N Without	With	Mean	
Manure as F.Y.M.	1	9.08	10.34	9.71	1.26	6.90	7.28	7.09	0.38
	2	6.12	8.31	7.22	2.19	6.20	7.99	7.10	1.79
	3	6.56	8.04	7.30	1.48	5.48	6.15	5.82	0.67
	4	6.77	7.08	6.92	0.31	5.38	7.99	6.68	2.61
	5	3.82	4.65	4.24	0.83	5.46	7.72	6.59	2.26
Manure as Adco	1	7.77	7.16	7.46	-0.61	8.34	9.20	8.77	0.86
	2	5.39	7.81	6.60	2.42	4.77	6.59	5.68	1.82
	3	4.28	4.61	4.44	0.33	4.72	6.62	5.67	1.90
	4	4.57	6.09	5.33	1.52	5.13	4.83	4.98	-0.30
	5	5.15	5.24	5.20	0.09	5.26	6.68	5.97	1.42
Manure as Straw	1	10.22	11.73	10.98	1.51	7.13	9.31	8.22	2.18
	2	6.85	9.67	8.26	2.82	5.97	7.63	6.80	1.66
	3	7.93	7.52	7.72	-0.41	6.62	8.03	7.32	1.41
	4	4.07	4.02	4.04	-0.05	5.81	7.95	6.88	2.14
	5	6.73	7.16	6.94	0.43	4.92	6.43	5.68	1.51
Super-Phosphate	1	6.90	8.31	7.60	1.41	8.51	10.41	9.46	1.90
	2	4.46	5.65	5.06	1.19	6.29	8.22	7.26	1.93
	3	9.14	10.04	9.59	0.90	7.28	8.58	7.93	1.30
	4	7.23	7.85	7.54	0.62	8.40	9.10	8.75	0.70
	5	7.31	7.19	7.25	-0.12	6.85	7.48	7.16	0.63
Gafsa Rock Phosphate	1	4.06	3.74	3.90	-0.32	5.30	5.63	5.46	0.33
	2	5.57	7.81	6.69	2.24	6.58	5.80	6.19	-0.78
	3	5.83	4.98	5.40	-0.85	7.01	8.19	7.60	1.18
	4	4.13	6.52	5.32	2.39	5.88	6.14	6.01	0.26
	5	7.52	5.64	6.58	-1.88	5.55	6.31	5.93	0.76

Four Course Rotation Experiment

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1944			N Effect	1945			N Effect
		Additional N Without	With	Mean		Additional N Without	With	Mean	
Manure as F.Y.M.	1	10.68	12.72	11.70	2.04	9.60	12.77	11.18	3.17
	2	7.85	8.03	7.94	0.18	8.14	12.27	10.20	4.13
	3	11.69	12.09	11.89	0.40	7.27	10.50	8.88	3.23
	4	8.05	8.80	8.42	0.75	8.87	10.71	9.79	1.84
	5	8.97	11.90	10.44	2.93	6.11	8.03	7.07	1.92
Manure as Adco	1	12.49	10.96	11.72	-1.53	11.82	13.69	12.76	1.87
	2	9.66	11.10	10.38	1.44	7.72	9.62	8.67	1.90
	3	8.55	9.54	9.04	0.99	6.80	8.92	7.86	2.12
	4	7.07	8.69	8.33	0.72	7.01	9.27	8.14	2.26
	5	9.63	10.13	9.88	0.50	7.08	8.07	7.58	0.99
Manure as Straw	1	12.60	13.90	13.25	1.30	12.83	9.95	11.39	-2.88
	2	8.21	9.25	8.73	1.04	9.00	8.39	8.70	-0.61
	3	6.88	7.11	7.00	0.23	8.43	11.60	10.02	3.17
	4	8.80	9.14	8.97	0.34	8.15	9.52	8.84	1.37
	5	10.02	10.29	10.16	0.27	7.79	10.49	9.14	2.70
Super-Phosphate	1	9.98	10.99	10.48	1.01	9.27	9.82	9.54	0.55
	2	10.86	11.90	11.38	1.04	9.45	10.83	10.14	1.38
	3	9.53	10.80	10.16	1.27	9.27	10.49	9.88	1.22
	4	11.06	12.09	11.58	1.03	9.84	10.52	10.18	0.68
	5	8.03	9.03	8.53	1.00	10.01	10.56	10.28	0.55
Gafsa Rock Phosphate	1	8.62	9.34	8.98	0.72	9.31	8.46	8.88	-0.85
	2	9.60	12.05	10.82	2.45	7.67	7.88	7.78	0.21
	3	6.63	8.60	7.62	1.97	8.13	8.99	8.56	0.86
	4	8.72	8.13	8.42	-0.59	7.93	8.09	8.01	0.16
	5	5.27	7.42	6.34	2.15	8.48	6.98	7.73	-1.50

Potatoes, Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1946			1947				
		Additional N Without	With	Mean	N Effect	Additional N Without	With	Mean	N Effect
Manure as F.Y.M.	1	7.29	8.65	7.97	1.36	6.13	8.06	7.10	1.93
	2	7.03	8.80	7.92	1.77	5.47	6.55	6.01	1.08
	3	5.54	8.00	6.77	2.46	5.84	6.36	6.10	0.52
	4	5.06	8.63	6.84	3.57	5.05	5.97	5.51	0.92
	5	6.38	6.79	6.58	0.41	4.30	5.39	4.84	1.09
Manure as Adco	1	9.24	9.18	9.21	-0.06	6.05	6.01	6.03	-0.04
	2	7.26	8.78	8.02	1.52	5.59	5.42	5.50	-0.17
	3	6.60	8.58	7.59	1.98	4.56	5.89	5.22	1.33
	4	7.04	7.09	7.06	0.05	5.21	5.94	5.58	0.73
	5	6.18	7.53	6.86	1.35	5.13	4.65	4.89	-0.48
Manure as Straw	1	9.13	9.93	9.53	0.80	6.57	6.35	6.46	-0.22
	2	6.37	10.66	8.52	4.29	4.36	5.80	5.08	1.44
	3	7.20	9.09	8.14	1.89	4.55	6.74	5.64	2.19
	4	6.19	7.26	6.72	1.07	5.66	6.43	6.04	0.77
	5	6.64	8.52	7.58	1.88	5.07	6.34	5.70	1.27
Super-Phosphate	1	9.19	10.08	9.64	0.89	6.48	7.41	6.94	0.93
	2	7.58	9.78	8.68	2.20	5.63	5.59	5.61	-0.04
	3	7.39	7.99	7.69	0.60	6.36	6.40	6.38	0.04
	4	8.41	8.18	8.30	-0.23	5.98	5.34	5.66	-0.64
	5	8.02	7.51	7.76	-0.51	6.17	5.62	5.90	-0.55
Gafsa Rock Phosphate	1	7.18	6.17	6.68	-1.01	4.04	4.70	4.37	0.66
	2	6.41	6.01	6.21	-0.40	5.41	5.65	5.53	0.24
	3	6.85	6.61	6.73	-0.24	5.26	5.21	5.24	-0.05
	4	6.24	6.20	6.22	-0.04	5.47	5.18	5.32	-0.29
	5	8.35	7.02	7.68	-1.33	4.90	4.79	4.84	-0.11

Four Course Rotation Experiment

Manure	Year of Cycle	Barley Grain: cwt. per acre								
		1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F.Y.M	1	26.3	27.6	18.4	35.0	27.4	35.8	29.8	26.9	22.6
	2	25.9	32.5	14.6	24.1	23.3	29.4	21.8	24.2	16.2
	3	22.8	24.2	12.5	21.6	17.9	25.2	19.0	25.1	15.3
	4	23.7	20.7	15.3	22.0	19.6	23.0	19.2	22.5	13.3
	5	21.5	22.6	12.2	16.3	16.1	27.2	17.6	23.8	14.6
Manure as Adco	1	31.5	36.5	17.3	28.4	32.4	31.6	31.5	30.2	19.0
	2	26.1	28.1	13.8	18.6	22.7	30.3	22.4	25.2	13.8
	3	20.6	24.3	12.6	18.9	16.4	24.9	18.1	21.6	15.3
	4	20.5	18.5	10.4	17.0	20.9	27.6	16.6	24.5	13.4
	5	22.4	27.5	11.0	13.9	16.3	27.5	14.8	21.8	14.5
Manure as Straw	1	23.7	34.5	25.5	32.0	32.2	34.8	38.4	34.3	24.0
	2	24.5	27.3	15.1	26.6	23.1	28.2	24.8	27.2	16.5
	3	20.8	27.1	12.0	19.2	20.8	28.1	19.6	25.6	19.1
	4	23.8	26.0	12.6	17.2	21.6	26.0	16.8	24.3	14.1
	5	26.3	24.2	12.6	21.4	13.4	25.1	20.0	24.8	15.8
Super- phosphate	1	32.2	30.2	25.1	25.4	27.8	29.2	26.2	28.6	23.7
	2	32.3	30.8	24.8	27.2	25.3	28.6	26.3	22.8	22.6
	3	31.7	31.1	25.9	26.4	30.0	26.7	24.2	27.2	22.6
	4	31.7	31.3	22.0	28.6	28.3	27.5	22.7	29.1	22.0
	5	33.0	29.7	21.7	29.2	22.7	29.4	26.6	29.2	20.4
Gafsa Rock Phosphate	1	29.0	33.2	18.7	13.1	23.7	28.8	20.0	29.3	20.6
	2	29.8	34.5	15.0	27.7	24.6	28.0	21.4	28.9	17.4
	3	32.9	31.0	17.3	27.9	24.1	28.8	26.2	23.3	20.6
	4	31.5	30.4	22.3	22.8	20.9	28.1	21.2	30.3	19.9
	5	26.5	32.1	16.9	30.4	26.1	29.9	23.4	27.4	19.4

Barley Straw: cwt. per acre

Manure	Year of Cycle	Barley Straw: cwt. per acre									
		1939	1940	1941	1942	1943	1944	1945	1946	1947	
Manure as F. Y. M.	1	32.2	28.5	23.0	37.5	30.1	33.3	33.8	29.6	21.9	
	2	28.8	25.3	23.2	22.2	23.8	29.1	23.7	28.4	17.5	
	3	26.1	24.7	19.8	20.4	19.4	23.5	21.0	26.4	16.0	
	4	27.6	22.0	20.8	20.7	19.0	22.8	20.9	28.4	13.5	
	5	28.2	24.7	18.4	16.5	15.8	25.0	17.2	29.5	16.6	
Manure as Adco	1	39.7	35.7	27.0	31.0	34.0	31.4	37.4	40.0	20.5	
	2	32.0	29.2	21.2	23.9	21.8	26.4	25.6	29.4	14.3	
	3	24.6	24.5	23.0	22.3	16.7	23.5	21.1	22.8	15.6	
	4	26.5	27.7	17.0	23.6	21.8	26.4	21.8	33.2	14.3	
	5	24.7	28.2	20.5	15.8	17.6	23.1	18.7	28.2	16.3	
Manure as Straw	1	27.2	37.8	32.1	35.8	33.9	34.1	34.4	42.0	23.8	
	2	29.0	27.7	21.6	25.6	22.6	26.8	27.8	34.0	17.7	
	3	24.4	27.8	20.0	19.7	22.4	25.9	28.4	30.5	18.7	
	4	27.8	26.4	18.9	21.1	20.7	23.6	25.4	30.0	15.7	
	5	27.6	24.7	21.3	16.9	14.9	22.1	20.7	26.9	16.3	
Super-phosphate	1	35.9	35.2	30.6	30.6	28.3	26.9	31.6	36.4	24.7	
	2	39.6	32.3	30.8	26.5	28.0	28.2	25.4	28.2	22.6	
	3	34.1	33.4	29.8	20.4	28.7	25.5	29.4	34.4	23.7	
	4	33.7	32.9	29.7	28.0	27.6	24.0	29.4	32.5	22.7	
	5	34.7	30.3	31.8	27.3	26.0	24.9	29.3	38.2	21.1	
Gafsa Rock Phosphate	1	33.3	37.9	29.1	22.8	26.0	25.6	26.5	36.5	24.0	
	2	36.8	39.8	29.2	31.3	27.4	26.2	25.1	34.7	18.9	
	3	37.1	37.5	28.5	29.5	26.3	26.5	27.8	29.1	22.8	
	4	37.3	32.3	⊥	23.4	24.1	25.1	29.4	35.5	22.6	
	5	36.2	34.8	32.0	29.9	26.7	28.2	25.1	36.4	23.0	

⊥ Recorded yield obviously incorrect.

Four Course Rotation Experiment

Ryegrass: cwt. per acre dry matter

Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F. Y. M.	1	20.4	19.4	7.0	18.8	16.5	19.4	17.3	33.3	6.7
	2	10.9	11.4	9.7	9.5	12.7	10.2	13.1	22.8	3.2
	3	10.8	7.1	5.5	7.3	10.5	11.4	11.5	20.8	3.3
	4	8.5	9.1	6.5	9.0	8.9	8.2	11.8	12.3	3.2
	5	9.5	9.1	5.8	5.6	8.6	9.6	9.6	16.2	3.2
Manure as Adco	1	14.4	16.9	10.1	9.4	17.8	18.7	25.3	31.9	6.7
	2	10.2	9.9	6.7	5.8	10.6	13.3	14.0	27.6	3.5
	3	8.8	7.6	5.6	9.0	9.6	9.0	11.5	18.9	3.5
	4	7.2	8.9	5.4	6.1	8.3	9.1	8.1	16.5	1.2
	5	8.1	8.5	3.6	6.2	8.8	9.8	10.4	15.5	3.9
Manure as Straw	1	40.5	28.1	14.3	21.5	29.3	16.4	39.2	59.1	12.4
	2	11.0	8.8	4.4	8.6	9.4	10.7	13.2	21.7	3.7
	3	9.2	12.1	6.6	11.4	11.4	10.6	12.5	23.5	5.0
	4	9.3	9.8	7.0	9.6	8.3	11.8	10.6	15.5	4.4
	5	9.2	9.3	6.9	7.1	8.1	9.6	8.5	14.0	3.1
Super- phosphate	1	22.5	18.4	10.0	13.5	14.2	12.6	22.0	39.7	11.2
	2	23.3	12.9	10.0	15.6	18.1	12.0	20.0	33.7	7.8
	3	17.0	14.8	9.4	10.8	15.1	14.3	22.3	34.0	4.3
	4	20.2	10.9	11.6	7.1	13.7	15.4	19.2	36.7	6.9
	5	20.5	13.3	7.5	11.0	17.1	12.6	18.3	35.9	6.6
Gafsa Rock Phosphate	1	17.7	7.8	9.0	6.2	16.6	12.8	20.8	31.6	7.2
	2	16.1	12.0	9.3	9.7	17.7	8.5	18.7	31.4	5.8
	3	16.1	10.7	8.4	3.6	14.8	10.4	19.2	32.3	8.4
	4	18.5	11.5	6.7	10.2	15.4	11.2	16.9	37.1	5.4
	5	24.9	10.4	5.4	15.6	11.8	8.9	18.3	29.0	7.2

In 1941 the ryegrass failed and the plots were resown with barley, which was cut for hay.

Wheat Grain: cwt. per acre

Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F.Y.M.	1	23.9	26.0	18.0	19.9	24.9	14.1	24.6	22.5	12.7
	2	19.3	20.1	16.4	17.8	20.0	7.8	22.2	17.3	11.2
	3	15.4	16.3	15.4	19.0	15.6	12.1	17.9	12.0	10.4
	4	16.2	17.4	12.5	14.6	15.0	8.2	19.4	14.6	7.8
	5	14.6	18.1	14.1	14.9	14.0	7.9	18.1	17.3	8.9
Manure as Adco	1	19.3	26.3	17.7	22.9	24.0	14.1	27.5	22.7	12.8
	2	17.0	18.9	15.1	18.5	14.9	10.4	19.4	19.1	11.1
	3	16.4	16.3	15.6	17.4	15.9	9.2	19.3	14.4	9.1
	4	12.6	16.3	13.7	23.4	15.8	11.6	16.9	12.2	9.2
	5	17.4	16.8	12.1	15.1	12.7	9.9	15.6	12.6	7.3
Manure as Straw	1	23.9	28.7	24.4	16.9	28.4	18.9	30.3	28.7	11.3
	2	17.4	19.1	13.7	13.9	17.0	6.4	20.0	14.1	11.2
	3	15.8	18.2	14.0	18.2	16.1	12.1	20.8	16.4	10.6
	4	17.4	25.7	16.2	18.1	16.2	7.3	17.7	12.6	10.3
	5	14.3	18.8	11.9	18.4	14.0	7.6	17.4	14.7	8.9
Super- Phosphate	1	22.7	18.8	16.5	20.6	21.4	9.4	22.1	15.9	8.6
	2	21.4	19.3	17.4	17.8	17.9	10.2	21.0	12.0	11.3
	3	19.4	21.8	17.9	20.1	22.2	11.0	22.1	16.0	9.0
	4	19.2	21.9	18.1	19.5	21.6	11.3	22.6	16.2	10.9
	5	21.3	21.4	18.9	21.0	21.4	9.5	23.4	17.9	10.2
Gafsa Rock	1	19.6	24.7	16.1	18.9	20.4	12.8	19.2	15.7	9.0
	2	22.5	21.6	14.5	19.9	20.2	17.1	21.2	17.7	7.5
	3	16.9	23.6	19.1	19.9	19.6	15.5	21.1	20.5	6.7
	4	21.7	21.6	18.0	22.0	21.0	15.9	21.9	16.1	2.4
	5	19.8	22.2	18.2	18.8	18.2	12.6	16.9	15.8	9.2

Four Course Rotation Experiment

		Wheat Straw: cwt. per acre									
Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947	
Manure as F. Y. M.	1	33.6	36.7	22.2	32.7	38.0	27.5	35.9	43.1	16.8	
	2	26.9	25.7	20.1	24.6	28.5	12.1	31.2	35.3	13.4	
	3	20.9	21.5	17.3	26.5	20.3	16.5	24.7	27.4	15.8	
	4	26.3	24.9	14.4	20.9	26.1	11.7	25.7	34.3	10.0	
	5	27.2	21.0	15.8	23.2	18.3	10.8	25.7	32.4	10.8	
Manure as Adco	1	36.4	36.2	24.4	32.1	36.6	23.6	41.4	43.5	22.2	
	2	23.3	22.4	17.4	25.0	25.3	14.7	27.1	36.4	17.7	
	3	25.0	21.4	19.5	22.6	29.7	13.2	26.2	28.7	12.2	
	4	26.6	21.3	16.9	32.5	22.2	13.7	22.1	24.9	13.3	
	5	25.8	21.1	13.9	21.9	22.5	13.9	20.2	25.5	10.0	
Manure as Straw	1	35.8	40.9	34.7	25.1	44.6	29.8	49.8	50.7	24.6	
	2	23.7	21.6	16.9	20.4	29.9	8.8	27.4	28.2	13.2	
	3	35.6	23.2	17.0	24.9	22.4	16.5	29.7	32.3	13.4	
	4	24.4	31.7	18.1	24.4	22.5	10.3	26.1	27.0	14.5	
	5	20.9	22.0	15.2	24.5	19.3	10.8	23.9	28.9	11.3	
Super- phosphate	1	33.0	24.3	20.4	27.8	33.2	12.9	30.3	30.1	15.1	
	2	33.2	25.8	22.2	26.0	31.0	12.7	30.3	23.9	16.4	
	3	34.5	28.2	21.1	32.3	30.4	14.7	30.6	31.3	13.0	
	4	27.7	30.5	22.0	26.6	32.7	13.9	33.2	30.7	14.4	
	5	32.3	27.1	22.6	31.8	28.7	12.7	32.1	37.2	14.9	
Gafsa Rock Phosphate	1	27.3	31.3	20.7	23.6	30.3	16.9	30.1	30.5	16.1	
	2	29.9	27.3	18.0	28.1	35.7	20.8	29.6	35.4	9.5	
	3	35.9	29.5	22.8	26.3	28.7	16.7	31.3	39.3	9.8	
	4	30.3	28.7	21.4	28.8	33.4	18.4	32.4	32.5	4.5	
	5	32.6	31.7	21.2	25.8	26.7	14.7	24.0	31.1	12.8	

Annual Report

Year	1907	1908	1909	1910	1911	1912	1913	1914	1915	Year of Cycle	Notes
1	10.5	11.2	12.0	12.8	13.5	14.2	15.0	15.8	16.5	1	
2	17.0	18.5	19.8	21.0	22.2	23.5	24.8	26.0	27.2	2	
3	23.5	25.5	27.5	29.5	31.5	33.5	35.5	37.5	39.5	3	
4	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0	4	
5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	57.5	60.5	5	
6	43.0	46.5	50.0	53.5	57.0	60.5	64.0	67.5	71.0	6	
7	49.5	53.5	57.5	61.5	65.5	69.5	73.5	77.5	81.5	7	
8	56.0	60.5	65.0	69.5	74.0	78.5	83.0	87.5	92.0	8	
9	62.5	67.5	72.5	77.5	82.5	87.5	92.5	97.5	102.5	9	
10	69.0	74.5	80.0	85.5	91.0	96.5	102.0	107.5	113.0	10	
11	75.5	81.5	87.5	93.5	99.5	105.5	111.5	117.5	123.5	11	
12	82.0	88.5	95.0	101.5	108.0	114.5	121.0	127.5	134.0	12	
13	88.5	95.5	102.5	109.5	116.5	123.5	130.5	137.5	144.5	13	
14	95.0	102.5	110.0	117.5	125.0	132.5	140.0	147.5	155.0	14	
15	101.5	109.5	117.5	125.5	133.5	141.5	149.5	157.5	165.5	15	
16	108.0	116.5	125.0	133.5	142.0	150.5	159.0	167.5	176.0	16	
17	114.5	123.5	132.5	141.5	150.5	159.5	168.5	177.5	186.5	17	
18	121.0	130.5	140.0	149.5	159.0	168.5	178.0	187.5	197.0	18	
19	127.5	137.5	147.5	157.5	167.5	177.5	187.5	197.5	207.5	19	
20	134.0	144.5	155.0	165.5	176.0	186.5	197.0	207.5	218.0	20	
21	140.5	151.5	162.5	173.5	184.5	195.5	206.5	217.5	228.5	21	
22	147.0	158.5	169.5	180.5	191.5	202.5	213.5	224.5	235.5	22	
23	153.5	165.0	176.5	187.5	198.5	209.5	220.5	231.5	242.5	23	
24	160.0	171.5	183.0	194.0	205.0	216.0	227.0	238.0	249.0	24	
25	166.5	178.5	190.0	201.0	212.0	223.0	234.0	245.0	256.0	25	
26	173.0	185.0	196.5	207.5	218.5	229.5	240.5	251.5	262.5	26	
27	179.5	192.0	203.5	214.5	225.5	236.5	247.5	258.5	269.5	27	
28	186.0	199.0	210.5	221.5	232.5	243.5	254.5	265.5	276.5	28	
29	192.5	206.0	217.5	228.5	239.5	250.5	261.5	272.5	283.5	29	
30	199.0	213.0	224.5	235.5	246.5	257.5	268.5	279.5	290.5	30	

SIX COURSE ROTATION EXPERIMENT

ROTHAMSTED, Long Hoos IV, and WOBURN, Stackyard Field, Series B.

Experiment begun in 1930 (Rothamsted) and 1929 (Woburn)

Seasonal effects of N, P₂O₅ and K₂O

The six crops of the rotation are sugar beet, barley, clover hay, wheat, potatoes and rye. Both at Rothamsted and Woburn there are fifteen plots under each crop in any year, and each plot receives one of the three common fertilizers, sulphate of ammonia, superphosphate and muriate of potash, at one of five levels. The rates of application of fertilizers are

N and P₂O₅: 0.00, 0.15, 0.30, 0.45, 0.60 cwt. per acreK₂O: 0.00, 0.25, 0.50, 0.75, 1.00 cwt. per acre

Plots do not receive the same treatment throughout, but on each plot the fifteen treatments follow one another in a definite order in successive years, and in this way cumulative effects of treatments are avoided.

Area of each plot: Rothamsted 0.025 acre Woburn 0.0271 acre.

Details of the experiment are as given in the 1932 Report, p.131, except that since 1934 the forage crop has been replaced by rye, harvested as a mature crop, and that the green manure crops are now omitted. Since 1934 lime has been applied at the rate of 10 cwt. per acre at two stages in the rotation: immediately after the removal of the potato crop and before sowing barley.

The increments given in the following tables are linear regressions of yield on quantity of fertilizer.

Crop Notes

	ROTHAMSTED			WOBURN		
	Variety	Sown	Harvested	Variety	Sown	Harvested
Sugar beet						
1939	Kuhn	Apr. 22	Oct. 24	Kuhn	May 4	Nov. 14
1940	"	May 3	Nov. 26	"	" 6	" 19
1941	"	Apr. 30	" 3	"	Apr. 29	Dec. 12
1942	Klein E.	" 24	Oct. 23	"	" 22	" 9
1943	" "	" 14	" 14	Klein E.	" 17	" 17
1944	" "	" 21	" 20	" "	May 4	" 18
1945	" "	" 12	" 18	" "	" 3	Nov. 28
1946	" "	" 13	" 22	" "	Apr. 16	Oct. 12
1947	" "	" 26	" 16	" "	May 3	" 17

	ROTHAMSTED				WOBURN	
	Variety	Sown	Harvested	Variety	Sown	Harvested
Barley						
1939	Plumage Archer	Mar. 7	Aug. 16	Plumage Archer	Mar. 1	Aug. 30
1940	" "	" 9	" 3	" "	" 9	" 30
1941	" "	" 25	Sep. 2	" "	" 17	" 27
1942	" "	" 25	Aug. 17	" "	Apr. 1	" 13
1943	" "	" 2	" 7	" "	Mar. 4	Jul. 29
1944	" "	" 6	" 8	" "	" 14	Aug. 28
1945	" "	" 26	" 6	" "	" 5	" 2
1946	" "	" 20	" 15	" "	" 19	" 22
1947	" "	Apr. 12	" 8	" "	Apr. 17	" 6
Clover						
1939	Crimson Clover	Apr. 24 [‡]	Jul. 28	Broad Red	31.3.38, 14.9.38	Jun. 9
1940	Montgomery Red	23.4.39	Jun. 17	" "	17.4.39	" 20
1941	" "	May 3 [‡]	Aug. 25	" "	6.5.40	Jul. 10
1942	" "	9.5.41	Jun. 27	" "	5.5.41	Jun. 26
1943	" "	7.5.42	Jul. 15	" "	20.5.42	" 7
1944	" "	Mar. 27	" 28	" "	16.4.43	" 5
1945	Crimson Clover	12.9.44	Jun. 13	" "	Mar. 7 [‡]	Aug. 3
1946	Montgomery Red	28.3.45	" 22	Montgomery Red	23.4.45	Jul. 22
1947	" "	15.4.46	" 18	" "	2.5.46	Jun. 17
	‡ Second sowing; first sowing failed					
Wheat						
1939	Yeoman	22.10.38	Aug. 12	Yeoman	31.10.38	Aug. 14
1940	" "	21.10.39	" 6	" "	1.11.39	" 12
1941	" "	29.10.40	" 22	" "	28.10.40	" 14
1942	" "	27.10.41	" 12	" "	21.11.41	" 19
1943	" "	10.10.42	" 2	Eaten by rats		
1944	" "	4.10.43	" 3	Yeoman	11.10.43	Aug. 10
1945	" "	26.10.44	" 6	Crop failed		
1946	" "	17.10.45	" 9	Yeoman	15.10.45	Aug. 21
1947	" "	18.10.46	" 5	Squareheads Master	5.11.46	" 6
Potatoes						
1939	Ally	Apr. 17	Sep. 18	Ally	Apr. 12	Sep. 8
1940	" "	" 26	" 23	" "	Mar. 30	Sep. 17
1941	" "	" 29	Oct. 2	" "	Apr. 17	Oct. 3
1942	Majestic	" 21	" 2	Majestic	" 16	" 1
1943	" "	" 9	Sep. 17	" "	" 12	Sep. 20
1944	" "	Mar. 28	" 29	" "	May 5	Oct. 3
1945	" "	" 29	" 22	" "	Apr. 24	" 4
1946	" "	" 29	Oct. 2	" "	" 24	" 3
1947	" "	May 2	Sep. 29	" "	May 12	" 2
Rye						
1939		8.11.38	Aug. 12		31.10.38	Aug. 11
1940		23.10.39	" 3		1.11.39	" 2
1941		29.10.40	" 14		22.10.40	" 7
1942		28.10.41	" 4		21.11.41	" 1
1943		13.10.42	Jul. 24		10.11.42	Jul. 29
1944		2.10.43	" 22		12.10.43	" 30
1945		2.11.44	" 30		10.11.44	Aug. 3
1946		16.10.45	Aug. 1		5.10.45	" 19
1947		18.10.46	Jul. 29		6.11.46	Jul. 29

Mean yields and increments in yield per cwt. of N, P₂O₅ and K₂O

Sugar Beet					WOBURN			
ROTHAMSTED					WOBURN			
	Mean Yield	N	P ₂ O ₅	K ₂ O	Mean Yield	N	P ₂ O ₅	K ₂ O
Roots (Washed): tons per acre								
1939	9.98	2.16	-1.07	2.03	8.76	3.75	-1.71	0.44
1940	8.25	3.64	-2.67	-0.24	5.84	2.40	-0.39	0.79
1941	9.30	4.17	0.47	0.83	7.87	3.11	-1.19	0.81
1942	12.48	0.76	-0.35	0.39	6.78	-0.24	-5.33	1.53
1943	12.21	7.36	-1.29	-1.05	7.54	9.52	-0.98	-1.52
1944	6.45	-1.25	2.75	2.26	11.56	4.53	1.60	-1.24
1945	12.44	5.06	-2.01	0.38	12.75	6.47	-2.47	3.12
1946	11.18	3.71	-0.99	-0.16	5.11	2.97	-2.83	0.33
1947	6.80	-1.88	2.55	0.62	8.06	-1.23	1.93	0.26
Sugar Percentage								
1939	17.86	1.00	-0.20	1.33	18.25	10.05 -0.05	0.18	-0.10
1940	19.25	-0.25	0.75	0.04	18.66	-1.52	-0.13	0.07
1941	19.52	-0.01	0.81	0.77	18.35	-0.71	-0.52	0.20
1942	17.92	-2.87	1.46	0.90	17.88	-0.59	-0.97	-0.04
1943	18.56	-1.16	0.45	-0.03	17.67	-1.27	-0.40	-0.44
1944	16.58	-1.79	2.63	1.32	17.76	-0.35	-0.09	0.26
1945	19.24	1.07	-0.27	0.42	17.98	-0.41	0.57	0.56
1946	18.10	-0.85	-0.16	0.36	19.50	0.11	0.82	0.80
1947	19.22	-0.65	-1.76	0.26	20.06	0.10	0.53	1.01
Total Sugar: cwt. per acre								
1939	35.7	9.6	-4.1	9.9	32.0	13.5	-5.9	1.4
1940	31.8	13.3	-8.9	-0.9	21.7	7.0	-1.6	3.0
1941	36.3	16.3	3.3	4.8	28.9	10.3	-5.2	3.3
1942	44.7	-4.4	2.6	3.5	24.2	-1.5	-20.0	5.2
1943	45.3	24.4	-4.0	-4.0	26.6	31.5	-4.1	-6.0
1944	21.4	-6.3	12.5	9.4	41.1	15.2	5.6	-3.9
1945	47.9	21.6	-8.5	2.6	45.9	22.0	-7.6	12.4
1946	40.4	11.4	-4.0	0.2	19.9	11.7	-10.3	2.2
1947	26.2	-8.4	7.4	2.8	32.3	-4.7	8.6	2.6
Tops: tons per acre								
1939	11.01	3.40	-1.00	-0.32	5.73	2.42	-0.52	-0.62
1940	4.81	2.25	-0.98	-0.25	2.93	0.98	-0.65	0.42
1941	8.92	8.18	-0.22	-0.86	6.03	4.47	-1.41	0.52
1942	12.73	9.99	-3.08	-1.28	2.78	-0.51	-1.66	0.49
1943	6.94	8.75	1.82	-0.93	3.62	3.71	1.84	-0.28
1944	9.31	3.95	0.35	1.84	5.95	1.37	3.61	-2.70
1945	10.46	7.20	1.22	1.06	4.82	3.49	-0.73	1.94
1946	9.98	8.97	2.33	0.10	3.27	2.80	-1.65	-0.46
1947	4.28	1.37	1.63	0.04	3.56	0.93	1.00	0.21

Mean yields and increments in yield per cwt. of N, P₂O₅ and K₂O

ROTHAMSTED					WOBURN			
Mean Yield	N	P ₂ O ₅	K ₂ O	Mean Yield	N	P ₂ O ₅	K ₂ O	
Barley Grain: cwt. per acre								
1939	38.3	18.5	7.1	-1.9	21.6	8.1	-6.7	7.1
1940	30.4	19.6	-3.9	-0.2	22.3	13.9	9.9	-0.3
1941	28.5	11.7	6.0	-1.6	16.4	5.4	2.1	-4.9
1942	31.0	21.3	-3.7	1.4	25.0	22.4	8.5	-1.0
1943	32.4	10.6	2.3	0.6	15.1	15.7	0.5	2.2
1944	30.8	13.7	3.8	-0.9	19.4	9.5	-5.4	7.1
1945	30.7	10.9	2.7	2.2	16.0	12.7	-3.5	-5.4
1946	33.0	7.1	-6.3	0.4	24.0	8.9	-1.1	-1.3
1947	27.5	14.7	-5.2	-3.8	18.4	26.7	5.1	-1.0
Barley Straw: cwt. per acre								
1939	41.8	17.1	9.5	0.6	32.7	20.1	-3.6	-8.4
1940	31.6	24.5	2.7	0.6	21.7	33.9	8.5	0.1
1941	30.4	16.0	10.9	-2.6	21.7	8.7	-2.8	-0.8
1942	31.8	26.9	-2.5	4.4	34.0	38.5	6.0	-3.6
1943	33.6	17.4	1.7	-1.0	30.7	31.7	-4.9	8.4
1944	29.7	20.2	8.0	-0.9	19.0	16.4	-6.1	4.8
1945	33.1	6.6	0.7	0.3	21.0	20.5	1.3	-4.1
1946	43.5	22.6	-7.3	0.5	24.6	15.4	-2.9	-4.4
1947	26.1	19.9	-4.3	-2.0	16.9	19.9	-2.7	-5.2
Clover Hay. Dry matter: cwt. per acre								
1939	22.3	9.4	4.7	2.9	25.1	-12.3	13.7	-1.7
1940	39.6	9.5	5.1	2.3	42.5	1.5	4.8	4.1
1941	19.8	6.4	-0.3	-0.4	21.0	-7.7	3.6	-4.5
1942	23.5	4.7	-4.3	-4.7	21.6	-7.4	11.5	3.7
1943	40.4	9.3	-14.5	6.6	15.6	20.7	-2.9	-4.4
1944	15.6	6.2	0.3	6.2	6.6	11.6	-3.9	1.8
1945	36.3	4.9	-1.4	-0.9	27.5	12.5	1.3	5.9
1946	31.9	21.3	13.8	-6.6	55.0	4.7	-8.7	-2.3
1947	32.0	1.8	-2.5	0.7	23.9	12.1	-2.9	1.7
Potatoes: Total tubers, tons per acre								
1939	8.10	1.31	2.60	2.35	6.86	6.39	0.57	-0.03
1940	6.72	1.38	3.01	2.12	7.07	5.20	2.68	1.00
1941	9.24	5.79	0.63	0.64	8.52	9.63	-4.29	-0.83
1942	9.47	1.95	-0.33	3.71	8.46	4.72	4.03	-0.25
1943	8.50	4.29	0.15	2.50	5.90	3.55	1.07	-1.15
1944	10.07	6.38	2.05	0.84	9.98	2.07	4.97	-2.10
1945	9.55	3.79	-0.95	3.59	10.61	5.46	-2.05	0.90
1946	10.75	7.97	-1.73	2.49	6.60	6.35	-1.79	-2.51
1947	5.69	1.52	1.61	1.29	6.51	1.42	-1.02	2.90

Six Course Rotation Experiment

	ROTHAMSTED				WOBURN			
	Mean Yield	N	P ₂ O ₅	K ₂ O	Mean Yield	N	P ₂ O ₅	K ₂ O
<u>Wheat. Grain: cwt. per acre</u>								
1939	27.7	0.7	-5.8	0.2	23.3	-1.1	9.7	-3.1
1940	27.7	11.7	-1.5	-1.6	18.7	16.6	-7.1	0.2
1941	19.3	6.1	-10.2	-4.3	19.5	11.4	10.7	1.4
1942	37.2	10.5	2.8	-1.4	10.8	10.5	13.4	-3.6
1943	36.8	3.9	-0.5	3.8	(Crop eaten by rats in barn)			
1944	41.1	11.9	-1.5	-1.6	9.9	6.3	0.6	1.2
1945	25.8	12.3	2.1	1.2	(Crop failed)			
1946	29.2	13.8	12.7	-2.4	13.4	16.5	1.7	2.7
1947	25.1	10.1	-0.4	0.5	9.5	8.2	-7.3	5.3
<u>Wheat Straw: cwt. per acre</u>								
1939	48.0	22.7	-1.1	-0.3	35.5	8.7	20.2	-6.3
1940	34.1	23.9	-1.9	-1.6	32.3	28.5	-5.7	-2.2
1941	24.3	9.5	-11.3	-3.3	31.3	24.2	17.6	3.3
1942	44.8	14.8	3.5	-1.0	20.7	13.9	11.6	0.0
1943	49.0	5.1	-1.7	3.9	(Crop eaten by rats in barn)			
1944	52.8	15.4	-14.1	-1.5	29.7	10.5	-3.2	6.5
1945	36.8	22.9	0.7	1.8	(Crop failed)			
1946	47.3	19.3	18.7	-3.5	22.4	25.9	-2.1	6.6
1947	27.5	15.0	0.9	-1.6	15.4	14.8	-7.3	6.5
<u>Rye Grain: cwt. per acre</u>								
1939	22.1	19.9	1.2	0.0	15.7	11.2	0.5	0.7
1940	26.8	11.1	-0.3	0.1	20.3	13.6	1.7	-0.3
1941	16.7	10.5	0.3	-4.0	18.9	5.1	-3.7	1.0
1942	27.8	24.4	-0.3	-2.0	23.7	33.8	-4.5	-3.6
1943	32.2	27.5	-7.1	1.5	8.7	13.3	2.7	0.0
1944	31.0	15.9	-1.5	-2.6	17.1	17.6	3.1	0.4
1945	25.7	12.9	-0.9	2.3	14.2	11.5	-1.1	-1.7
1946	29.4	10.4	-3.1	0.4	14.8	9.1	-2.9	-3.5
1947	15.8	9.8	1.5	1.2	14.9	21.3	2.7	-2.0
<u>Rye Straw: cwt. per acre</u>								
1939	42.8	32.9	7.7	-2.1	33.3	28.6	-6.1	3.5
1940	36.7	19.5	-0.6	-1.3	37.7	30.3	-1.9	3.2
1941	25.3	17.1	2.2	-1.9	36.3	15.1	-0.5	5.0
1942	36.5	24.3	2.3	1.6	42.2	53.2	-6.3	-5.9
1943	47.0	32.7	-9.9	2.9	25.5	28.9	7.4	-6.8
1944	62.3	11.6	2.8	-3.0	37.8	31.3	2.3	0.7
1945	32.7	14.7	0.7	1.6	29.1	26.5	5.1	-0.2
1946	55.7	17.5	-5.9	-2.5	26.3	16.3	1.7	-3.3
1947	21.8	11.4	1.6	-2.4	18.3	26.9	-8.9	3.3

LONG PERIOD CULTIVATION EXPERIMENT

Long Hoos V, 1934-39

This experiment was completed in 1939. The results were reported by E.W. Russell and B.A. Keen in "Studies in Soil Cultivation - X. The results of a six-year cultivation experiment". J. Agric. Sci., 31, (1941), 326.

The experiment was designed to compare the effects on crop yield and weed infestation of continued ploughing, rotary cultivation with the Simar implement and stirring the soil with a cultivator, and also to investigate the value of cyanamide as a weed-killer. The crops grown in rotation were wheat, mangolds, barley, there being four blocks of twelve plots each under each crop. The twelve treatments were made up of all combinations of:-

Ploughing (P), Simaring (S) or Cultivating (C)
Shallow cultivation (4 ins.) (Sh) or deep cultivation (8 ins.) (D)
Cyanamide (Cy) or Nitrochalk (N)

On two of the four blocks the treatments were continued on the same plots in successive years, while on the other two blocks cycles of cultivations and manuring were used.

Area of each plot, 0.015 acre.

A basal dressing of 0.75 cwt. P_2O_5 per acre (as superphosphate) and 1.0 cwt. K_2O per acre (as muriate of potash) was given to all plots growing mangolds.

Details of the experiment are as given in the 1934 Report, p. 175.

Crop Notes

	Wheat	Mangolds	Barley
Variety	Wilhelmina	Yellow Globe	Plumage Archer
Previous crop	Barley	Wheat	Mangolds
Date sown	24/10/38	April 25	March 20
Harvested	Aug. 18	Oct. 25	Aug. 29

Standard errors per plot:

Wheat Grain, 0.950 cwt. per acre or 3.6%, 11 d.f.
Mangolds Roots, 1.539 tons per acre or 6.6%, 11 d.f.
Barley Grain, 1.313 cwt. per acre or 6.9%, 11 d.f.

1939

1938 1939	Continuous			Mean	Cycle A			Cycle B			Mean	
	P	S	C		C	P	S	S	C	P		
	P	S	C		P	S	C	P	S	C		
Wheat Grain: cwt. per acre												
		± 0.67		± 0.39		± 0.95			± 0.95		± 0.39	
N	D	31.3	25.0	24.3	26.9	22.5	27.3	21.4	29.3	26.6	22.8	25.0
	Sh	28.6	26.5	22.8	26.0	27.6	26.6	24.7	27.5	25.0	22.3	25.6
Cy	D	29.8	23.8	23.6	25.7	27.6	25.9	26.6	29.5	23.7	25.8	26.5
	Sh	25.4	24.5	26.6	25.5	29.3	26.2	24.6	23.7	21.0	23.9	24.8
Wheat Straw: cwt. per acre												
N	D	45.4	36.5	34.0	38.6	52.9	51.6	41.9	46.7	40.7	34.6	44.7
	Sh	42.5	39.4	34.0	38.6	43.8	44.7	43.8	42.1	39.5	33.4	41.2
Cy	D	46.3	36.6	35.0	39.3	41.5	45.4	40.7	44.8	34.3	38.0	40.8
	Sh	43.7	35.6	40.7	40.0	45.0	39.3	42.7	34.3	31.3	38.8	38.6
Mangolds Roots: tons per acre												
		± 1.09		± 0.63		± 1.54			± 1.54		± 0.63	
N	D	24.98	22.29	23.56	23.61	25.30	25.19	23.85	28.26	23.21	27.16	25.50
	Sh	26.20	23.21	21.88	23.76	26.46	23.50	24.72	24.20	21.94	26.99	24.64
Cy	D	24.46	23.30	23.07	23.61	28.03	23.74	23.91	29.48	25.30	22.63	25.52
	Sh	24.93	21.13	19.01	21.69	24.72	26.99	24.96	22.87	21.12	24.61	24.21
Mangolds Tops: tons per acre												
N	D	5.72	5.37	6.15	5.75	6.27	5.57	6.04	5.80	5.28	6.62	5.93
	Sh	5.86	5.98	5.69	5.84	5.75	6.04	5.80	5.57	4.87	6.44	5.74
Cy	D	6.09	5.92	5.69	5.90	5.75	5.80	5.80	7.08	5.69	5.11	5.87
	Sh	6.56	5.51	5.40	5.82	5.46	6.04	5.98	5.80	4.99	5.57	5.64
Barley Grain: cwt. per acre												
		± 0.93		± 0.54		± 1.31			± 1.31		± 0.54	
N	D	19.8	22.6	17.1	19.8	23.6	21.5	19.2	23.6	22.6	18.8	21.6
	Sh	22.6	18.6	15.7	19.0	22.1	24.1	19.9	24.7	16.4	20.4	21.3
Cy	D	23.6	20.6	16.4	20.2	23.1	21.7	20.5	25.2	20.1	21.7	22.0
	Sh	21.5	16.2	14.1	17.3	22.5	19.2	16.8	19.3	18.0	20.8	19.4
Barley Straw: cwt. per acre												
N	D	24.3	26.2	22.0	24.2	25.1	23.7	23.8	28.6	25.0	24.1	25.0
	Sh	27.2	23.2	16.8	22.4	22.1	25.8	27.7	28.7	21.9	23.7	25.0
Cy	D	25.7	24.6	21.6	24.0	27.4	24.1	25.3	28.1	22.8	25.3	25.5
	Sh	25.2	20.0	17.5	20.9	25.1	22.6	21.5	24.8	18.6	22.8	22.6

Standard errors are based on 11 d. f.

Long Period Cultivation ExperimentMean of Nitrochalk and Cyanamide
1939

1938 1939	Continuous				Cycle A			Cycle B			Mean
	P	S	C	Mean	C	P	S	S	C	P	
	P	S	C	Mean	P	S	C	P	S	C	Mean
Wheat Grain: cwt. per acre											
D		± 0.48		± 0.27		± 0.67			± 0.67		± 0.27
Sh	30.6	24.4	24.0	26.3	25.0	26.6	24.0	29.4	25.2	24.3	25.8
	27.0	25.5	24.7	25.7	28.4	26.4	24.6	25.6	23.0	23.1	25.2
Mean	28.8	25.0	24.4	26.1	26.7	26.5	24.3	27.5	24.1	23.7	25.5
		± 0.34				± 0.48			± 0.48		
Wheat Straw: cwt. per acre											
D	45.8	36.6	34.5	39.0	47.2	48.5	41.3	45.8	37.5	36.3	42.8
Sh	43.1	37.5	37.4	39.3	44.4	42.0	43.2	38.2	35.4	36.1	39.9
Mean	44.4	37.0	36.0	39.2	45.8	45.2	42.2	42.0	36.4	36.2	41.3
Mangolds: Roots: tons per acre											
D		± 0.77		± 0.44		± 1.09			± 1.09		± 0.44
Sh	24.72	22.80	23.32	23.61	26.66	24.46	23.88	28.87	24.26	24.90	25.50
	25.56	22.17	20.44	22.72	25.59	25.24	24.84	23.54	21.53	25.80	24.42
Mean	25.14	22.48	21.88	23.17	26.12	24.85	24.36	26.20	22.90	25.35	24.96
		± 0.54				± 0.77			± 0.77		
Mangolds Tops: tons per acre											
D	5.90	5.64	5.92	5.82	6.01	5.68	5.92	6.44	5.48	5.86	5.90
Sh	6.21	5.74	5.54	5.83	5.60	6.04	5.89	5.68	4.93	6.00	5.69
Mean	6.06	5.69	5.73	5.83	5.80	5.86	5.90	6.06	5.20	5.93	5.79
Barley Grain: cwt. per acre											
D		± 0.66		± 0.38		± 0.93			± 0.93		± 0.38
Sh	21.7	21.6	16.8	20.0	23.4	21.6	19.8	24.4	21.4	20.2	21.8
	22.0	17.4	14.9	18.1	22.3	21.6	18.4	22.0	17.2	20.6	20.4
Mean	21.8	19.5	15.8	19.0	22.8	21.6	19.1	23.2	19.3	20.4	21.1
		± 0.46				± 0.66			± 0.66		
Barley Straw: cwt. per acre											
D	25.0	25.4	21.8	24.1	26.2	23.9	24.6	28.4	23.9	24.7	25.3
Sh	26.2	21.6	17.2	21.7	23.6	24.2	24.6	26.8	20.2	23.2	23.8
Mean	25.6	23.5	19.5	22.9	24.9	24.0	24.6	27.6	22.0	24.0	24.5

Standard errors are based on 11 d. f.

State of Illinois and University

Year	Continuum			Series A			Series B		
	1	2	3	1	2	3	1	2	3
1934	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1935	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1936	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1937	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1938	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1939	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1940	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1941	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1942	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1943	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1944	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1945	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1946	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1947	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1948	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1949	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1950	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1951	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1952	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1953	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1954	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1955	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1956	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1957	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1958	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1959	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1960	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1961	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1962	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1963	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1964	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1965	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1966	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1967	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1968	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1969	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1970	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2

DEEP CULTIVATION ROTATION EXPERIMENT

Long Hoos I and II (begun in 1944)

- (1) To compare deep ploughing (about 12 inches) with shallow ploughing (about 6 inches).
- (2) A test of dung ploughed in at different depths.
- (3) To compare ploughing in mineral fertilizers (superphosphate and muriate of potash) at different depths with applying them in the seed bed.

The crops of the six course rotation are sugar beet, barley, one year seeds, wheat, potatoes, oats. There are six series, one for each crop of the rotation. Each series has 16 main plots for the ploughing, dung, P and K treatments. The main plots are divided into two to test the depth of application of mineral fertilizers to sugar beet and potatoes. Each plot receives the same treatment throughout the experiment.

System of replication: 2 blocks of 8 plots each in each series, the four-factor interaction of main plot treatments being confounded with block differences.

Area of each whole plot: 0.0132 acre, before rejecting edge rows.

Treatments

Whole plots: All combinations of:-

- (1) Shallow (6") v. Deep (12") ploughing. Ploughing treatments on stubbles in Autumn for sugar beet and potatoes, on seeds aftermath for wheat.

(2) No dung v. dung ploughed in	Sugar Beet 10 tons	Potatoes 20 tons
(3) No phosphate v. superphosphate	0.6 cwt. P_2O_5	0.8 cwt. P_2O_5
(4) No potash v. muriate of potash	0.6 cwt. K_2O	1.0 cwt. K_2O

(all amounts per acre)

Half plots (Sugar beet and potatoes only): -

Minerals (PK combinations) ploughed in v. minerals in seed bed.

Basal manuring: Applied in the ridges for potatoes, as a top dressing to wheat and in the seed bed for other crops.

Basal Manuring (continued)

	Sugar beet	Barley	Ley	Wheat	Potatoes	Bc/1.2 Spring Oats
Sulphate of Ammonia (cwt. N per acre)	0.8	0.3	-	0.5	0.6	0.2
Basic Slag (cwt. P ₂ O ₅ per acre)	-	0.6	-	-	-	-

Non-experimental Cultivations: These are carried out over the whole of any series, with the proviso that they must not be deeper than 6 inches except that deep ploughed plots may be worked to a depth of below 6 inches for the root crops.

Cropping: Series	Preliminary years		Years of complete cropping	
	1944	1945	1946	1947
1	Potatoes	Spring oats	Sugar beet	Barley
2	Sugar beet	Barley	Ley	Wheat
3	(Barley)	(Ley)	Wheat	Potatoes
4	(Wheat)	(Barley)	Potatoes	Spring oats
5	(Wheat)	Potatoes	Spring oats	Sugar beet
6	(Wheat)	Sugar beet	Barley	Ley

(Non-experimental crops in brackets)

The Physics Department has made observations on crop development from 1944 onwards.

Crop Notes

	Sugar beet	Barley	Ley	Wheat	Potatoes	Spring oats
1944						
Sown	Apr. 20				Apr. 5	
Harvested	Oct. 19				Sep. 27	
1945						
Sown	Apr. 13	Mar. 26			Apr. 4	Mar. 22
Harvested	Oct. 22	Aug. 11			Sep. 25	Aug. 16
1946						
Sown	Apr. 13	Mar. 21	27.3.45	Oct. 16	May 1	Mar 21
Harvested	Oct. 24	Aug. 13	Jun. 24	Aug. 12	Oct. 1	Aug. 6
1947						
Sown	Apr. 25	Apr. 12	16.4.46	Oct. 18	May 2	Apr. 11
Harvested	Nov. 1	Aug. 11	Jun. 10	Aug. 1	Sep. 30	Aug. 5
Variety	Klein E	Plumage Archer	Mixture given below	Yeoman	Majestic	Star

Seeds mixture (all amounts per acre): 18 lb. Perennial ryegrass, 6 lb. late flowering red clover, 2 lb. Alsike clover.

Sugar Beet

Roots (washed): tons per acre

	Mean yield	Standard errors	
		per whole plot	per split plot
1944	10.83	0.890 or 8.2%	1.70 or 15.3%, 7 d.f.
1945	15.20	1.03 or 6.8%	0.781 or 5.1%, 7 d.f.
1946	16.21	1.19 or 7.4%	1.61 or 9.7%, 7 d.f.
1947	10.08	0.658 or 6.5%	0.418 or 4.1%, 7 d.f.

Responses to treatments

	Mean	Floughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
<u>1944</u>									
Floughing	±0.44								
deep-									
shallow	0.39	-	-	0.45	0.33	0.59	0.19	0.90	-0.12
Dung	1.00	1.06	0.94	-	-	0.68	1.32	1.48	0.52
Phosphate	0.51	0.71	0.31	0.19	0.83	-	-	0.47	0.55
Potash	0.98	1.49	0.47	1.46	0.50	0.94	1.02	-	-
<u>1945</u>									
Floughing	±0.52								
deep-									
shallow	0.53	-	-	0.80	0.26	1.04	0.02	0.65	0.41
Dung	1.00	1.27	0.73	-	-	1.23	0.77	1.50	0.50
Phosphate	0.61	1.12	0.10	0.84	0.38	-	-	0.34	0.88
Potash	0.21	0.33	0.09	0.71	-0.29	-0.06	0.48	-	-
<u>1946</u>									
Floughing	±0.60								
deep-									
shallow	0.64	-	-	0.72	0.56	0.13	1.15	0.73	0.55
Dung	0.91	0.99	0.83	-	-	2.06	-0.24	1.49	0.33
Phosphate	0.44	-0.07	0.95	1.59	-0.71	-	-	0.13	0.75
Potash	0.79	0.88	0.70	1.37	0.21	0.48	1.10	-	-
<u>1947</u>									
Floughing	±0.33								
deep-									
shallow	3.24	-	-	3.20	3.28	3.45	3.03	3.51	3.17
Dung	2.23	2.19	2.27	-	-	2.19	2.27	2.65	1.81
Phosphate	0.01	0.22	-0.20	-0.03	0.05	-	-	0.65	-0.63
Potash	0.20	0.27	0.13	0.62	-0.22	0.84	-0.44	-	-

Deep Cultivation Rotation Experiment

Ploughing: The plough used for deep cultivations was a Ransome Solotrac giving a depth of 12 inches at least, except in 1944 when a Massey Harris Grub Breaker was used. This could not be made to cut a 12 inch deep furrow at all satisfactorily, the actual depth in that year being 9-12 inches. Until 1947 the whole of the seeds area was ploughed 6" deep after the hay was carted, the deep ploughing being carried out subsequently at the same time as the stubbles were deep ploughed for roots. In autumn 1946 the second ploughing of the seeds could not be carried out owing to wet conditions, so there was no test of deep ploughing on wheat in 1947. In summer 1947 the deep and shallow ploughing treatments were carried out directly on the hay stubble and this will be continued.

Deep Cultivation Rotation Experiment

Sugar Beet

Roots (washed): tons per acre

Time of application of mineral fertilizers

		Superphosphate			Potash			Mean
		None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	
Standard errors:		(a)	(b) & (c)		(a)	(b) & (c)		
<u>1944</u>	Shallow	10.28	10.73	11.25	9.89	11.37	11.41	10.64
	Deep	10.87	11.97	10.39	10.79	12.05	10.46	11.03
	No dung	10.23	10.20	10.61	9.60	11.22	10.88	10.32
	Dung	10.92	12.50	10.99	11.08	12.16	10.99	11.33
	Mean	10.58	11.35	10.81	10.34	11.70	10.94	10.83
<u>1945</u>	Shallow	14.37	15.54	15.43	14.76	15.28	14.91	14.93
	Deep	15.41	15.89	15.13	15.42	15.38	15.64	15.46
	No Dung	14.28	15.35	14.89	14.34	15.13	14.98	14.70
	Dung	15.50	16.09	15.63	15.84	15.53	15.57	15.69
	Mean	14.89	15.72	15.28	15.09	15.33	15.28	15.21
<u>1946</u>	Shallow	15.93	15.93	15.78	15.45	16.46	16.20	15.89
	Deep	16.05	17.03	16.97	16.18	16.51	17.23	16.53
	No dung	14.96	17.12	15.99	15.07	16.14	16.74	15.75
	Dung	17.02	15.85	16.77	16.56	16.83	16.69	16.66
	Mean	15.99	16.48	16.38	15.82	16.49	16.72	16.21
<u>1947</u>	Shallow	8.35	8.86	8.27	8.32	9.17	8.01	8.46
	Deep	11.79	11.50	11.70	11.63	12.04	11.48	11.69
	No dung	8.97	9.12	8.78	8.65	9.99	8.55	8.96
	Dung	11.16	11.24	11.19	11.30	11.23	10.93	11.19
	Mean	10.07	10.18	9.98	9.97	10.61	9.74	10.08
	Standard errors:		(a)		(b)		(c)	
			1944	0.44	0.85		0.74	
			1945	0.52	0.39		0.58	
			1946	0.60	0.80		0.83	
			1947	0.33	0.21		0.36	

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

Sugar Beet
Sugar Percentage

	Mean	Standard errors	
		per whole plot	per split plot
1944	15.73	0.371, 9 d.f.	0.398, 7 d.f.
1945	19.09	0.728, 7 d.f.	1.12, 7 d.f.
1946	15.59	0.480, 10 d.f.	0.500, 7 d.f.

Responses to treatments									
	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
<u>1944</u>									
Ploughing	±0.19					±0.26			
deep shallow	0.05	-	-	-0.24	0.34	-0.11	0.21	0.11	-0.01
Dung	-0.25	-0.54	0.04	-	-	-0.22	-0.28	-0.23	-0.27
Phosphate	0.13	-0.03	0.29	0.16	0.10	-	-	0.28	-0.02
Potash	0.38	0.44	0.32	0.40	0.36	0.53	0.23	-	-
<u>1945</u>									
Ploughing	±0.36					±0.51			
deep-shallow	0.34	-	-	-0.17	0.85	0.18	0.50	0.40	0.28
Dung	-0.19	-0.70	0.32	-	-	-0.25	-0.13	0.02	-0.40
Phosphate	-0.31	-0.47	-0.15	-0.37	-0.25	-	-	-0.45	-0.17
Potash	0.39	0.45	0.33	0.60	0.18	0.25	0.53	-	-
<u>1946</u>									
Ploughing	±0.24					±0.34			
deep shallow	0.16	-	-	-0.11	0.43	0.16	0.16	-0.24	0.56
Dung	-0.28	-0.55	-0.01	-	-	0.08	-0.64	-0.06	-0.50
Phosphate	0.33	0.33	0.33	0.69	-0.03	-	-	0.20	0.46
Potash	0.26	-0.14	0.66	0.48	0.04	0.13	0.39	-	-
<u>1947</u>									
Ploughing									
deep shallow	-0.31	-	-	-0.24	-0.38	-0.53	-0.09	-0.15	-0.47
Dung	-0.01	0.06	-0.08	-	-	-0.10	0.08	-0.23	0.21
Phosphate	-0.01	-0.23	0.21	-0.10	0.08	-	-	-0.10	0.08
Potash	0.32	0.48	0.16	0.10	0.54	0.23	0.41	-	-

Deep Cultivation Rotation Experiment

Sugar Beet
Sugar percentage

Time of application of mineral fertilizers

	Superphosphate			Potash			Mean
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	
Standard errors:	(a)	(b) &	(c)	(a)	(b) &	(c)	
<u>1944</u>							
Shallow	15.72	15.70	15.67	15.48	15.93	15.92	15.70
Deep	15.61	15.88	15.92	15.60	15.78	16.04	15.76
No dung	15.77	15.92	15.94	15.65	16.07	16.03	15.85
Dung	15.55	15.67	15.64	15.42	15.64	15.93	15.60
Mean	15.66	15.79	15.79	15.54	15.86	15.98	15.73
<u>1945</u>							
Shallow	19.16	18.62	18.76	18.70	18.67	19.62	18.92
Deep	19.34	19.39	18.97	19.10	19.77	19.08	19.26
No dung	19.38	18.87	19.13	18.89	19.01	19.96	19.19
Dung	19.12	19.14	18.60	18.90	19.43	18.74	19.00
Mean	19.25	19.01	18.86	18.90	19.22	19.35	19.09
<u>1946</u>							
Shallow	15.34	15.50	15.84	15.58	15.52	15.35	15.51
Deep	15.51	16.06	15.60	15.34	15.99	16.00	15.67
No dung	15.38	16.04	16.10	15.49	16.05	15.88	15.73
Dung	15.47	15.52	15.34	15.43	15.46	15.47	15.45
Mean	15.42	15.78	15.72	15.46	15.76	15.68	15.59
<u>1947</u>							
Shallow	20.47	20.03	20.45	20.11	20.38	20.82	20.36
Deep	19.94	20.14	20.17	19.97	20.10	20.16	20.05
No dung	20.26	20.14	20.17	20.16	20.07	20.44	20.21
Dung	20.16	20.02	20.45	19.92	20.40	20.54	20.20
Mean	20.21	20.08	20.31	20.04	20.24	20.49	20.20

Standard errors:	(a)	(b)	(c)
1944	±0.19	±0.20	±0.23
1945	±0.36	±0.56	±0.54
1946	±0.24	±0.25	±0.30

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

Sugar Beet

Total sugar: cwt. per acre

Standard errors

	Mean yield	per whole plot		per sub-plot	
1944	34.1	3.32 or 9.8%	9 d.f.	6.23 or 17.7%	7 d.f.
1945	58.0	3.87 or 6.7%	8 d.f.	4.37 or 7.5%	7 d.f.
1946	50.5	4.54 or 9.0%	10 d.f.	5.54 or 10.8%	7 d.f.
1947	40.7	2.37 or 5.8%	4 d.f.	1.26 or 3.1%	7 d.f.

Responses to treatments

	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Absent	Present	Absent	Present	Absent	Present
<u>1944</u>									
Ploughing	± 1.66					± 2.35			
deep-shallow	1.4	-	-	1.0	1.8	1.6	1.2	3.1	-0.3
Dung	2.6	2.2	3.0	-	-	1.7	3.5	4.2	1.0
Phosphate	2.0	2.2	1.8	1.1	2.9	-	-	2.2	1.8
Potash	3.9	5.6	2.2	5.5	2.3	4.1	3.7	-	-
<u>1945</u>									
Ploughing	± 1.94					± 2.74			
deep-shallow	3.2	-	-	2.7	3.7	4.7	1.7	3.7	2.7
Dung	3.4	2.9	3.9	-	-	4.2	2.6	5.7	1.1
Phosphate	1.5	3.0	0.0	2.3	0.7	-	-	-0.2	3.2
Potash	1.9	2.4	1.4	4.2	-0.4	0.2	3.6	-	-
<u>1946</u>									
Ploughing	± 2.27					± 3.21			
deep-shallow	2.5	-	-	2.0	3.0	0.9	4.1	1.4	3.6
Dung	1.8	1.3	2.3	-	-	6.4	-2.8	4.4	-0.8
Phosphate	2.5	0.9	4.1	7.1	-2.1	-	-	1.0	4.0
Potash	3.3	2.2	4.4	5.9	0.7	1.8	4.8	-	-
<u>1947</u>									
Ploughing	± 1.19					± 1.68			
deep-shallow	12.4	-	-	12.5	12.3	12.8	12.0	12.9	11.9
Dung	9.0	9.1	8.9	-	-	8.6	9.4	10.1	7.9
Phosphate	0.1	0.5	-0.3	-0.3	0.5	-	-	2.5	-2.3
Potash	1.4	1.9	0.9	2.5	0.3	3.8	-1.0	-	-

Deep Cultivation Rotation Experiment

Sugar Beet

Total sugar: cwt. per acre

	Time of application of mineral fertilizers						Mean
	Superphosphate			Potash			
	None	Ploughed In seed		None	Ploughed In seed		
		in	bed		in	bed	Mean
Standard error (a)		(b) and (c)		(a)	(b) and (c)		Mean
<u>1944</u>							
Shallow	32.3	33.7	35.3	30.6	36.2	36.3	33.4
Deep	33.9	38.3	33.1	33.7	38.1	33.7	34.8
No dung	32.3	32.7	34.0	30.1	36.1	35.0	32.8
Dung	34.0	39.3	34.4	34.3	38.1	35.0	35.4
Mean	33.1	36.0	34.2	32.2	37.2	35.0	34.1
<u>1945</u>							
Shallow	54.8	57.9	57.9	55.2	57.1	58.1	56.4
Deep	59.6	61.7	57.4	58.9	60.9	59.6	59.6
No dung	55.1	57.9	57.0	54.2	57.5	59.3	56.3
Dung	59.3	61.7	58.3	59.9	60.5	58.3	59.6
Mean	57.2	59.8	57.6	57.0	59.0	58.8	58.0
<u>1946</u>							
Shallow	48.8	49.6	49.9	48.1	51.0	49.8	49.3
Deep	49.7	54.6	53.1	49.6	52.8	55.2	51.8
No dung	46.1	54.8	51.6	46.7	51.8	53.4	49.6
Dung	52.5	49.3	51.5	51.1	52.0	51.6	51.4
Mean	49.3	52.1	51.5	48.9	51.9	52.5	50.6
<u>1947</u>							
Shallow	34.2	35.5	33.9	34.5	37.4	33.4	34.4
Deep	47.0	46.3	47.2	46.4	48.4	46.3	46.9
No dung	36.3	36.7	35.3	34.9	40.0	34.8	36.2
Dung	44.9	45.0	45.7	45.0	45.8	44.8	45.1
Mean	40.6	40.9	40.5	39.9	42.9	39.8	40.7
	Standard errors:			(a)	(b)	(c)	
				1944	1.66	3.12	2.76
				1945	1.94	2.18	2.48
				1946	2.27	2.77	3.00
				1947	1.19	0.63	1.27

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

Sugar Beet

Tops: tons per acre

	Mean Yield	Standard errors	
		per whole plot	per sub-plot
1944	16.85	1.32 or 7.9%, 9 d.f.	1.75 or 10.2%, 7 d.f.
1945	16.05	1.27 or 7.9%, 8 d.f.	1.32 or 8.2%, 7 d.f.
1946	18.89	1.08 or 5.7%, 7 d.f.	1.37 or 7.3%, 7 d.f.
1947	7.00	0.281 or 4.0%, 4 d.f.	0.612 or 8.6%, 7 d.f.

Responses to treatments

	Mean	Ploughing		Dung		Phosphate		Potash		
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.	
Ploughing	± 0.66					± 0.93				
deep-shallow	-0.18	-	-	-0.70	0.34	-0.50	0.14	0.03	-0.39	
Dung	1.82	1.30	2.34	-	-	1.43	2.21	3.01	0.63	
Phosphate	-0.01	-0.33	0.31	-0.40	0.38	-	-	-0.25	0.23	
Potash	1.92	2.13	1.71	3.11	0.73	1.68	2.16	-	-	
<u>1945</u>										
Ploughing	± 0.63					± 0.90				
deep-shallow	1.66	-	-	1.20	2.12	1.02	2.30	2.28	1.04	
Dung	1.05	0.59	1.51	-	-	1.36	0.74	1.16	0.94	
Phosphate	0.44	-0.20	1.08	0.75	0.13	-	-	0.03	0.85	
Potash	0.13	0.75	-0.49	0.24	0.02	-0.28	0.54	-	-	
<u>1946</u>										
Ploughing	± 0.54					± 0.76				
deep-shallow	0.04	-	-	1.74	-1.66	0.44	-0.36	1.07	-0.99	
Dung	1.60	3.30	-0.10	-	-	0.25	2.95	1.43	1.77	
Phosphate	-0.40	0.00	-0.80	-1.75	0.95	-	-	-0.16	-0.64	
Potash	0.07	1.10	-0.96	-0.10	0.24	0.31	-0.17	-	-	
<u>1947</u>										
Ploughing	± 0.14					± 0.20				
deep-shallow	1.73	-	-	1.84	1.62	2.21	1.25	1.61	1.85	
Dung	1.69	1.80	1.58	-	-	1.90	1.48	2.22	1.16	
Phosphate	0.16	0.64	-0.32	0.37	-0.05	-	-	0.68	-0.36	
Potash	0.19	0.07	0.31	0.72	-0.34	0.71	-0.33	-	-	

Sugar Beet

Tops: tons per acre

Time of application of mineral fertilizers

	Superphosphate			Potash			Mean
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	
Standard errors:	(a)	(b) and (c)		(a)	(b) and (c)		
<u>1944</u>							
Shallow	17.11	16.00	17.56	15.88	17.28	18.74	16.94
Deep	16.61	16.77	17.07	15.91	17.44	17.80	16.76
No dung	16.14	14.94	16.55	14.39	16.68	18.32	15.94
Dung	17.57	17.82	18.08	17.40	18.04	18.22	17.76
Mean	16.86	16.38	17.32	15.90	17.36	18.27	16.85
<u>1945</u>							
Shallow	15.32	15.21	15.03	14.84	15.79	15.39	15.22
Deep	16.34	17.31	17.52	17.12	16.14	17.13	16.88
No dung	15.15	15.99	15.80	15.40	15.46	15.83	15.52
Dung	16.51	16.53	16.75	16.57	16.47	16.70	16.58
Mean	15.83	16.26	16.28	15.98	15.96	16.26	16.05
<u>1946</u>							
Shallow	18.87	18.34	19.38	18.32	19.37	19.45	18.87
Deep	19.30	19.30	17.71	19.38	19.09	17.76	18.90
No dung	18.96	17.61	16.80	18.14	18.73	17.33	18.08
Dung	19.21	20.02	20.30	19.57	19.74	19.87	19.69
Mean	19.09	18.82	18.55	18.85	19.23	18.60	18.88
<u>1947</u>							
Shallow	5.82	6.72	6.20	6.10	6.59	5.76	6.14
Deep	8.03	7.20	8.22	7.72	7.89	8.16	7.87
No dung	5.97	6.04	6.65	5.80	6.77	6.26	6.16
Dung	7.87	7.88	7.77	8.02	7.70	7.66	7.85
Mean	6.92	6.96	7.21	6.91	7.24	6.96	7.00
Standard errors:		(a)	(b)	(c)			
	1944	0.66	0.88	0.90			
	1945	0.63	0.66	0.79			
	1946	0.54	0.68	0.73			
	1947	0.14	0.31	0.26			

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

N

Sugar Beet

Plant number: thousands per acre

Standard errors

Mean yield		per whole plot				per split plot			
1944	26.4	1.59 or 6.0%, 9 d.f.				0.990 or 3.7%, 7 d.f.			
1945	26.4	1.55 or 5.9%, 9 d.f.				1.25 or 4.7%, 7 d.f.			
1946	24.4	0.912 or 3.7%, 7 d.f.				0.760 or 3.1%, 7 d.f.			
1947	23.1								
Responses to treatments									
		Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Frcs.	Abs.	Frcs.	Abs.	Frcs.
<u>1944</u>	Mean								
Ploughing	±0.80	±1.12							
deep-shallow	1.2	-	-	0.7	1.7	1.0	1.4	2.7	-0.3
Dung	-0.8	-1.3	-0.3	-	-	-1.4	-0.2	-0.9	-0.7
Phosphate	-0.2	-0.4	0.0	-0.3	0.4	-	-	0.2	-0.6
Potash	0.5	2.0	-1.0	0.4	0.6	0.9	0.1	-	-
<u>1945</u>	Mean								
Ploughing	±0.78	±1.10							
deep-shallow	0.3	-	-	1.0	-0.4	-0.1	0.7	0.4	0.2
Dung	-0.2	0.5	-0.9	0.9	-	-0.1	-0.3	-0.4	0.0
Phosphate	1.2	0.8	1.6	1.3	1.1	-	-	0.6	1.8
Potash	-0.4	-0.3	-0.5	-0.6	-0.2	-1.0	0.2	-	-
<u>1946</u>	Mean								
Ploughing	±0.46	±0.65							
deep-shallow	-0.2	-	-	0.3	-0.7	-0.4	0.0	-0.6	0.2
Dung	0.2	0.7	-0.3	-	-	1.2	-0.8	-0.7	1.1
Phosphate	-0.1	-0.3	0.1	0.9	-1.1	-	-	-0.2	0.0
Potash	1.0	0.6	1.4	0.1	1.9	0.9	1.1	-	-
<u>1947</u>	Mean								
Ploughing									
deep-shallow	0.2	-	-	-0.6	1.0	0.5	-0.1	-1.0	1.4
Dung	1.2	0.4	2.0	-	-	0.9	1.5	1.1	1.3
Phosphate	0.5	0.8	0.2	0.2	0.8	-	-	0.7	0.3
Potash	1.7	0.5	2.9	1.6	1.8	1.9	1.5	-	-

K

Bc/1.13

Deep Cultivation Rotation Experiment:

Sugar Beet

Plant number: thousands per acre

Time of application of mineral fertilizers

	Superphosphate			Potash			Mean
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	
Standard errors:	(a)	(b) & (c)		(a)	(b) & (c)		
<u>1944</u>							
Shallow	26.0	25.5	25.6	24.8	26.6	27.0	25.8
Deep	27.0	26.9	27.0	27.4	27.2	25.8	27.0
No dung	27.2	26.3	26.5	26.6	27.1	26.9	26.8
Dung	25.8	26.1	26.2	25.6	26.7	25.9	26.0
Mean	26.5	26.2	26.3	26.1	26.9	26.4	26.4
<u>1945</u>							
Shallow	25.9 8	26.4 7	27.0 8	26.4 3	25.9 3	26.1 5	26.3 8
Deep	25.7 4	27.5 9	27.3 4	26.8 1	25.7 4	26.9 4	26.6 7
No dung	25.9 0	26.9 0	27.5 1	26.9 5	26.2 0	26.3 1	26.6 6
Dung	25.7 3	27.0 6	26.8 1	26.4 9	25.5 6	27.0 8	26.3 0
Mean	25.8 1	26.9 3	27.2 6	26.6 2	25.8 3	26.6 4	26.4 2
<u>1946</u>							
Shallow	24.6	24.6	24.0	24.1	25.1	24.5	24.4
Deep	24.2	24.5	24.2	23.5	24.8	25.2	24.3
No dung	23.8	25.2	24.3	24.2	24.7	23.9	24.3
Dung	25.0	24.0	23.9	23.5	25.1	25.8	24.5
Mean	24.4	24.6	24.1	23.8	24.9	24.6	24.4
<u>1947</u>							
Shallow	22.6	23.3	23.5	22.8	23.7	22.7	23.0
Deep	23.1	21.8	24.9	21.8	25.1	24.3	23.2
No dung	22.4	21.5	23.7	21.8	23.7	22.8	22.5
Dung	23.3	23.5	24.7	22.8	25.1	24.1	23.7
Mean	22.9	22.5	24.2	22.3	24.4	23.5	23.1

Standard errors:	(a)	(b)	(c)
1944	0.80	0.50	0.87
1945	0.78	0.62	0.90
1946	0.46	0.38	0.53

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

9

K

Barley - Residual Effects

Grain: cwt. per acre

	Mean yield	Standard error per plot
1945	29.2	1.43 or 4.9%, 7 d.f.
1946	36.4	1.79 or 4.9%, 7 d.f.
1947	31.2	0.903 or 2.9%, 4 d.f.

Responses to treatments

Mean	Ploughing		Dung		Phosphate		Potash		
	Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.	
Grain: cwt. per acre									
<u>1945</u>									
Ploughing	±0.71		±1.01						
deep-shallow	-0.6	-	-	-0.9	-0.3	0.1	-1.3	-1.5	0.3
Dung	1.3	1.0	1.6	-	0.3	0.3	2.3	2.4	0.2
Phosphate	0.8	1.5	0.1	-0.2	1.8	-	-	0.3	1.3
Potash	0.7	-0.2	1.6	1.8	-0.4	0.2	1.2	-	-
<u>1946</u>									
Ploughing	±0.90		±1.27						
deep-shallow	0.4	-	-	0.6	0.2	1.2	-0.4	1.0	-0.2
Dung	1.3	1.5	1.1	-	-	1.0	1.6	2.4	0.2
Phosphate	0.7	1.5	-0.1	0.4	1.0	-	-	0.6	0.8
Potash	0.0	0.6	-0.6	1.1	-1.1	-0.1	0.1	-	-
<u>1947</u>									
Ploughing	±0.45		±0.64						
deep-shallow	2.4	-	-	2.4	2.4	2.3	2.5	2.4	2.4
Dung	0.9	0.9	0.9	-	-	0.3	1.5	0.7	1.1
Phosphate	0.0	-0.1	0.1	-0.6	0.6	-	-	0.4	-0.4
Potash	0.4	0.4	0.4	0.2	0.6	0.8	0.0	-	-

Deep Cultivation Rotation Experiment

Barley - Residual Effects

Straw: cwt. per acre

	Mean Yield	Standard error per plot
1945	32.7	2.36 or 7.2%, 7 d.f.
1946	43.4	2.33 or 5.4%, 7 d.f.
1947	31.2	

	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
		<i>Straw: cwt. per acre</i>							
Ploughing	±1.18					±1.67			
deep-shallow	-0.7	-	-	-1.2	-0.2	0.4	-1.8	-3.1	1.7
Dung	3.3	2.8	3.8	-	-	2.8	3.8	4.3	2.3
Phosphate	-0.1	1.0	-1.2	-0.6	0.4	-	-	-0.6	0.4
Potash	1.7	-0.7	4.1	2.7	0.7	1.2	2.2	-	-
<u>1946</u>									
Ploughing	±1.16					±1.64			
deep-shallow	0.8	-	-	3.2	-1.6	2.5	-0.9	2.6	-1.0
Dung	5.1	7.5	2.7	-	-	6.1	4.1	10.4	-0.2
Phosphate	0.9	2.6	-0.8	1.9	-0.1	-	-	0.4	1.4
Potash	1.1	2.9	-0.7	6.4	-4.2	0.6	1.6	-	-
<u>1947</u>									
Ploughing									
deep-shallow	2.4	-	-	2.3	2.5	1.8	3.0	3.4	1.4
Dung	1.7	1.6	1.8	-	-	0.8	2.6	1.2	2.2
Phosphate	-0.8	-1.4	-0.2	-1.7	0.1	-	-	-0.4	-1.2
Potash	0.8	1.8	-0.2	0.3	1.3	1.2	0.4	-	-

X
6

Wheat
Straw: cwt. per acre

Hay: cwt. per acre - Residual effects

	1946	1947
Mean yield	82.2	54.2
Standard error per plot	3.54 or 4.3% (6 d.f.) 2.82 or 5.2% (4 d.f.)	

Responses to treatments

8

	Mean	Ploughing		Dung		Phosphate		Potash		
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.	
<u>1946</u>										
Ploughing	±1.77	-	-	2.9	1.1	±2.5	1.9	-3.7	-1.9	0.1
deep-shallow	-0.9	-	-	-2.9	1.1	1.9	-3.7	-1.9	0.1	
Dung	3.8	1.8	5.8	-	-	3.4	4.2	3.1	4.5	
Phosphate	1.3	4.1	-1.5	0.9	1.7	-	-	-1.5	4.1	
Potash	1.5	0.5	2.5	0.8	2.2	-1.3	4.3	-	-	
<u>1947</u>										
Ploughing	±1.41					±1.99				
deep-shallow	0.5	-	-	-1.7	2.7	-1.4	2.4	2.0	-1.0	
Dung	-1.0	-3.2	1.2	-	-	-1.3	-0.7	-1.1	-0.9	
Phosphate	0.7	-1.2	2.6	0.4	1.0	-	-	1.2	0.2	
Potash	1.7	3.2	0.2	1.6	1.8	2.2	1.2	-	-	

2

Potatoes

Ware tubers: tons per acre

	Mean yield	Standard errors	
		per whole plot	per split plot
1944	10.82	0.863 or 8.0%, 9 d.f.	1.10 or 9.9%, 7 d.f.
1945	11.01	0.917 or 8.3%, 7 d.f.	0.531 or 4.8%, 7 d.f.
1946	11.30	0.640 or 5.7%, 6 d.f.	1.08 or 9.4%, 7 d.f.
1947	5.66	0.538 or 9.5%, 4 d.f.	0.397 or 6.8%, 7 d.f.

Responses to treatments

	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
<u>1944</u>									
Ploughing	±0.43					±0.61			
deep-shallow	0.17	-	-	-0.01	0.35	-0.69	1.03	0.26	0.08
Dung	1.27	1.09	1.45	-	-	1.29	1.25	1.29	1.25
Phosphate	0.38	-0.48	1.24	0.40	0.36	-	-	0.33	0.43
Potash	1.16	1.25	1.07	1.18	1.14	1.11	1.21	-	-
<u>1945</u>									
Ploughing	±0.46					±0.65			
deep-shallow	1.44	-	-	1.72	1.16	2.30	0.58	1.70	1.18
Dung	3.29	3.57	3.01	-	-	3.18	3.40	3.99	2.59
Phosphate	0.49	1.35	-0.37	0.38	0.60	-	-	-0.10	1.08
Potash	1.09	1.35	0.83	1.79	0.39	0.50	1.68	-	-
<u>1946</u>									
Ploughing	±0.32					±0.45			
deep-shallow	0.86	-	-	0.41	1.31	1.17	0.55	0.27	1.45
Dung	1.46	1.01	1.91	-	-	1.64	1.28	1.12	1.80
Phosphate	0.32	0.63	0.01	0.50	0.14	-	-	-0.23	0.87
Potash	0.69	0.10	1.28	0.35	1.03	0.14	1.24	-	-
<u>1947</u>									
Ploughing	±0.27					±0.38			
deep-shallow	0.04	-	-	0.01	0.07	0.34	-0.26	-0.46	0.54
Dung	1.64	1.61	1.67	-	-	1.61	1.67	2.41	0.87
Phosphate	0.16	0.46	-0.14	0.13	0.19	-	-	0.11	0.21
Potash	1.05	0.55	1.55	1.82	0.28	1.00	1.10	-	-

Deep Cultivation Rotation Experiment

Wheat

	Mean yield	Standard error per plot
Grain: cwt. per acre		
1946	29.0	3.56 or 12.3%, 13 d. f.
1947	26.8	2.25 or 8.4%, 4 d. f.
Straw: cwt. per acre		
1946	48.0	7.43 or 15.5%, 13 d. f.
1947	32.3	

Responses to treatments

<u>1946</u>		Grain		Straw			
Response to deep ploughing (deep-shallow)		2.2(±1.78)		1.1(±3.71)			
<u>1947</u>		Dung		Phosphate		Potash	
Residual Effects	Mean	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.

Grain: cwt. per acre

	±1.12			±1.59			
Dung	1.5	-	-	2.1	0.9	1.7	1.3
Phosphate	-0.9	-0.3	-1.5	-	-	-2.9	1.1
Potash	-0.1	0.1	-0.3	-2.1	1.9	-	-

Straw: cwt. per acre

Dung	3.2	-	-	3.7	2.7	3.6	2.8
Phosphate	-0.9	-0.4	-1.4	-	-	-3.9	2.1
Potash	-0.5	-0.1	-0.9	-3.5	2.5	-	-

There was no test of deep ploughing in this year.

Potatoes
Percentage Ware

	Mean	Standard errors	
		per whole plot	per split plot
1944	78.1	1.07, 9 d.f.	1.43, 7 d.f.
1945	96.3	0.404, 5 d.f.	0.310, 7 d.f.
1946	95.3	1.17, 7 d.f.	1.87, 7 d.f.

Responses to treatments

	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Fres.	Abs.	Fres.	Abs.	Fres.
<u>1944</u>									
Floughing									
deep-shallow	0.6	-	-	0.7	0.5	-0.9	2.1	1.6	-0.4
Dung	2.6	2.7	2.5	-	-	1.4	3.8	3.0	2.2
Phosphate	-3.0	-4.5	-1.5	-4.2	-1.8	-	-	-6.1	0.1
Potash	-2.4	-1.4	-3.4	-2.0	-2.8	-5.5	0.7	-	-
<u>1945</u>									
Floughing	+0.20								
deep-shallow	1.0	-	-	1.2	0.8	0.9	1.1	1.0	1.0
Dung	0.5	0.7	0.3	-	-	0.6	0.4	0.7	0.3
Phosphate	-0.5	-0.6	-0.4	-0.4	-0.6	-	-	-0.4	-0.6
Potash	0.6	0.6	0.6	0.8	0.4	0.7	0.5	-	-
<u>1946</u>									
Floughing	+0.58								
deep-shallow	0.5	-	-	0.5	0.5	0.8	0.2	1.0	0.0
Dung	-0.4	-0.4	-0.4	-	-	0.3	-1.1	-0.2	-0.6
Phosphate	-1.6	-1.3	-1.9	-0.9	-2.3	-	-	-1.7	-1.5
Potash	0.7	1.2	0.2	0.9	0.5	0.6	0.8	-	-
<u>1947</u>									
Floughing									
deep-shallow	-0.3	-	-	-0.8	0.2	-0.4	-0.2	-0.7	0.1
Dung	2.2	1.7	2.7	-	-	2.1	2.3	3.6	0.8
Phosphate	-0.8	-0.9	-0.7	-0.9	-0.7	-	-	-1.0	-0.6
Potash	+2.2	+1.8	+2.6	+3.6	+0.8	2.0	2.4	-	-

X
all five

N

Deep Cultivation Rotation Experiment

Potatoes

Ware tubers: tons per acre

Time of application of mineral fertilizers

	Superphosphate			Potash			Mean
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	
Standard errors	(a)	(b) & (c)		(a)	(b) & (c)		
<u>1944</u>							
Shallow	10.98	11.01	9.97	10.11	11.33	11.38	10.75
Deep	10.29	10.89	12.16	10.37	10.98	11.90	10.91
No dung	9.99	10.24	10.52	9.59	10.56	11.00	10.18
Dung	11.28	11.66	11.61	10.89	11.76	12.29	11.46
Mean	10.64	10.95	11.06	10.24	11.16	11.64	10.82
<u>1945</u>							
Shallow	9.62	10.76	11.17	9.61	10.86	11.07	10.29
Deep	11.92	11.16	11.93	11.32	11.47	12.82	11.73
No dung	9.18	9.22	9.88	8.47	9.94	10.58	9.37
Dung	12.36	12.69	13.22	12.46	12.39	13.32	12.66
Mean	10.77	10.96	11.55	10.47	11.16	11.95	11.01
<u>1946</u>							
Shallow	10.56	10.87	11.51	10.83	10.10	11.75	10.88
Deep	11.73	11.21	12.27	11.10	12.22	12.53	11.73
No dung	10.33	10.06	11.59	10.40	10.04	11.46	10.57
Dung	11.96	12.03	12.18	11.52	12.28	12.81	12.03
Mean	11.14	11.04	11.89	10.96	11.16	12.14	11.30
<u>1947</u>							
Shallow	5.40	5.47	6.26	5.36	5.36	6.46	5.63
Deep	5.75	5.20	6.01	4.90	5.71	7.19	5.68
No dung	4.77	4.57	5.23	3.93	5.04	6.45	4.84
Dung	6.38	6.11	7.04	6.34	6.03	7.20	6.48
Mean	5.58	5.34	6.13	5.13	5.54	6.82	5.66
Standard errors:		(a)		(b)		(c)	
		1944	0.43	0.55		0.58	
		1945	0.46	0.27		0.50	
		1946	0.32	0.54		0.50	
		1947	0.27	0.20		0.30	

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

Deep Cultivation Rotation ExperimentPotatoes
Percentage ware

Time of application of mineral fertilizers

	Superphosphate			Potash			Mean
	None	Ploughed In seed in bed		None	Ploughed In seed in bed		
Standard errors:	(a)	(b) & (c)		(a)	(b) & (c)		
<u>1944</u>							
Shallow	80.0	76.3	74.8	78.5	76.9	77.48	77.8
Deep	79.2	77.4	78.1	80.2	76.2	77.4	78.5
No dung	77.8	76.4	75.7	77.8	75.7	76.1	76.8
Dung	81.5	77.3	77.2	80.8	77.4	78.6	79.4
Mean	79.6	76.8	76.4	79.3	76.6	77.4	78.2
<u>1945</u>							
Shallow	96.0	95.3	95.6	95.4	95.6	96.4	95.7
Deep	97.0	96.8	96.4	96.5	96.8	97.3	96.8
No dung	96.2	95.8	95.9	95.6	96.0	96.9	96.1
Dung	96.8	96.2	96.2	96.3	96.5	96.8	96.5
Mean	96.5	96.0	96.0	96.0	96.2	96.8	96.3
<u>1946</u>							
Shallow	95.7	94.5	94.3	94.5	95.9	95.3	95.0
Deep	96.5	95.6	93.6	95.5	95.9	95.4	95.6
No dung	95.9	96.0	94.2	95.0	95.9	96.0	95.5
Dung	96.2	94.1	93.8	94.9	96.0	94.6	95.1
Mean	96.0	95.0	94.0	95.0	96.0	95.3	95.3
<u>1947</u>							
Shallow	93.8	93.2	92.5	92.4	93.9	94.6	93.3
Deep	93.4	92.6	92.7	91.7	94.0	94.6	93.0
No dung	92.5	91.8	91.4	90.2	93.3	94.4	92.1
Dung	94.6	94.0	93.8	93.9	94.6	94.8	94.3
Mean	93.6	92.9	92.6	92.1	93.9	94.6	93.2

Standard errors:	(a)	(b)	(c)
1944	0.54	0.72	0.74
1945	0.20	0.16	0.23
1946	0.58	0.94	0.88

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

Spring Oats - Residual Effects

1945	16.8	1.12 or 6.6%, 6 d.f.	28.0	1.21 or 4.3%, 7 d.f.
1946	41.9	1.86 or 4.4%, 5 d.f.	57.3	2.72 or 4.8%, 5 d.f.
1947	28.9	1.97 or 6.8%, 4 d.f.	35.3	

Responses to treatments

	Mean	Ploughing		Dung		Phosphate		Potash	
		Shallow	Deep	Abs.	Pres.	Abs.	Pres.	Abs.	Pres.
Grain: cwt. per acre									
<u>1945</u>									
Ploughing	+0.56								
deep-shallow	-0.9								
Dung	1.6	2.2	1.0	-	-	1.4	1.8	0.8	2.4
Phosphate	+0.6	-0.3	1.5	0.4	0.8	-	-	1.2	0.0
Potash	0.3	0.3	0.3	-0.5	1.1	0.9	-0.3	-	-
<u>1946</u>									
Ploughing	+0.93								
deep-shallow	0.6								
Dung	2.5	3.9	1.1	-	-	3.4	1.6	4.4	0.6
Phosphate	1.8	2.3	1.3	2.7	0.9	-	-	2.6	1.0
Potash	-0.3	-1.8	1.2	1.6	-2.2	0.5	-1.1	-	-
<u>1947</u>									
Ploughing	+0.98								
deep-shallow	-1.5								
Dung	80.8	1.7	-0.1	-	-	2.5	-0.9	2.2	-0.6
Phosphate	1.0	0.7	1.3	2.7	-0.7	-	-	0.8	1.2
Potash	-0.6	0.1	-1.3	0.8	-2.0	-0.8	-0.4	-	-
Straw: cwt. per acre									
<u>1945</u>									
Ploughing	+0.60								
deep-shallow	-0.1								
Dung	1.5	2.4	0.6	-	-	0.3	2.7	1.4	1.6
Phosphate	-1.6	-1.1	-2.1	-2.8	-0.4	-	-	-0.1	-3.1
Potash	1.2	1.1	1.3	1.1	1.3	2.7	-0.3	-	-
<u>1946</u>									
Ploughing	+1.36								
deep-shallow	0.2								
Dung	6.5	6.6	6.4	-	-	9.0	4.0	7.9	5.1
Phosphate	2.6	0.9	4.3	5.1	0.1	-	-	2.0	3.2
Potash	-0.3	0.3	-0.9	1.1	-1.7	-0.9	0.3	-	-
<u>1947</u>									
Ploughing									
deep-shallow	-2.4								
Dung	1.4	2.1	0.7	-	-	2.1	0.7	2.8	0.0
Phosphate	-0.6	-0.5	-0.7	0.1	-1.3	-	-	-0.7	-0.5
Potash	0.5	0.1	0.9	1.9	-0.9	0.4	0.6	-	-

GRAZING EXPERIMENT

Highfield (begun in 1937)The residual manurial value of feeding stuffs consumed on grassland

The experiment consisted of 3 blocks each of 3 plots. Each year one block began a new three-year cycle. In the first year of each cycle all three plots of the block were grazed with cattle only, additional feeding stuffs being fed on one plot. In the following winter or early spring another plot of each block received fertilizers estimated to be equivalent to the residual manurial value of the feeding stuffs consumed on the first plot in the previous year. The third plot of each block received neither feeding stuff nor fertilizer. In the second and third years of the cycle each of the plots was grazed by cattle and sheep which were weighed regularly.

Area of each plot, 5 acres.

Details of the design of the experiment are as given in the 1937 Station Report, pp. 24-27.

In order to obtain a single measure of the yield of a plot, the amount of starch equivalent produced on each plot in each year has been calculated. In this way it is possible to include in a single figure the energy value of the food required to produce the observed live-weight increases, together with the energy value required to maintain the animals. The calculations are based upon the tables of average composition given by Woodman, H.E., in "Rations for Livestock", Min. of Agric. and Fish. Bull. No. 48. H.M.S.O., 1948.

A full report of the experiment is given by Boyd, D.A., Crowther, E.M., Moffatt, J.R. and Yates, F. in a paper entitled "A grazing experiment on residual manurial value of feeding stuffs consumed on grass". J.R.A.S.E., 110, (1949), 104-114.

Herbage analyses were made by the Botany Department.

Amounts of Feeding Stuffs and Fertilizers applied

Year	Plot	Feeding Stuffs cwt. per acre			Year	Plot	Fertilizers cwt. per acre		
		1st Period	2nd Period	Total			N	P ₂ O ₅	K ₂ O
1938	4	3.00	5.98	8.98					
1938	2	3.38	6.74	10.12	1939	6	0.17	0.06	0.07
1939	7	3.06	3.78*	3.24	1939	3	0.19	0.07	0.07
1940	4	3.24	4.80	8.04	1940	8	0.17	0.05	0.05
1941	2	4.00	8.91	12.91	1941	6	0.16	0.05	0.06
1942	7	2.89	5.11	8.00	1942	3	0.25	0.09	0.09
1943	4	3.80	4.31	8.11	1943	8	0.16	0.06	0.05
1944	2	3.35	7.40	10.75	1944	6	0.17	0.07	0.07
1945	7	4.52	4.52	9.03	1945	3	0.25	0.09	0.10
1946	4	3.65	5.54	9.19	1946	8	0.18	0.07	0.06
					1947	6	0.19	0.08	0.07

*Plus 1.41 second-period ration fed during first period. Feeding stuffs; equal parts of flaked maize and undecorticated cotton cake (1st period) or decorticated groundnut cake (2nd period).

Starch Equivalent: lb. per acre

Plot	1		2		3		4		5		6		7		8	
	No	Cake	No	Cake	No	Equivalent	No	Cake	No	Manure	No	Equivalent	No	Manure	No	Equivalent
	Manure	44	Manure	Manures	Manure	Manures	Manure	Manures	Manure	Manures	Manure	Manures	Manure	Manures	Manure	Manures
1937	Cattle	779	763	710	544	576	594	672	629	616						
	Sheep	116	142	117	134	112	101	86	119	79						
1938	Cattle															
	Sheep															
1939	Cattle	864	1033	985	917	1022	1059	672	993	963						
	Sheep	746	724	807	746	774	848	86	650	625						
1940	Cattle	680	847	719				639	976	950						
	Sheep	601	560	631				653	655	652						
1941	Cattle															
	Sheep															
1942	Cattle	780	849	768	747	1108	792	646	993	625						
	Sheep	716	852	811	598	713	629	1027	650	950						
1943	Cattle	870	872	1086	775	813	783	702	976	652						
	Sheep	689	728	936	822	656	838	882	680							
1944	Cattle															
	Sheep															
1945	Cattle	811	1231	1037	1182	1017	1408	1074	1195	1163						
	Sheep	445	680	743	716	551	674	908	999	863						
1946	Cattle	1296	1627	1312	1079	1006	1174	1074	1399	945						
	Sheep	646	631	568	696	624	731	622	680	591						
1947	Cattle															
	Sheep															

Bd/1.2

Highfield Grazing Experiment

Bd/1.3

Live weight increase: lb. per acre

Flot	1		2		3		5		4		6		9		7		8	
	No Manure	Cake 1938,41, 44	No Manure	Cake 1938,40, 43,46	No Manure	Cake 1938,41, 44	No Manure	Cake 1938,40, 43,46	No Manure	Cake 1938,40, 43,46	No Manure	Cake 1938,40, 43,46	No Manure	Cake 1939,42, 45	No Manure	Cake 1939,42, 45	No Manure	Equivalent Manures
1937	181	176	151	118	105	118	126	114	118	140	118	114	118	118	114	118	114	
1938	3	13	6	6	14	6	4	0	9	0	9	-1	9	9	-1	9	-1	
1939	193	274	231	237	205	237	242	205	237	205	237	242	205	237	205	237	242	
1940	114	100	123	107	115	107	130	115	107	115	130	115	115	115	115	115	115	
1941	135	178	133	214	128	214	147	128	214	148	235	229	148	235	229	235	229	
1941	91	74	95	79	89	79	101	89	79	84	101	96	84	111	96	111	96	
1942	154	177	133	190	160	190	144	160	190	217	144	144	217	192	180	192	180	
1942	104	145	127	96	135	96	124	135	96	91	124	72	91	74	72	74	72	
1943	222	221	263	296	332	296	404	332	296	237	404	300	237	312	300	312	300	
1943	69	84	108	30	54	30	19	54	30	108	19	79	108	113	79	113	79	
1944	175	276	237	210	209	210	219	209	210	315	219	236	315	398	236	398	236	
1945	38	54	68	53	74	53	67	74	53	52	67	29	52	31	29	31	29	
1946	276	339	264	215	343	215	373	343	215	278	373	328	278	388	328	388	328	
1946	62	59	48	81	46	81	73	46	81	66	73	56	66	63	56	63	56	
1947	62	59	48	215	343	215	373	343	215	319	373	290	319	378	290	378	290	
1947	62	59	48	81	46	81	73	46	81	38	73	90	38	48	90	48	90	

Grazing days per acre

Plot	1		2		3		5		4		6		9		7		8	
	No Manure	Cake 1938,41, 44	No Manure	Cake 44	No Manure	Equivalent Manures	No Manure	Equivalent Manures	No Manure	Equivalent Manures	No Manure	Equivalent Manures	No Manure	Equivalent Manures	No Manure	Equivalent Manures	No Manure	Equivalent Manures
1937	74	74	74	74	62	74	62	63	62	63	62	63	66	66	66	66	66	66
1938	74	74	74	74	65	74	65	65	65	65	65	65	62	62	62	62	62	62
1939	107	110	114	110	113	114	113	120	120	120	126	126	83	83	83	83	83	83
1940	344	356	342	356	343	342	343	362	362	379	379	379	253	253	253	253	253	253
1941	96	122	112	122		112												
1941	288	308	314	308		314												
1942	115	121		121	119		119	153	153	147	147	147	121	126	126	126	126	126
1942	339	355	366	355	358	366	358	457	457	358	358	358	361	312	312	312	312	312
1943	96	96	125	96	106	125	106	102	102	117	117	117	145	145	145	145	145	145
1943	288	288	373	288	338	373	338	316	316	374	374	374	434	434	434	434	434	434
1944																		
1945	92	133	112	133	113	112	113	92	92	127	127	127	97	129	129	129	129	129
1945	198	293	303	293	346	303	346	285	285	389	389	389	348	385	385	385	385	385
1946	122	155	132	155	131	132	131	115	115	149	149	149	93	125	125	125	125	125
1947	259	259	267	259	268	267	268	257	257	301	301	301	286	369	369	369	369	369
1947					154		154	106	106	149	149	149	108	165	165	165	165	165
1947					218		218	202	202	238	238	238	309	307	307	307	307	307
1947													123	155	155	155	155	155
1947													180	193	193	193	193	193

Bd/1.4

GREEN MANURING EXPERIMENT

Woburn Stackyard (begun in 1936)

The experiment was designed to test the effects on kale of leys and green manures ploughed-in in mid-season, and also the effects of dung, straw and sulphate of ammonia. A barley crop tests the residual effects of these treatments.

The rotation was 1st year, green manure crops followed by kale, 2nd year barley. The leys and green manures were clover, ryegrass, tares and mustard; the tares and mustard were grown on the same plots every second year, but the clover and ryegrass alternately. A crop of hay was taken from the ley plots each year until 1940 and again in 1942; in other years all green material was buried.

There are 40 plots under each of the test crops, and until 1943 the experiment consisted of a single replicate (for each crop) of a 5×2^5 factorial design with all combinations of the following treatments, applied to kale;

Leys and green manures: Fallow (F), clover (C), ryegrass (R), tares (T) and mustard (M). The clover and ryegrass are undersown in the barley and the other green manures are sown after the barley stubble has been ploughed.

Dung: None, 10 tons per acre (D)
 Straw: None, 1.5 tons per acre (S)
 Sulphate of ammonia: 0.4, 0.8 cwt. N per acre (N)

A basal dressing of 3 cwt. superphosphate and 1 cwt. muriate of potash per acre is applied.

In 1944 and succeeding years a top dressing of sulphate of ammonia (0.3 cwt. N per acre in 1944, 0.4 cwt. N per acre thereafter) has been applied to half the plots under barley so that the experiment is now in half replicate according to the identity $I \equiv (R+C-T-M-F) DSNA$, where A represents the top dressing of sulphate of ammonia.

From 1946 onwards, a further dressing of sulphate of ammonia (0.4 cwt. N per acre) has been applied to the fallow and all ley and green manure crops, on those plots which receive the top dressing when under barley. Also from 1946 onwards, cabbages replaced the kale (which had failed in several years), and the green manures were changed, tares being replaced by lupins and mustard by rape.

Full details of the original design are given in the 1936 Report, p. 203.

Owing to an error in the chain used, the plot area has been given previously as 0.0367 acre. The correct value is 0.0379 acre. Consequently the yields given in the Station Reports for 1936-38 should be multiplied by 0.968.

Crop Notes

Test Year

	1939	1940	1941	1942
<u>Leys and Green Manures</u>				
Clover and Ryegrass				
undersown	31.3.38	19.4.39	3.5.40	5.5.41
cut	June 8	June 3		June 2
Tares sown	6.10.38	Apr.23 ⁽¹⁾	16.10.40	Apr.20 ⁽²⁾
Mustard sown	6.10.38	Apr.23 ⁽¹⁾	Mar 24 ⁽¹⁾	Apr.15 ⁽¹⁾

Manures ploughed in	June 16	June 20	May 23	June 13
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Kale (Thousand Head)

Sown	June 21	June 26		June 16
Cut	Feb.1940	Feb.1941	Failed ⁽³⁾	Feb and Mar.1943

Cabbages (January King)

Transplanted

Cut

Barley (Plumage Archer)

Sown	Mar.1	Mar.4	Mar.14	Apr.1
Harvested	Aug.29	Aug.26	Aug.26	Aug.19

- (1) Second sowing. First sowing failed and was ploughed in
 (2) Maple peas, replacing tare crop which failed
 (3) First sowing destroyed by flea beetle; second sowing by pigeons

Crop Notes

	Test Year				
	1943	1944	1945	1946	1947
<u>Clover and Ryegrass</u>					
undersown				23.4.45	2.5.46
	(Leys and green manures were ploughed in after failure of the kale.)				
Lupins sown				Apr.15	Apr.16
Rape sown				Apr.15 ⁽¹⁾	Apr.16
Manures ploughed in				June 18	June 28
<u>Kale (Thousand Head)</u>					
Sown			(Fallow)		
Cut	Failed ⁽⁴⁾	Failed ⁽⁴⁾			
<u>Cabbages (January King)</u>					
Transplanted				July 22 ⁽⁵⁾	July 12 ⁽⁵⁾
Cut				Jan. & Mar.1947	Dec.Feb.& Mar.1948
<u>Barley (Plumage Archer)</u>					
Sown	Mar.17	Mar.9	Mar.6	Mar.18	Apr.18
Harvested	Aug.20	Sept.9	Aug.3	Aug.23	Aug.12

(1) Second sowing. First sowing failed and was ploughed in.

(4) Crop failed due to attack of flea beetle.

(5) Gaps were filled in by further transplanting during subsequent two months.

Kale

Be/1.4

Leys and green manures:	Means					Mean
	None	Tares	Clover	Mustard	Rye-grass	
Manures	Total weight: tons per acre					
	<u>1939</u>					
	± 0.418					± 0.187
No dung	4.54	4.62	6.31	4.57	3.61	4.73
Dung	5.87	6.27	8.27	6.11	4.38	6.18
No straw	5.49	5.92	7.57	5.27	4.21	5.69
Straw	4.92	4.96	7.02	5.41	3.77	5.22
Sulphate of ammonia						
0.4 cwt.N per acre	4.56	4.69	6.58	4.79	2.44	4.61
0.8 cwt.N per acre	5.85	6.20	8.01	5.89	5.55	6.30
Mean ± 0.296	5.20	5.44	7.29	5.34	3.99	5.46
	<u>1940</u>					
	± 0.562					± 0.251
No dung	6.16	5.54	5.62	4.59	3.43	5.07
Dung	7.09	7.24	8.04	6.85	5.52	6.95
No straw	6.73	6.53	6.86	6.08	5.07	6.26
Straw	6.52	6.24	6.80	5.35	3.88	5.76
Sulphate of ammonia						
0.4 cwt.N per acre	5.46	5.25	6.95	5.07	4.18	5.38
0.8 cwt.N per acre	7.79	7.52	6.71	6.36	4.77	6.63
Mean ± 0.397	6.62	6.39	6.83	5.72	4.47	6.01
	<u>1942</u>					
	± 0.725					± 0.324
No dung	8.73	9.11	11.18	9.08	5.88	8.80
Dung	11.46	11.92	13.61	11.54	10.02	11.71
No straw	9.74	9.53	11.92	10.18	8.28	9.93
Straw	10.45	11.49	12.87	10.43	7.62	10.57
Sulphate of ammonia						
0.4 cwt.N per acre	9.01	9.63	12.67	8.52	5.63	9.09
0.8 cwt.N per acre	11.17	11.40	12.12	12.10	10.27	11.41
Mean ± 0.513	10.09	10.51	12.40	10.31	7.95	10.25

Note: The kale failed in 1941, 1943 and 1944. The land was fallowed in 1945.

Standard errors per plot

1939 0.84 or 15.3%

1940 1.12 or 18.7%

1942 1.45 or 14.1%

These are based on 16 d.f.

Cabbages

Leys and green manures:	Means					Rye- grass	Mean
	None	Lupins	Clover	Rape			
Manures	Total weight: tons per acre						
	1946						
	± 0.721						± 0.322
No dung	2.96	3.27	4.68	3.20	2.46	3.31	
Dung	4.80	4.09	6.67	4.44	3.78	4.76	
No straw	3.52	4.29	5.90	4.27	2.84	4.16	
Straw	4.24	3.06	5.45	3.37	3.41	3.91	
Sulphate of ammonia							
0.4 cwt.N per acre	4.08	2.92	5.22	2.93	2.58	3.55	
0.8 cwt.N per acre	3.68	4.44	6.12	4.71	3.66	4.52	
Sulphate of ammonia to green manures.							
None	3.10	3.87	6.24	2.43	3.46	3.82	
0.4 cwt.N per acre	4.66	3.48	5.10	5.20	2.79	4.25	
Mean ± 0.510	3.88	3.68	5.67	3.82	3.12	4.03	
	1947						
	± 0.430						± 0.192
No dung	3.76	2.36	1.20	1.83	1.87	2.20	
Dung	4.40	3.11	1.11	2.36	2.04	2.60	
No straw	4.32	2.42	1.21	2.05	2.35	2.47	
Straw	3.83	3.06	1.10	2.14	1.56	2.34	
Sulphate of ammonia							
0.4 cwt.N per acre	3.38	2.43	0.97	1.96	1.94	2.14	
0.8 cwt.N per acre	4.77	3.04	1.34	2.22	1.98	2.67	
Sulphate of ammonia to gree manures.							
None	3.95	2.92	1.12	2.07	1.85	2.38	
0.4 cwt.N per acre	4.20	2.56	1.19	2.12	2.06	2.43	
Mean ± 0.304	4.08	2.74	1.16	2.09	1.96	2.40	

Standard errors per plot

1946 1.44 or 35.7%

1947 0.86 or 35.8%

These are based on 9 d.f.

Cabbages

Be/1.6

Leys and green manures:	Means					Mean
	None	Lupins	Clover	Rape	Rye-grass	
Manures	Plant number: thousands per acre					
	<u>1946</u>					
	± 0.80					± 0.36
No dung	16.8	16.0	16.0	16.4	15.6	16.2
Dung	16.2	15.7	16.0	16.9	16.2	16.2
No straw	16.1	17.0	15.8	16.9	15.7	16.3
Straw	16.8	14.7	16.2	16.5	16.1	16.1
Sulphate of ammonia						
0.4 cwt.N per acre	16.7	16.0	16.5	16.5	16.6	16.5
0.8 cwt.N per acre	16.3	15.7	15.5	16.8	15.3	15.9
Sulphate of ammonia to green manures.						
None	16.8	16.4	15.6	16.6	16.8	16.4
0.4 cwt.N per acre	16.1	15.4	16.4	16.7	15.1	15.9
Mean ± 0.61	16.5	15.9	16.0	16.7	15.9	16.2
	<u>1947</u>					
	± 0.76					± 0.34
No dung	17.1	16.9	15.6	15.8	15.5	16.2
Dung	17.4	17.6	14.9	15.1	16.0	16.2
No straw	17.3	17.4	14.7	16.1	16.9	16.5
Straw	17.2	17.2	15.7	14.9	14.6	15.9
Sulphate of ammonia						
0.4 cwt.N per acre	16.4	17.6	15.7	16.4	16.0	16.4
0.8 cwt.N per acre	18.1	16.9	14.7	14.6	15.6	16.0
Sulphate of ammonia to green manures.						
None	16.7	17.7	14.4	14.9	15.8	15.9
0.4 cwt.N per acre	17.8	16.9	16.0	16.1	15.7	16.5
Mean ± 0.54	17.3	17.3	15.2	15.5	15.8	16.2

Standard errors per plot.

1946 1.60 or 9.9%

1947c 1.52 or 9.4%

These are based on 9 d.f.



Differential Responses

Kale. Total weight: tons per acre

Response to	Mean	Dung		Straw		Sulphate of Ammonia to Kale cwt.N per acre		Sulphate of Ammonia to Barley and Green crops	
		Abs.	Pres.	Abs.	Pres.	0.4	0.8	Abs.	Pres.
<u>1939</u>	± 0.264								
Dung	1.45	-	-	0.90	2.00	1.88	1.02		
Straw	-0.48	-1.03	0.07	-	-	-0.70	-0.26		
Sulph. of Amm.	1.69	2.12	1.26	1.47	1.91	-	-		
<u>1940</u>	± 0.355								
Dung	1.88	-	-	1.76	2.00	2.43	1.33		
Straw	-0.50	-0.62	-0.38	-	-	-1.45	0.45		
Sulph. of Amm.	1.25	1.80	0.70	0.30	2.20	-	-		
<u>1942</u>	± 0.458								
Dung	2.91	-	-	3.06	2.76	3.34	2.48		
Straw	0.64	0.79	0.49	-	-	0.33	0.95		
Sulph. of Amm.	2.32	2.75	1.89	2.01	2.63	-	-		

Cabbages. Total weight: tons per acre

<u>1946</u>	± 0.456								
Dung	1.45	-	-	1.76	1.14	2.54	0.36	1.43	1.47
Straw	-0.26	0.05	-0.57	-	-	-0.12	-0.40	-1.40	0.88
Sulph. of Amm.	0.98	2.07	-0.11	1.12	0.84	-	-	1.60	0.36
Sulph. of Amm. to Green crops	0.43	0.41	0.45	-0.71	1.57	1.05	-0.19	-	-
<u>1947</u>	± 0.272								
Dung	0.40	-	-	0.24	0.56	0.39	0.41	0.53	0.27
Straw	-0.13	-0.29	0.03	-	-	0.14	-0.40	0.03	-0.29
Sulph. of Amm.	0.53	0.52	0.54	0.80	0.26	-	-	0.44	0.62
Sulph. of Amm. to Green crops	0.04	0.17	-0.09	± 0.20	-0.12	-0.05	0.13	-	-

Cabbages. Plant Number: thousands per acre

<u>1946</u>	± 0.51								
Dung	0.0	-	-	-0.1	0.1	0.7	-0.7	-0.4	0.4
Straw	-0.2	-0.3	-0.1	-	-	0.1	-0.5	-1.2	0.8
Sulph. of Amm. to Cabbages	-0.5	0.2	-1.2	-0.2	-0.8	-	-	-1.4	0.4
Sulph. of Amm. to Green crops	-0.5	-0.9	-0.1	-1.5	± 0.5	-1.4	0.4	-	-
<u>1947</u>	± 0.48								
Dung	0.0	-	-	-0.6	0.6	0.6	-0.6	0.4	-0.4
Straw	-0.5	-1.1	0.0	-	-	-1.1	0.0	-0.6	-0.5
Sulph. of Amm. to Cabbages	-0.4	0.1	-1.0	-1.0	0.1	-	-	-0.8	-0.1
Sulph. of Amm. to Green crops	0.6	1.0	0.2	0.5	0.7	0.3	0.9	-	-



Barley

Grain: cwt. per acre

Means

Leys and green manures before kale:	None	Tares	Clover	Mustard	Rye- grass	Mean
Manures applied to previous kale			<u>1939</u> ± 1.16			± 0.52
No dung	12.8	15.1	18.7	13.8	14.1	14.9
Dung	15.8	15.9	20.6	17.0	18.4	17.5
No straw	12.4	15.1	19.9	16.2	16.2	16.0
Straw	16.2	15.9	19.5	14.6	16.5	16.6
Sulphate of Ammonia						
0.4 cwt. N per acre	15.0	15.0	20.9	14.2	13.5	15.7
0.8 cwt. N per acre	13.6	16.0	18.4	16.7	19.1	16.8
Mean ± 0.82	14.3	15.5	19.7	15.4	16.3	16.3
			<u>1940</u> ± 1.53			± 0.68
No dung	10.5	11.0	13.4	10.6	7.7	10.7
Dung	13.7	15.0	16.1	11.9	11.9	13.8
No straw	10.8	12.4	13.7	12.1	9.3	11.6
Straw	13.3	13.7	15.8	10.4	10.4	12.7
Sulphate of Ammonia						
0.4 cwt. N per acre	9.6	11.8	15.3	11.1	9.1	11.4
0.8 cwt. N per acre	14.5	14.2	14.1	11.3	10.6	13.0
Mean ± 1.08	12.0	13.0	14.7	11.2	9.8	12.2
			<u>1941</u> ± 0.86			± 0.38
No dung	11.0	11.5	12.5	10.1	11.4	11.3
Dung	12.9	12.6	14.7	11.7	14.4	13.3
No straw	12.3	11.5	13.8	11.0	12.8	12.3
Straw	11.6	12.6	13.6	10.7	13.0	12.3
Sulphate of Ammonia						
0.4 cwt. N per acre	11.7	10.7	12.0	9.5	12.5	11.3
0.8 cwt. N per acre	12.2	13.4	15.3	12.3	13.3	13.3
Mean ± 0.61	12.0	12.0	13.7	10.8	12.9	12.3

		Barley					
		Grain: cwt. per acre					
		Means					
Leys and green manures before kale:	None	Tares	Clover	Mustard	Rye- grass	Mean	
		<u>1942</u>					
Manures applied to previous kale			± 0.84			± 0.37	
No dung	9.0	8.3	7.1	8.1	9.8	8.5	
Dung	11.2	12.1	10.7	10.3	12.0	11.3	
No straw	9.6	8.9	8.1	9.4	9.8	9.2	
Straw	10.6	11.4	9.7	9.0	12.0	10.5	
Sulphate of Ammonia							
0.4 cwt.N per acre	9.0	10.4	8.3	9.6	11.1	9.7	
0.8 cwt.N per acre	11.3	10.0	9.5	8.8	10.7	10.1	
Mean ± 0.59	10.1	10.2	8.9	9.2	10.9	9.9	
		<u>1943</u>					
			± 1.76			± 0.79	
No dung	7.4	11.0	9.9	7.1	6.6	8.4	
Dung	13.1	11.4	11.2	13.2	11.2	12.0	
No straw	9.1	12.3	11.6	8.7	8.8	10.1	
Straw	11.5	10.1	9.5	11.6	9.0	10.3	
Sulphate of Ammonia							
0.4 cwt.N per acre	10.2	12.0	10.4	8.9	9.6	10.2	
0.8 cwt.N per acre	10.4	10.4	10.7	11.3	8.2	10.2	
Mean ± 1.24	10.3	11.2	10.6	10.1	8.9	10.2	
		<u>1944</u>					
			± 1.06			± 0.48	
No dung	9.9	10.1	8.6	8.2	7.0	8.8	
Dung	8.6	10.5	8.1	8.7	12.0	9.6	
No straw	9.6	10.4	7.4	8.6	7.9	8.8	
Straw	8.9	10.2	9.3	8.4	11.1	9.6	
Sulphate of Ammonia							
0.4 cwt.N per acre	10.0	10.6	7.5	9.3	9.2	9.3	
0.8 cwt.N per acre	8.5	10.0	9.3	7.7	9.8	9.1	
Sulphate of Ammonia applied to Barley							
None	7.3	9.4	6.5	7.9	9.8	8.2	
0.3 cwt.N per acre	11.2	11.2	10.3	9.1	9.2	10.2	
Mean ± 0.75	9.2	10.3	8.4	8.5	9.5	9.2	

Barley
Grain: cwt. per acre

Means

X Leys and green manures
before kale

	None	Tares	Clover	Mustard	Rye- grass	Mean
			<u>1945</u>			
			±0.60			±0.27
No dung	13.4	15.4	13.2	13.6	13.2	13.8
Dung to kale	16.7	15.2	15.8	18.2	14.2	16.0
No straw	16.3	14.3	14.1	15.5	13.7	14.8
Straw to kale	13.8	16.3	14.8	16.3	13.7	15.0
Sulph. of Amm. to kale						
0.4 cwt. N per acre	16.2	15.4	14.1	15.8	13.2	14.9
0.8 cwt. N per acre	13.9	15.2	14.9	16.0	14.2	14.8
Sulph. of Amm. to Barley						
None	10.9	10.7	10.3	9.6	9.8	10.3
0.4 cwt. N per acre	19.2	19.9	18.6	22.2	17.6	19.5
Mean ±0.42	15.0	15.3	14.5	15.9	13.7	14.9
			<u>1946</u>			
			±0.90			±0.40
No dung	10.5	9.4	9.8	10.6	9.9	10.0
Dung to kale in 1945 [‡]	9.6	10.5	10.2	9.8	9.8	10.0
No straw	10.5	9.5	11.4	9.6	8.4	9.9
Straw to kale in 1945 [‡]	9.6	10.4	8.6	10.8	11.3	10.1
Sulph. of Amm. to kale in 1945 [‡]						
0.4 cwt. N per acre	10.3	10.4	8.4	11.6	7.8	9.7
0.8 cwt. N per acre	9.8	9.5	11.6	8.8	11.8	10.3
Sulph. of Amm. to Barley						
None	5.5	6.4	4.4	6.8	5.8	5.8
0.4 cwt. N per acre	14.6	13.5	15.7	13.6	13.8	14.2
Mean ±0.63	10.0	10.0	10.0	10.2	9.8	10.0

[‡]The Kale crop of 1945 failed and therefore no manures were applied.

Barley

Grain: cwt. per acre

Means

Leys and green manures before cabbages	None	Lupins	Clover	Rape	Rye- grass	Mean
			<u>1947</u>			
			± 0.96			
No dung	14.2	15.2	12.0	14.2	13.1	13.7
Dung to cabbages	18.3	17.8	16.2	18.0	16.6	17.4
No straw	16.5	16.1	14.0	16.1	14.8	15.5
Straw to cabbages	16.1	16.8	14.2	16.1	14.9	15.6
Sulphate of ammonia to Cabbages						
0.4 cwt.N per acre	16.2	16.0	13.4	16.3	15.9	15.6
0.8 cwt.N per acre	16.4	16.9	14.9	15.9	13.9	15.6
Sulphate of ammonia to Barley						
None	14.3	14.3	13.1	13.8	13.2	13.7
0.4 cwt.N per acre	18.3	18.6	15.1	18.5	16.6	17.4
Mean ± 0.68	16.3	16.5	14.1	16.1	14.9	15.6

Barley

Straw: cwt. per acre

Means

Leys and green manures before kale:	None	Tares	Clover	Mustard	Rye- grass	Mean
			<u>1943</u>			
No dung	8.9	12.5	14.2	8.8	8.9	10.7
Dung to kale	15.8	14.2	17.2	17.4	15.0	15.9
No straw	11.1	14.5	17.1	11.9	11.6	13.2
Straw to kale	13.6	12.2	14.3	14.4	12.3	13.4
Sulphate of ammonia to kale						
0.4 cwt.N per acre	12.4	13.5	15.2	12.2	11.7	13.0
0.8 cwt.N per acre	12.2	13.1	16.2	14.1	12.2	13.6
Mean	12.3	13.3	15.7	13.1	12.0	13.3

Barley

Straw: cwt. per acre

Means

Leys and green manures before kale:	None	Tares	Clover	Mustard	Rye- grass	Mean
			<u>1944</u>			
			± 0.97			± 0.43
No dung	12.3	12.8	11.0	10.6	8.4	11.0
Dung to kale	12.4	15.4	10.8	10.1	14.7	12.7
No straw	12.5	13.5	10.2	10.3	9.9	11.3
Straw to kale	12.1	14.8	11.6	10.3	13.2	12.4
Sulphate of ammonia to kale						
0.4 cwt. N per acre	12.6	15.1	10.5	11.1	11.4	12.1
0.8 cwt. N per acre	12.1	13.1	11.3	9.6	11.7	11.6
Sulphate of ammonia to barley						
None	9.8	13.2	8.3	9.7	12.2	10.6
0.3 cwt. N per acre	14.8	15.1	13.5	10.9	10.9	13.0
Mean ± 0.69	12.3	14.1	10.9	10.3	11.6	11.8
			<u>1945</u>			
			± 1.18			± 0.53
No dung	15.3	16.2	14.6	14.5	13.8	14.9
Dung to kale	20.8	18.7	18.8	19.5	16.1	18.8
No straw	18.6	16.8	16.3	16.8	14.8	16.7
Straw to kale	17.5	18.1	17.1	17.2	15.1	17.9
Sulphate of ammonia to kale						
0.4 cwt. N per acre	19.0	18.6	15.9	17.3	14.1	17.0
0.8 cwt. N per acre	17.1	16.3	17.5	16.7	15.8	16.7
Sulphate of ammonia to barley						
None	13.4	12.1	12.3	10.7	11.7	12.0
0.4 cwt. N per acre	22.7	22.8	21.1	23.3	18.2	21.6
Mean ± 0.84	18.0	17.4	16.7	17.0	15.0	16.8

Barley

Straw: cwt. per acre

Means

Leys and green manures before kale ⁽¹⁾	None	Tares ⁽²⁾	1946			Rye- grass	Mean
			Clover	Mustard ⁽³⁾			
No dung	14.1	12.9	13.6	14.2	11.4	13.2	
Dung to kale in 1943 [‡]	16.0	17.8	15.2	14.0	12.9	15.2	
No straw	14.6	14.1	15.1	14.0	11.2	13.8	
Straw to kale in 1943 [‡]	15.4	16.6	13.8	14.2	13.1	14.6	
Sulphate of ammonia to kale 1943 [‡]							
0.4 cwt.N per acre	14.4	15.6	13.8	15.4	11.2	14.1	
0.8 cwt.N per acre	15.7	15.1	15.0	12.7	13.1	14.3	
Sulphate of ammonia to barley							
None	8.6	10.4	9.4	10.2	7.5	9.2	
0.4 cwt.N per acre	21.4	20.3	19.4	17.9	16.8	19.2	
Mean	15.0	15.3	14.4	14.1	12.2	14.2	
			1947				
			±0.78				±0.35
No dung	14.4	15.6	12.4	14.8	14.4	14.3	
Dung to cabbages	19.1	18.2	16.4	18.7	18.1	18.1	
No straw	16.7	16.9	13.7	17.3	16.0	16.1	
Straw to cabbages	16.8	16.9	15.1	16.2	16.5	16.3	
Sulphate of ammonia to cabbages							
0.4 cwt.N per acre	16.6	16.3	13.7	16.3	17.0	16.0	
0.8 cwt.N per acre	16.9	17.5	15.0	17.1	15.5	16.4	
Sulphate of ammonia to barley							
None	14.3	15.2	13.3	14.4	15.3	14.5	
0.4 cwt.N per acre	19.2	18.6	15.5	19.1	17.2	17.9	
Mean ±0.55	16.8	16.9	14.4	16.7	16.2	16.2	

[‡] The kale crop of 1945 failed and therefore no manures were applied.

Note. The following changes in headings are applicable to the 1947 barley results.

1. Cabbages replaced Kale. 2. Lupins replaced Tares. 3. Rape replaced Mustard.

Standard errors per plot.

Grain: cwt. per acre		Straw: cwt. per acre	
1939	2.32 or 14.3%	1945	1.21 or 8.1%
1940	3.06 or 25.1%	1946	1.79 or 17.9%
1941	1.72 or 14.0%	1947	1.93 or 12.4%
1942	1.67 or 16.9%		
1943	3.51 or 34.3%		
1944	2.13 or 23.2%		

These are based on 16. d.f., 1939-1943

9 d.f., 1944-1947

Differential Responses

Barley. Grain: cwt. per acre

Response to	Mean	Dung		Straw		Sulphate of Ammonia cwt. N per acre		to Barley Abs. Pres.	
		Abs. Pres.	Abs. Pres.	Abs. Pres.	Abs. Pres.	0.4.	0.8	Abs. Pres.	Abs. Pres.
<u>1939</u>	± 0.74								
Dung	2.6	-	-	3.2	2.0	3.6	1.6		
Straw	0.6	1.2	0.0	-	-	0.5	0.7		
Sulph. of Amm.	1.0	2.0	0.0	0.9	1.1	-	-		
<u>1940</u>	± 0.97								
Dung	3.1	-	-	3.6	2.6	3.8	2.4		
Straw	1.1	1.6	0.6	-	-	0.6	1.6		
Sulph. of Amm.	1.6	2.3	0.9	1.1	2.1	-	-		
<u>1941</u>	± 0.54								
Dung	2.0	-	-	1.9	2.1	2.7	1.3		
Straw	0.0	-0.1	0.1	-	-	0.3	-0.3		
Sulph. of Amm.	2.0	2.7	1.3	2.3	1.7	-	-		
<u>1942</u>	± 0.53								
Dung	2.8	-	-	3.2	2.4	3.4	2.2		
Straw	1.3	1.7	0.9	-	-	1.0	1.6		
Sulph. of Amm.	0.4	0.9	-0.1	0.1	0.7	-	-		
<u>1943</u>	± 0.98								
Dung	3.6	-	-	5.1	2.1	4.7	2.5		
Straw	0.2	1.7	-1.3	-	-	2.2	-1.8		
Sulph. of Amm.	0.0	1.1	-1.1	2.0	-2.0	-	-		
<u>1944</u>	± 0.67								
Dung	0.8	-	-	2.1	-0.5	0.7	0.9	0.8	0.8
Straw	0.8	2.1	-0.5	-	-	1.5	0.0	0.7	0.8
Sulph. of Amm.	-0.3	-0.4	-0.2	0.5	-1.0	-	-	-0.6	0.0
Sulph. of Amm. to Barley	2.0	2.0	2.1	2.0	2.1	1.8	2.4	-	-
<u>1945</u>	± 0.38								
Dung	2.3	-	-	2.7	1.9	3.1	1.5	1.7	2.9
Straw	0.2	0.6	-0.2	-	-	0.1	0.3	0.2	0.2
Sulph. of Amm.	-0.1	0.7	-0.9	-0.2	0.0	-	-	-1.0	0.8
Sulph. of Amm. to Barley	9.2	8.6	9.8	9.2	9.2	8.3	10.1	-	-
<u>1946</u>	± 0.57								
Dung	-0.1	-	-	0.1	-0.2	0.5	-0.6	-0.1	0.0
Straw	0.2	0.4	0.1	-	-	-0.7	1.2	1.0	-0.5
Sulph. of Amm.	0.6	1.2	0.1	-0.3	1.5	-	-	1.7	-0.5
Sulph. of Amm. to Barley	8.5	8.4	8.6	9.2	7.8	9.6	7.4	-	-
<u>1947</u>	± 0.61								
Dung	3.6	-	-	3.9	3.3	5.0	2.2	2.5	4.7
Straw	0.1	0.4	-0.2	-	-	0.3	-0.1	-1.5	1.7
Sulph. of Amm.	0.0	1.4	-1.4	0.2	-0.2	-	-	0.4	-0.4
Sulph. of Amm. to Barley	3.7	2.6	4.8	2.1	5.3	4.1	3.3	-	-

All treatments were applied to the previous Kale (or Cabbage) unless otherwise stated.

Differential Responses

Barley. Straw: cwt. per acre

Response to	Mean	Dung		Straw		Sulphate of Ammonia cwt. N per acre		to Barley	
		Abs. Pres.	Abs. Pres.	Abs. Pres.	Abs. Pres.	0.4	0.8	Abs. Pres.	Abs. Pres.
<u>1943</u>									
Dung	5.2	-	-	7.2	3.2	5.6	4.8		
Straw	0.1	2.1	-1.9	-	-	1.7	-1.5		
Sulph. of Amm.	0.6	1.0	0.2	2.2	-1.0	-	-		
	± 0.61			± 0.87					
<u>1944</u>									
Dung	1.6	-	-	3.3	-0.1	1.5	1.8	0.8	2.4
Straw	1.1	2.8	-0.6	-	-	2.2	0.0	1.1	1.2
Sulph. of Amm.	-0.6	-0.8	-0.4	0.5	-1.7	-	-	-1.3	0.1
Sulph. of Amm. to Barley	2.4	1.6	3.2	2.4	2.4	1.7	3.1	-	-
	± 0.75			± 1.07					
<u>1945</u>									
Dung	3.9	-	-	4.7	3.1	5.1	2.7	3.8	4.0
Straw	0.3	1.1	-0.5	-	-	0.2	0.4	-0.5	1.1
Sulph. of Amm.	-0.3	0.9	-1.5	-0.4	-0.2	-	-	-1.3	0.7
Sulph. of Amm. to Barley	9.6	9.5	9.7	8.8	10.4	8.6	10.6	-	-
	\pm								
<u>1946</u>									
Dung	2.0	-	-	2.1	1.8	2.6	1.3	1.3	2.6
Straw	0.8	1.0	0.7	-	-	0.5	1.1	1.7	0.0
Sulph. of Amm.	0.2	0.9	-0.4	-0.1	0.5	-	-	1.1	-0.7
Sulph. of Amm. to Barley	9.9	9.3	10.6	10.8	9.1	10.8	9.1	-	-
	± 0.49			± 0.71					
<u>1947</u>									
Dung	3.8	-	-	3.0	4.6	4.9	2.7	3.1	4.5
Straw	0.2	-0.6	1.0	-	-	0.0	0.4	-0.7	1.1
Sulph. of Amm.	0.4	1.5	-0.7	0.2	0.6	-	-	2.0	-1.2
Sulph. of Amm. to Barley	3.4	2.7	4.1	2.5	4.3	5.0	1.8	-	-

All treatments were applied to the previous Kale (or Cabbage) unless otherwise stated.

No replic within years

3 yrs on each series: from each

plot take mean

lin Regr

Rem = within-plot errors

Treatment totals \times series \rightarrow between plot errors

But also replic within years for first 5 years

LEY AND ARABLE ROTATIONS EXPERIMENT

Woburn, Stackyard, Series D (begun in 1938)

The purpose of the experiment is to test the value of a three year ley, three years of lucerne and an arable rotation with a one year ley, as means of building up soil fertility, in comparison with a rotation without leys. The effects of these crop sequences are measured by the yields of two following crops of potatoes and barley, which may be termed the indicator crops. Each rotation therefore has five courses. The rotations compared are:-

- | | | |
|--|---|------------------|
| (1) Three year ley | } | Potatoes, barley |
| (2) Three years of lucerne | | |
| (3) Potatoes, wheat, one year ley [⊥] | | |
| (4) Potatoes, wheat, kale | | |

There are five series, one for each course of the five year rotation, so that all courses of every rotation are represented every year. Each series has eight main plots, on four of which the same rotation continues throughout the experiment. On the other four plots, ley and arable rotations alternate.

Each main plot is divided into two sub-plots, one of which receives dung at the rate of 15 tons per acre applied to the indicator crop of potatoes only. The same sub-plots receive dung throughout the experiment. All plots are liberally manured with inorganic fertilizers.

Details are as given in the 1938 Report pp. 135-137, except that owing to the unsatisfactory crops obtained on the kale plots in the years 1938-44 it was decided to substitute sugar beet for kale as from 1945.

Owing to an error in the chain used, the sub-plot area has been given previously as 0.0390 acre. The correct value is 0.0403 acre. Consequently the yields given in the Station Report for 1938 should be multiplied by 0.968. The correct values for 1938 are included in this Report.

[⊥] The one year ley will be referred to as "hay", to distinguish from the three year ley. The geological term "series" is used to denote the area under each crop in a rotation experiment. However, in this experiment the word "block" is used with the same meaning.

Crop Notes

Bf/1.2

First three years of each Rotation

Previous crop - Barley

Rotation 1. Ley

Grass Mixture

	lb. per acre		lb. per acre
Perennial Ryegrass	14	Wild White Clover	2
Cocksfoot	8	Italian Ryegrass (1941	10
Late Flowering Red Clover	4	and onwards only)	

First year	Block	Sown	First year Grazed by sheep	Second year Grazed by sheep	Third year Grazed by sheep
1938	3	May 20	Aug. 3 - Sept. 14 2 grazings = 16 days	Apr. 13 - Oct. 17 9 grazings = 108 days	Apr. 27 - Oct. 16 4 grazings = 55 days
1939	5	May 4	Aug. 16 - Oct. 20 3 grazings = 28 days	Apr. 17 - Oct. 25 5 grazings = 119 days	May 5 - Oct. 26 4 grazings = 94 days
1940	4	May 6	Aug. 26 - Nov. 2 2 grazings = 30 days	May 5 - Oct. 18 4 grazings = 65 days	May 27 - Sept. 19 4 grazings = 38 days
1941	2	May 14	No grazing ¹	May 19 - Sept. 14 4 grazings = 46 days	Aug. 31 - Oct. 1 3 grazings = 17 days ²
1942	1	May 15	Aug. 24 - Sept. 8 1 grazing, on half plots	Sept. 8 ³ - Oct. 20 3 grazings = 21 days	June 21 ³ - Oct. 27 4 grazings = 46 days
1943	3	Apr. 28	Oct. 20 1 grazing ⁴	July 12 - Nov. 5 4 grazings = 44 days	May 26 - Sept. 29 4 grazings = 70 days
1944	5	May 8	July 28 - Nov. 13 4 grazings = 34 days	June 11 - Oct. 28 4 grazings = 62 days	May 9 - Nov. 19 6 grazings = 95 days
1945	4	May 7	Aug. 10 - Oct. 15 2 grazings = 41 days	May 25 - Nov. 3 5 grazings = 85 days	May 21 - Oct. 19 4 grazings = 48 days
1946	2	May 1	Aug. 15 - Nov. 10 3 grazings = 24 days	May 5 - Oct. 15 4 grazings = 51 days	
1947	1	May 1	Oct. 3 - 11 1 grazing = 9 days		

- Owing to an unfavourable season, and because the wrong quantity of manure was applied.
- Prior to the grazings there was one cut of hay on June 22.
- The sheep were put on late owing to war conditions.
- There was one cut, on July 15, to get rid of annual weeds.

X

Ley and Arable Rotations Experiment

Bf/1.3

Rotation 2. Lucerne

Variety: Provence 1939-1944, Grim 1945, Argentine 1946.

First year	Block	First year			Second year			Third year		
		Sown	1st cut	2nd cut	1st cut	2nd cut	3rd cut	1st cut	2nd cut	3rd cut
1938	3	May 20	Sept. 14	-	July 6	Aug. 18	Nov. 13	July 10	Sept. 4	Dec. 22
1939	5	May 4	Aug. 19	Nov. 13	July 10	Sept. 4	-	June 17	Aug. 12	Dec. 22
1940	4	May 6 [†]	Sept. 4	-	June 24	Aug. 12	Dec. 22	June 26	Sept. 16	-
1941	2	May 14	Aug. 12	-	June 26	Sept. 16	-	June 7	Aug. 31	-
1942	1	May 15	Sept. 16	-	June 7	Aug. 31	-	June 6	Aug. 8	-
<hr/>										
1943	3	May 6	-	-	June 6	Sept. 4	-	June 8	Aug. 13	Nov. 12
1944	5	May 9	Sept. 12	-	June 8	Aug. 13	Nov. 12	June 25	Sept. 16	Dec. 10
1945	4	May 7	Aug. 13	Nov. 12	June 26	Sept. 16	-	June 11	July 31	Oct. 3
1946	2	May 1	Sept. 16	-	June 26	July 31	-			
1947	1	May 7	Oct. 3	-						

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[†]Bad patches reseeded June 11.

Rotations 3 and 4. First year - Potatoes, second year - Wheat, third year - Hay (Rot.3) and Kale or Sugar Beet (Rot.4).

Varieties:

Potatoes - Majestic

Wheat - Red Standard

Grass mixture { 16 lb. Italian Ryegrass and 10 lb. Broad Red Clover, 1940-44.
 24 lb. " " " 12 lb. " " " 1945.
 24 lb. " " " 12 lb. Montgomery Red Clover, 1946.

Kale - Thousand Head

Sugar Beet- Kleinwanzleben E.

First year	Block	1st year		Second year		Third year		Kale (Rot.4)		
		Potatoes Sown	Harvest- ed	Wheat Sown	Harvest- ed	Hay (Rot.3) Sown	1st cut	2nd cut	Sown	Harvest- ed
1938	3	Apr. 23	Sept. 22	31.10.38	Aug. 14	27.4.39	June 20		May 6	Dec. 30
1939	5	Apr. 25	Sept. 12	2.11.39	Aug. 12	3.5.40	June 17	Aug. 12	Apr. 29	Dec. 16
1940	4	Apr. 26	Sept. 20	16.10.40	Aug. 14	5.5.41	June 25	Sept. 16	Apr. 22	Dec. 29
1941	2	Apr. 24	Oct. 15	24.3.42 [†]	Sept. 15	20.5.42	1 cut, date unknown		Crop failed	
1942	1	Apr. 21	Oct. 5	(Eaten by rats)		16.4.43	June 6	Sept. 12	May 9 [†]	7.2.45
<hr/>										
1943	3	May 13	Sept. 22	11.10.43	Aug. 10	9.5.44	June 8	Aug. 13	Sugar beet May 3 Nov. 26	
1944	5	Apr. 28	Sept. 20	May 10 [†]	Aug. 10	10.5.45	June 24	Sept. 16	May 2	Oct. 12
1945	4	Apr. 27	Oct. 2	2.10.45	Aug. 22	19.5.46	June 11	July 31	May 2	Oct. 17
1946	2	Apr. 26	Oct. 8	6.11.46	Aug. 6					
1947	1	May 12	Oct. 10							

[†]Second sowing, first sowing failed.

N

Indicator Crops - Potatoes and Barley

Fourth and fifth years of rotations

Varieties: Potatoes - Majestic; Barley - Plumage Archer

Year	Block	Potatoes			Block	Barley		
		Sown	Harvested	Sown		Harvested		
1938	4	Prior to	Apr. 22	Sept. 30	5	Mar. 9	Mar. 19	Aug. 25
1939	2	rotations	Apr. 24	Sept. 20	4		Mar. 2	Aug. 30
1940	1		Apr. 12	Sept. 25	2	Prior to	Mar. 21	Aug. 30
1941	3	Fourth year	Apr. 18	Nov. 7	1	rotations	Mar. 17	Aug. 27
1942	5	of Cycle 1	Apr. 17	Oct. 9	3	Fifth year	Apr. 13	Aug. 19
1943	4	of	Apr. 14	Sept. 23	5	of Cycle 1	Mar. 4	Aug. 25
1944	2	rotations	Apr. 27	Oct. 2	4	of	Mar. 14	Aug. 30
1945	1		Apr. 26	Oct. 11	2	rotations	Mar. 2	Aug. 10
1946	3	Fourth year	Apr. 29	Oct. 6	1		Mar. 20	Aug. 23
1947	5	of Cycle 2	Apr. 12	Oct. 2	3	Fifth year	Apr. 17	Aug. 12
						of Cycle 2		

Rotation 1. Ley

Sheep-days of grazing per acre

First Cycle

Block 3			Block 5			Block 4		
1938	1939	1940	1939	1940	1941	1940	1941	1942
596	3667	2103	1135	1898	2062	645	1347	1344
Block 2			Block 1					
1941	1942	1943	1942	1943	1944			
None	1833	453	721	429	1050			

Second Cycle

Block 3			Block 5			Block 4		
1943	1944	1945	1944	1945	1946	1945	1946	1947
143	955	1910	764	1695	3101	1146	2787	1840
Block 2			Block 1					
1946	1947		1947					
811	1840		387					

Ley and Arable Rotations ExperimentRotation 2. Lucerne

Yields obtained during first three years of each rotation

Hay (85% dry matter), tons per acre

First Block year	First year			Second year				Third year				
	Crops:	1st	2nd	Total	1st	2nd	3rd	Total	1st	2nd	3rd	Total
1938	3	0.61	-	0.61	0.81	0.54	0.14	1.49	1.86	0.78	-	2.64
1939	5	0.34	0.08	0.42	1.36	0.73	-	2.09	1.48	1.26	0.12	2.87
1940	4	1.05	-	1.05	1.51	0.97	0.11	2.59	2.03	0.83	-	2.86
1941	2	0.39	-	0.39	2.05	0.53	-	2.58	1.67	0.64	-	2.31
1942	1	0.32	-	0.32	1.29	0.77	-	2.06	1.96	1.58	-	3.54

First year	Block	First year			Second year				Third year			
		1st	2nd	Total	1st	2nd	3rd	Total	1st	2nd	3rd	Total
1943	3											
No dung	Not cut			-	1.58	0.86	-	2.44	1.84	1.36	0.10	3.30
Dung (1941)				-	1.48	0.87	-	2.35	1.76	1.10	0.06	2.92
Mean				-	1.53	0.86	-	2.39	1.80	1.23	0.08	3.11
Increase			-	-0.10	0.01	-	-0.09	-0.08	-0.26	-0.04	-0.38	
Previous rotation:												
Lucerne				-	1.42	0.77	-	2.19	1.68	1.22	0.09	2.99
Arable				-	1.64	0.96	-	2.60	1.92	1.23	0.07	3.22
1944	5											
No dung	Not cut	0.94	-	0.94	1.43	1.24	0.20	2.87	2.26	2.08	0.04	4.38
Dung (1942)		1.00	-	1.00	1.50	1.28	0.24	3.02	2.54	1.90	0.10	4.54
Mean		0.97	-	0.97	1.46	1.26	0.22	2.94	2.40	1.99	0.07	4.46
Increase	0.06	-	0.06	0.07	0.04	0.04	0.15	0.28	-0.18	0.06	0.16	
Previous rotation:												
Lucerne		1.08	-	1.08	1.87	1.38	0.26	3.51	2.28	2.04	0.06	4.38
Arable		0.85	-	0.85	1.06	1.14	0.18	2.38	2.52	1.94	0.08	4.54
1945	4											
No dung	Not cut	0.74	0.05	0.79	1.44	1.18	-	2.62	1.96	0.77	0.06	2.78
Dung (1943)		0.70	0.04	0.74	1.76	1.25	-	3.01	2.04	1.02	0.04	3.10
Mean		0.72	0.04	0.76	1.60	1.22	-	2.82	2.00	0.89	0.05	2.94
Increase	-0.04	-0.01	-0.05	0.32	0.07	-	0.39	0.08	0.26	-0.02	0.32	
Previous rotation:												
Lucerne		0.84	0.04	0.88	1.76	1.20	-	2.96	2.12	0.96	0.05	3.13
Arable		0.60	0.06	0.66	1.44	1.24	-	2.68	1.87	0.83	0.06	2.75

Lucerne Hay, tons per acre

Bf/1.6

First

Second Cycle (continued)

First year	Block	First year			Second year				Third year			
		1st	2nd	Total	1st	2nd	3rd	Total	1st	2nd	3rd	Total
1946	2											
No dung		0.53	-	0.53	0.64	0.25	-	0.89				
Dung (1944)		0.51	-	0.51	0.72	0.34	-	1.06				
Mean		0.52	-	0.52	0.68	0.29	-	0.97				
Increase		-0.02	-	-0.02	0.08	0.09	-	0.17				
Previous rotation:												
Lucerne		0.62	-	0.62	0.48	0.31	-	0.79				
Arable		0.42	-	0.42	0.88	0.28	-	1.16				
1947	1											
No dung		0.10	-	0.10								
Dung (1945)		0.07	-	0.07								
Mean		0.09	-	0.09								
Increase		-0.03	-	-0.03								
Previous rotation:												
Lucerne		0.09	-	0.09								
Arable		0.08	-	0.08								

Ley and Arable Rotations ExperimentRotations 3 and 4

First year - Potatoes, total tubers in tons per acre; percentage ware

	Total tubers	% ware	Total tubers	% ware	Total tubers	% ware	Total tubers	% ware
	<u>1938 - Block 3</u>		<u>1939 - Block 5</u>		<u>1940 - Block 4</u>		<u>1941 - Block 2</u>	
No dung					9.71	87.0	12.06	82.3
Dung [‡]					11.50	89.1	12.19	80.6
Mean	12.77	92.2	11.13	85.4	10.61	88.0	12.12	81.4
Increase	-	-	-	-	1.79	2.1	0.13	-1.7
	(Second cycle)							
	<u>1942 - Block 1</u>		<u>1943 - Block 3</u>		<u>1944 - Block 5</u>		<u>1945 - Block 4</u>	
No dung	9.24	75.8	7.76	75.7	12.18	86.0	11.71	86.4
Dung [‡]	9.59	75.5	9.53	80.7	13.33	86.0	13.28	88.9
Mean	9.41	75.6	8.64	78.2	12.75	86.0	12.50	87.6
Increase	0.35	-0.3	1.77	5.0	1.15	0.0	1.57	2.5
Previous rotation:								
Ley			10.48	82.6	12.54	86.8	11.66	88.6
Lucerne			8.28	76.8	13.26	86.1	13.82	87.6
Arable with hay			8.74	82.4	12.75	85.1	12.56	89.5
Arable with kale			7.08	70.9	12.46	86.2	11.94	85.2
	<u>1946 - Block 2</u>		<u>1947 - Block 1</u>					
No dung	8.04	87.2	6.11	91.9				
Dung [‡]	9.13	87.6	6.24	90.4				
Mean	8.58	87.4	6.18	91.2				
Increase	1.09	0.4	0.13	-1.5				
Previous rotation:								
Ley	10.21	89.2	6.90	91.6				
Lucerne	8.69	89.2	6.67	92.0				
Arable with hay	7.32	86.8	5.32	91.0				
Arable with kale	8.12	84.3	5.81	90.1				

[‡]Dung was applied two years previously, e.g. in 1938 on Block 4.

Rotations 3 and 4

Second year - Wheat, grain and straw in cwt. per acre

	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
First Cycle								
	<u>1939 - Block 3</u>		<u>1940 - Block 5</u>		<u>1941 - Block 4</u>		<u>1942 - Block 2</u>	
No dung [‡]					8.7	14.3	Crop complete	
Dung					9.5	16.2	failure	
Mean	12.9	22.5	15.2	24.2	9.1	15.2		
Increase	-	-	-	-	0.8	1.9		
	<u>1943 - Block 1</u>							
	Crop eaten by rats							
Second cycle								
	<u>1944 - Block 3</u>		<u>1945 - Block 5</u>		<u>1946 - Block 4</u>		<u>1947 - Block 2</u>	
No dung [‡]	9.1	23.3	13.7	30.2	10.8	18.0	7.7	14.8
Dung	11.3	27.8	14.0	25.8	12.6	24.2	8.8	14.8
Mean	10.2	25.6	13.8	28.0	11.7	21.1	8.2	14.8
Increase	2.2	4.5	0.3	-4.4	1.8	6.2	1.1	0.0
Previous rotation:								
Ley	14.1	32.1	15.2	33.4	12.1	21.5	9.6	18.4
Lucerne	10.6	24.3	15.0	26.0	12.7	21.9	8.6	13.5
Arable with hay	11.2	27.6	11.0	22.2	8.6	14.2	5.5	10.5
Arable with kale	5.0	18.1	14.2	30.4	13.3	26.8	9.3	16.8

[‡] The dung was applied three years previously, e.g. in 1938 on block 4, etc.

Ley and Arable Rotations ExperimentRotation 3

Third year - Hay, yield (85% dry matter) in tons per acre

	First Crop	Second Crop	Total	First Crop	Second Crop	Total	First Crop	Second Crop	Total
				First cycle					
	<u>1940 - Block 3</u>			<u>1941 - Block 5</u>					
	0.78	-	0.78	1.31	0.33	1.64			
	<u>1942 - Block 4</u>			<u>1943 - Block 2</u>			<u>1944 - Block 1</u>		
No dung [#]	1.85	0.22	2.07	1.04	-	1.04	1.02	0.37	1.38
Dung [#]	2.10	0.21	2.31	1.12	-	1.12	1.02	0.34	1.36
Mean	1.98	0.21	2.19	1.08	-	1.08	1.02	0.35	1.37
Increase	0.25	-0.01	0.24	0.08	-	0.08	-	-0.03	-0.02
				Second cycle					
	<u>1945 - Block 3</u>			<u>1946 - Block 5</u>			<u>1947 - Block 4</u>		
No dung [#]	1.32	0.33	1.65	2.64	1.12	3.76	1.76	0.32	2.07
Dung [#]	1.62	0.39	2.01	2.80	1.16	3.96	1.89	0.23	2.12
Mean	1.47	0.36	1.83	2.72	1.14	3.86	1.82	0.27	2.10
Increase	0.30	0.06	0.36	0.16	0.04	0.20	0.13	-0.09	0.05
Previous rotation:									
Ley	1.27	0.30	1.57				2.18	0.40	2.59
Lucerne				2.86	1.20	4.06			
Arable									
with hay	1.68	0.42	2.10	2.58	1.07	3.65	1.46	0.14	1.60

[#]Dung was applied four years previously, e.g. in 1938 on Block 4 etc.

Rotation 4Third year - Kale, in tons per acre, Cycle 1 orSugar Beet, clean beet and tops in tons per acre, total sugar in cwt. per acre and sugar percentage, Cycle 2.

Block	Cycle 1. Kale				
	1940 3	1941 5	1942 4	1943 2	1944 1
No dung			7.15	Crop	4.94
Dung			7.62	failed	4.27
Mean	7.34	9.35	7.38		4.60
Increase			0.47		-0.67

Cycle 2. Sugar Beet.

	1945 - Block 3				1946 - Block 5			
	Clean beet	Tops	Total Sugar	Sugar %	Clean beet	Tops	Total sugar	Sugar %
No dung	6.2	2.8	21.9	17.47	7.29	7.29	27.9	19.14
Dung	7.9	3.4	27.2	17.20	8.12	7.45	31.7	19.53
Mean	7.0	3.1	24.6	17.34	7.70	7.37	29.8	19.34
Increase	1.7	0.6	5.3	-0.27	0.83	0.16	3.8	0.39
Previous rotation:								
Ley					8.16	7.88	31.2	19.10
Lucerne	7.2	3.0	25.4	17.60				
Arable with kale	6.9	3.1	23.6	17.08	7.24	6.86	28.3	19.57

Dung was applied four years previously, e.g. in 1938 on Block 4, etc.

	1947 - Block 4			
No dung	4.97	2.88	20.7	20.82
Dung	8.63	4.82	35.4	20.52
Mean	6.80	3.85	28.1	20.67
Increase	3.66	1.94	14.7	-0.30
Previous rotation:				
Ley				
Lucerne	7.42	4.21	30.9	20.82
Arable with kale	6.18	3.49	25.3	20.52

Ley and Arable Rotations Experiment

Yields of Indicator Crops

Potatoes - effect of dung in current year

Total tubers, tons per acre				Percentage ware			
<u>Prior to rotations</u>							
1938 - Block 4				1939 - Block 2			
No dung	11.41			10.89			
Dung	15.47			12.52			
Mean	13.44			11.69			
Increase	4.06	(±0.32)		1.63	(±0.11)		
1940 - Block 1							
	After Hay	After Kale	Mean		After Hay	After Kale	Mean
No dung	8.23	±0.64 ¹ 6.75	7.49		82.0	±2.0 ¹ 76.6	79.3
Dung	9.83	7.85	8.84		82.4	79.5	81.0
Mean	±0.59	9.02	7.30	8.16	±1.70	82.2	78.0
Resp.	±0.50	1.60	1.10	1.35	±2.36	0.4	2.9
			±0.36				±1.67

Fourth year of cycles

Previous crop rotation						Previous crop rotation					
Arable						Arable					
Lu- with						Lu- with					
Ley cerne Hay Kale Mean						Ley cerne Hay Kale Mean					
1941 - Block 3						±0.45 ¹					
No dung	15.19	11.15	11.82	9.35	11.88	87.6	84.1	83.4	82.2	84.3	
Dung	14.38	14.23	14.40	12.19	13.80	86.2	85.0	84.2	86.6	85.5	
Mean	±0.41	14.79	12.69	13.11	10.76	±1.32	86.9	84.6	83.8	84.4	
Resp.	±0.37	-0.80	3.08	2.58	2.84	±1.27	-1.4	0.9	0.8	4.4	
					±0.18					±0.64	
1942 - Block 5						±1.16 ¹					
No dung	13.70	13.22	12.52	10.83	12.57	87.0	85.0	85.0	81.4	84.6	
Dung	14.66	15.40	14.75	13.14	14.49	87.4	86.1	87.2	84.2	86.2	
Mean	±0.35	14.18	14.31	13.64	11.98	±0.97	87.2	85.6	86.1	82.8	
Resp.	±0.26	0.96	2.18	2.23	2.31	±1.27	0.4	1.1	2.2	2.8	
					±0.13					±0.64	

Standard errors (1) for comparisons other than vertical ones.

Potatoes - effect of dung in current year.

Fourth year of cycles (continued)

Total tubers, tons per acre						Percentage ware											
Previous crop rotation						Previous crop rotation											
Arable						Arable											
Lu- with						Lu- with											
Ley	cerne	Hay	Kale	Mean		Ley	cerne	Hay	Kale	Mean							
<u>1943 - Block 4</u>						$\pm 0.68^1$						$\pm 2.60^1$					
No dung	8.84	9.76	8.08	7.43	8.53	80.4	79.8	76.6	71.4	77.0							
Dung	10.31	13.52	9.50	10.63	10.99	81.3	87.1	83.6	81.4	83.4							
Mean	± 0.40	9.58	11.64	8.79	9.03	9.76	± 1.14	80.8	83.4	80.1	76.4	80.2					
Resp.	± 1.11	1.47	3.76	1.42	3.20	2.46	± 4.67	0.9	7.3	7.0	10.0	6.4					
					± 0.56							± 2.34					
<u>1944 - Block 2</u>						$\pm 0.61^1$						$\pm 0.91^1$					
No dung	12.08	13.20	10.56	11.22	11.76	89.4	87.5	86.2	82.2	86.3							
Dung	13.04	14.64	11.76	12.24	12.92	89.4	89.0	88.1	85.5	88.0							
Mean	$\pm 0.57^1$	12.56	13.92	11.16	11.73	12.34	± 0.82	89.4	88.2	87.2	83.8	87.2					
Resp.	± 0.45	0.96	1.44	1.20	1.02	1.16	± 0.76	0.0	1.5	1.9	3.3	1.7					
					± 0.22							± 0.38					
<u>1945 - Block 1</u>						$\pm 0.78^1$						$\pm 1.55^1$					
No dung	13.28	12.96	12.46	11.06	12.44	87.0	86.8	84.7	85.0	85.9							
Dung	13.32	12.68	11.89	12.48	12.59	86.8	85.0	85.8	83.2	85.2							
Mean	± 0.39	13.30	12.82	12.18	11.77	12.52	± 0.71	86.9	85.9	85.2	84.1	85.6					
Resp.	± 1.35	0.04	-0.28	-0.57	1.42	0.15	± 2.76	-0.2	-1.8	1.1	-1.8	-0.7					
					± 0.68							± 1.38					
<u>1946 - Block 3</u>						$\pm 0.92^1$						$\pm 0.52^1$					
No dung	11.37	9.59	8.94	8.32	9.56	90.2	89.1	87.6	89.7	89.2							
Dung	13.28	11.50	11.93	8.88	11.40	90.6	92.3	90.8	93.2	91.7							
Mean	± 0.86	12.32	10.54	10.44	8.60	10.48	± 0.47	90.4	90.7	89.2	91.4	90.4					
Resp.	± 0.69	1.91	1.91	2.99	0.56	1.84	± 0.46	0.4	3.2	3.2	3.5	2.5					
					± 0.35							± 0.23					
<u>1947 - Block 5</u>						$\pm 0.38^1$						$\pm 0.64^1$					
No dung	8.42	8.74	6.28	8.03	7.87	93.3	92.8	92.4	93.2	92.9							
Dung	9.06	9.62	8.11	8.86	8.91	94.1	93.2	93.2	94.0	93.6							
Mean	± 0.35	8.74	9.18	7.20	8.44	8.39	± 0.53	93.7	93.0	92.8	93.6	93.3					
Resp.	± 0.28	0.64	0.88	1.83	0.83	1.04	± 0.70	0.8	0.4	0.8	0.8	0.7					
					± 0.14							± 0.35					

Standard errors (1) for comparisons other than vertical ones.

In 1946 and 1947 read "Arable with sugar beet" for "Arable with kale".

Ley and Arable Rotations Experiment

Potatoes

Standard errors per plot

		d.f.	Total tubers tons per acre	% of mean	Percentage ware
1938 - Block 4	Whole plot	7	0.68	5.08	
	Sub-plot	7	0.64	4.79	
1939 - Block 2	Whole plot	7	1.00	8.52	1.49
	Sub-plot	7	0.22	1.86	2.90
1940 - Block 1	Whole plot	6	1.18	14.5	3.40
	Sub-plot	6	0.72	8.75	3.34
<u>Fourth year of cycles</u>					
1941 - Block 3	Whole plot	4	0.57	4.47	1.87
	Sub-plot	4	0.37	2.86	1.27
1942 - Block 5	Whole plot	4	0.49	3.62	1.38
	Sub-plot	4	0.26	1.95	1.27
1943 - Block 4	Whole plot	4	0.57	5.82	1.61
	Sub-plot	4	1.11	11.3	4.67
1944 - Block 2	Whole plot	4	0.80	6.51	1.17
	Sub-plot	4	0.45	3.65	0.76
1945 - Block 1	Whole plot	4	0.55	4.40	1.00
	Sub-plot	4	1.35	10.8	2.76
1946 - Block 3	Whole plot	4	1.21	11.5	0.66
	Sub-plot	4	0.69	6.6	0.46
1947 - Block 5	Whole plot	4	0.50	6.0	0.75
	Sub-plot	4	0.28	3.3	0.70

Barley - residual effect of dung applied to potatoes in the previous year.

Grain, cwt. per acre.				Straw, cwt. per acre.			
<u>1938 - Block 5</u>		<u>1939 - Block 4</u>		(1938)	(1939)		
No dung		15.3			23.1		
Dung		16.2			28.6		
<hr/>		<hr/>		<hr/>		<hr/>	
Mean	7.66	15.8		12.6	25.8 (± 1.08)		
Response		0.9 (± 0.22)			5.5 (± 1.08)		
 <u>1940 - Block 2</u>							
No dung	6.4			7.9			
Dung	8.5			11.4			
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Mean	7.5			9.7			
Response	2.1 (± 0.80)			3.5 (± 1.02)			
 <u>1941 - Block 1</u>							
	Crop previous to potatoes						
	Hay	Kale	Mean		Hay	Kale	Mean
	$\pm 1.16^1$				$\pm 1.28^1$		
No dung	7.0	10.6	8.8		10.0	13.2	11.6
Dung	7.6	9.7	8.6		10.1	14.2	12.2
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Mean ± 0.87	7.3	10.1	8.7	± 1.03	10.1	13.7	11.9
Resp. ± 1.56	0.6	-0.9	-0.2	± 1.52	0.1	1.0	0.6
			± 1.10				± 1.07

Standard errors (1) for comparisons other than vertical ones

Ley and Arable Rotations Experiment

Barley - residual effect of dung applied to potatoes in previous year.

Grain, cwt. per acre

Straw, cwt. per acre

Fifth years of cycles

Crop previous to potatoes						Crop previous to potatoes						
	Ley	Arable with			Mean	Ley	Arable with			Mean		
		Lu- cerne	Hay	Kale			Lu- cerne	Hay	Kale			
1942 - Block 3						±2.27 ¹						
No dung	18.6	22.6	13.3	9.5	16.0	21.7	26.2	16.3	12.1	19.1		
Dung	21.8	21.3	18.1	17.8	19.8	25.0	25.7	21.7	20.7	23.3		
Mean	±1.42	20.2	21.9	15.7	13.7	17.9	±1.82	23.4	26.0	19.0	16.4	21.2
Resp.	±3.55	3.2	-1.3	4.8	8.3	3.8	±3.31	3.3	-0.5	5.4	8.6	4.2
					±1.78							±1.66
1943 - Block 5						±2.96 ¹						
No dung	13.2	14.9	14.0	22.7	16.2	23.8	24.1	20.7	34.7	25.8		
Dung	12.8	14.5	17.4	16.2	15.2	19.2	22.8	26.7	23.6	23.1		
Mean	±2.28	13.0	14.7	15.7	19.4	15.7	±2.19	21.5	23.4	23.7	29.2	24.4
Resp.	±3.79	-0.4	-0.4	3.4	-6.5	-1.0	±5.05	-4.6	-1.3	6.0	-11.1	-2.7
					±1.90							±2.52
1944 - Block 4						±3.24 ¹						
No dung	18.1	22.5	19.0	24.2	21.0	22.7	20.1	21.8	23.2	21.9		
Dung	15.7	19.7	23.0	17.4	18.9	19.2	23.5	29.2	20.8	23.2		
Mean	±2.21	16.9	21.1	21.0	20.8	20.0	±2.78	20.9	21.8	25.5	22.0	22.6
Resp.	±4.76	-2.4	-2.8	4.0	-6.8	-2.1	±6.77	-3.5	3.4	7.4	-2.4	1.3
					±2.38							±3.38
1945 - Block 2						±2.07 ¹						
No dung	13.2	17.6	11.6	13.7	14.0	15.3	18.9	11.9	14.8	15.2		
Dung	11.1	20.0	14.5	15.4	15.2	13.8	20.9	16.8	17.8	17.3		
Mean	±1.17	12.2	18.8	13.0	14.6	14.6	14.6	19.9	14.4	16.3	16.2	
Resp.	±3.43	-2.1	2.4	2.9	1.7	1.2	-1.5	2.0	4.9	3.0	2.1	
					±1.72							
1946 - Block 1						±1.44 ¹						
No dung	17.4	18.8	14.0	14.1	16.1	20.4	23.7	17.0	19.2	20.1		
Dung	16.4	16.4	15.6	15.7	16.0	18.5	20.1	19.6	19.8	19.5		
Mean	±0.80	16.9	17.6	14.8	14.9	16.0	±0.44	19.4	21.9	18.3	19.5	19.8
Resp.	±2.40	-1.0	-2.4	1.6	1.6	-0.1	±3.48	-1.9	-3.6	2.6	0.6	-0.6
					±1.20							±1.74

Standard errors (1) for comparisons other than vertical ones.

Barley - residual effect of dung applied to potatoes in the previous year.

Grain, cwt. per acre

Straw, cwt. per acre

Fifth years of cycles (continued)

	Crop previous to potatoes					Crop previous to potatoes				
	Ley	Lu- cerne	Hay	Arable with Sugar Beet	Mean	Ley	Lu- cerne	Hay	Arable with Sugar Beet	Mean
1947 - Block 3				$\pm 1.21^1$						
No dung	15.5	12.5	12.3	10.4	12.7	15.8	15.4	13.3	14.9	14.8
Dung	18.7	16.5	15.6	12.1	15.7	21.0	20.3	18.6	17.3	19.3
Mean ± 0.99	17.1	14.5	14.0	11.2	14.2	18.4	17.8	16.0	16.1	17.1
Resp. ± 1.39	3.2	4.0	3.3	1.7	3.0	5.2	4.9	5.3	2.4	4.5
					± 0.69					

Standard errors (1) for comparisons other than vertical ones

X

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Ley and Arable Rotations Experiment

Barley

Standard errors per plot

		Barley - Grain			Barley - Straw		
		d.f.	cwt. per acre	% of mean	d.f.	cwt. per acre	% of mean
1938 - Block 5	Whole plot	7	1.79	23.4	7	2.62	20.8
	Sub-plot	8	1.67	21.8	8	1.50	11.9
1939 - Block 4	Whole plot	7	1.55	9.85	7	1.29	4.98
	Sub-plot	6 [#]	0.44	2.76	6 [#]	2.17	8.39
1940 - Block 2	Whole plot	7	2.34	31.5	7	2.35	24.3
	Sub-plot	7	1.60	21.5	7	2.04	21.1
1941 - Block 1	Whole plot	6	1.74	20.0	6	2.06	17.4
	Sub-plot	6	2.21	25.4	6	2.15	18.2
<u>Fifth year of cycles</u>							
1942 - Block 3	Whole plot	4	2.01	11.2	4	2.57	12.1
	Sub-plot	4	3.55	19.9	4	3.31	15.6
1943 - Block 5	Whole plot	4	3.22	20.5	4	3.09	12.7
	Sub-plot	4	3.79	24.1	4	5.05	20.6
1944 - Block 4	Whole plot	4	3.12	15.6	4	3.93	17.4
	Sub-plot	4	4.76	23.9	4	6.77	30.0
1945 - Block 2	Whole plot	4	1.65	11.3			
	Sub-plot	4	3.43	23.4			
1946 - Block 3	Whole plot	4	1.13	7.0	4	0.62	3.15
	Sub-plot	4	2.40	15.0	4	3.48	17.6
1947 - Block 3	Whole plot	4	1.39	9.8			
	Sub-plot	4	1.39	9.8			

3.31

[#] One missing sub-plot.

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MARKET GARDEN EXPERIMENT

Woburn, Lansome Field (begun in 1942)

The use of heavy dressings of organic manures for making a market garden soil,
and the effect of sulphate of ammonia.

The four crops follow a two-year rotation, each of the two "series" into which the area is divided bearing two crops in a year, while the series carry different crops at any one season, except that in the first year the whole area was under winter cabbage.

System of replication: 2 series, each consisting of 4 randomized blocks of 10 plots each, certain interactions being partially confounded with block differences.

Area of each plot: 0.0125 acre. (In 1943, peas and beet 0.0105 acre)

Cropping:

1st year Globe beet (sown April, lifted July)
 Winter cabbage (transplanted August, cut December-March)

2nd year Peas (sown March-April, pulled June-July)
 Leeks (transplanted July, lifted January-March)

Treatments

Organic manures: Dung, sewage sludge compost (composted town refuse in 1942 and 1943), sewage sludge (West Middlesex) and vegetable compost, each at 15 and 30 tons per acre.

Organics were applied at 4 and 8 tons per acre to winter cabbage in the first year.

Sulphate of ammonia:

With organic manures: None, 0.6 cwt. N per acre
In absence of organics: None, 0.6, 1.2, 1.8 cwt. N per acre

Basal manuring:

Superphosphate, 0.4 cwt. P₂O₅ per acre (triple superphosphate in 1945 and 1946).
Muriate of potash, 0.5 cwt. K₂O per acre.

In 1943, 3200 lb. per acre carbonate of lime was applied to winter cabbage.

Time of application of manures:

Organic manures and basal dressings are given in a single dose in early spring before sowing peas and beet, except that in the first year the winter cabbage received a reduced dressing of organics and the full amount of basal manures. The sulphate of ammonia is divided between crops as follows (cwt. N per acre):

	With organics	In the absence of organics
Globe beet and peas	0, 0.2	0, 0.2, 0.4, 0.6
Cabbage and leeks	0, 0.4	0, 0.4, 0.8, 1.2

In the first year, the winter cabbage received the whole dressing of sulphate of ammonia.

Crop Notes

Winter Cabbage

Previous crop: Globe Beet (Cabbage in 1942)

Year	Series	Variety	Planted out	Harvested
1942	A	Christmas Cabbage	Aug. 13	Nov. 20 - Feb. 17
1943	B	January King	Sept. 2	Dec. 2 - March 16
1944	A	January King	Aug. 23	March 14, April 9
1945	B	January King	July 24 and Aug. 10	Dec. 1 - March 6
1946	A	Christmas Drumhead and Savoy	Aug. 12	Nov. 11 - 15
1947	B	Failed, owing to dry weather.		

Leeks (Cabbage in 1942)

Previous crop: Peas (Cabbage in 1942)

1942	B	January King ¹	Sept. 21	March 19
1943	A	Musselburgh	Aug. 6 - 20	March 6
1944	B	Musselburgh	July 18, 28	Feb. 22 - April 13
1945	A	Musselburgh	Aug. 7-14	March 5-12
1946	B	Musselburgh	Aug. 10, 30	May 15-20
1947	A	Musselburgh	July 18	Feb. 12-27

Globe Beet. Variety: Crimson Globe

Previous crop: Leeks (Cabbage in 1942)

Year	Series	Sown	Harvested
1943	B	April 27	July 19 - August 20
1944	A	April 16	July 24 - August 14
1945	B	April 20	July 5 - 30
1946	A	April 3	July 24 - August 6
1947	B	May 27	August 8 - 13

Peas. Variety: Kelvedon Wonder

Previous crop: Winter Cabbage

1943	A	May 4 ²	July 12 - 14
1944	B	April 11	July 5 - 11
1945	A	April 4, 18	June 25 - July 17
1946	B	March 25, May 13 ³	July 6, 23 - 30
1947	A	April 25	June 26 - 30

- (1) No leek plants available
- (2) First sowing, April 10, failed
- (3) Two sowings, March 15 and April 20, failed

Globe Beet and Peas

		Sulphate of Ammonia, cwt. N per acre								
		None	0.2	Mean	None	0.2	Mean	None	0.2	Mean
Organic Manures t.p.a.		Globe Beet Total produce ¹ : tons/acre			Globe Beet Bulbs ² : tons/acre			Peas Green peas: cwt./acre		
<u>1943</u>		(Series B)						(Series A)		
		±1.246			±0.881			±4.37		
O		2.65	3.53	3.09			22.1	16.7	19.4	
D	15	7.56	3.56	5.56			30.4	28.9	29.7	
D	30	8.06	8.80	8.43			15.4	27.7	21.5	
CTR	15	4.91	5.81	5.36			24.3	17.7	21.0	
CTR	30	5.43	7.86	6.64			21.6	30.1	25.8	
SS	15	5.29	5.11	5.20			20.1	28.3	24.2	
SS	30	6.98	6.66	6.82			31.8	26.9	29.3	
VC	15	5.46	6.92	6.19			15.4	23.8	19.6	
VC	30	8.34	7.24	7.79			29.4	33.0	31.2	
Mean		6.50 ³	6.49 ³	5.86 ⁴			23.5 ³	27.0 ³	24.0 ⁴	
S.E. per plot		1.763 or 30.1%						6.18 or 25.8%		
<u>1944</u>		(Series A)						(Series B)		
		±0.775			±0.548			±2.61		
O		1.33	1.10	1.21			11.2	7.1	9.1	
D	15	4.15	4.26	4.21			9.3	8.0	8.7	
D	30	3.07	5.77	4.42			8.3	14.2	11.2	
CSS	15	2.71	1.51	2.11			10.6	9.9	10.2	
CSS	30	1.96	5.01	3.48			10.4	11.2	10.8	
SS	15	2.94	3.78	3.36			11.2	10.8	11.0	
SS	30	4.90	4.13	4.52			7.3	8.9	8.1	
VC	15	1.21	2.99	2.10			4.9	13.6	9.3	
VC	30	4.68	5.76	5.22			9.8	11.5	10.6	
Mean		3.20 ³	4.15 ³	3.22 ⁴			9.0 ³	11.0 ³	10.2 ⁴	
S.E. per plot		1.09% or 33.0%						3.68 or 36.1%		

- (1) Excludes totally unmarketable produce and includes tops
 (3) Excludes "No organic manure".
 (4) Mean of all plots.

All standard errors have 17 d.f.

Symbols: O No organic manure CTR Composted town refuse
 D Dung CSS Composted sewage sludge
 SS Sewage sludge VC Vegetable compost

Globe Beet and Peas

Organic Manures t.p.a.	Sulphate of Ammonia, cwt. N per acre								
	None	0.2	Mean	None	0.2	Mean	None	0.2	Mean
	Globe Beet Total produce ¹ : tons/acre			Globe Beet Bulbs ² : tons/acre			Peas Green peas: cwt/acre		
<u>1945</u>	(Series B) ±0.748			(Series B) ±0.457			(Series A) ±7.79		
O	3.03	4.91	3.97	1.51	2.73	2.12	48.3	37.8	43.0
D 15	6.28	5.79	6.03	3.51	3.32	3.41	46.2	42.9	44.5
D 30	6.24	7.02	6.63	3.45	3.63	3.54	38.0	47.8	42.9
CSS 15	6.12	4.55	5.33	3.41	2.85	3.13	46.4	32.7	39.6
CSS 30	5.30	6.55	5.93	2.91	3.52	3.22	43.6	50.0	46.8
SS 15	5.40	5.95	5.68	2.87	3.29	3.08	41.8	49.9	45.8
SS 30	7.20	5.67	6.44	3.81	3.18	3.50	44.3	49.2	46.8
VC 15	5.80	5.13	5.46	3.25	3.16	3.21	46.5	38.7	42.6
VC 30	7.46	7.11	7.28	4.13	3.95	4.04	50.4	50.9	50.6
Mean	6.23 ³	5.97 ³	5.68 ⁴	3.42 ³	3.36 ³	3.15 ⁴	44.6 ³	45.2 ³	43.9 ⁴
S.E. per plot	1.058 or 18.6%			0.646 or 20.5%			11.02 or 25.1%		
<u>1946</u>				(Series A) ±0.648			(Series B) ±8.61		
O				0.51	0.88	0.69	20.2	37.6	28.9
D 15				2.32	2.77	2.55	35.5	31.6	33.6
D 30				4.01	3.64	3.82	40.2	36.6	38.4
CSS 15				0.97	1.44	1.21	38.6	36.8	37.7
CSS 30				1.95	1.63	1.79	33.6	18.2	25.9
SS 15				1.22	1.23	1.22	33.1	37.7	35.4
SS 30				1.32	2.32	1.82	36.6	30.2	33.4
VC 15				1.31	1.55	1.43	54.0	40.1	47.0
VC 30				3.01	2.90	2.96	32.1	30.4	31.2
Mean				2.01 ³	2.18 ³	1.84 ⁴	38.0 ³	32.7 ³	33.7 ⁴
S.E. per plot				0.916 or 49.7%			12.18 or 36.1%		

(1) Excludes totally unmarketable produce and includes tops.
In 1946 many plants went to seed.

(2) Excludes unmarketable produce.

(3) Excludes "No organic manure".

(4) Mean of all plots.

All standard errors have 17 d.f.

Symbols: O No organic manure CSS Composted sewage sludge
D Dung SS Sewage sludge
VC Vegetable compost

Globe Beet and Peas

	Sulphate of Ammonia, cwt. N per acre								
	None	0.2	Mean	None	0.2	Mean	None	0.2	Mean
Organic Manures t.p.a.	Globe Beet Total produce ¹ : tons/acre			Globe Beet Bulbs ² : tons/acre			Peas Green peas cwt/acre		
<u>1947</u>	(Series B) ±0.520			(Series B) ±0.310			(Series A) ±2.71		
O	1.43	0.86	1.14	0.87	0.46	0.66	22.3	17.1	19.7
D 15	3.35	2.90	3.12	1.57	1.52	1.54	27.4	25.7	26.6
D 30	5.52	5.25	5.39	3.02	3.04	3.03	26.9	27.0	26.9
CSS 15	1.67	2.63	2.15	0.97	1.38	1.18	28.6	25.8	27.2
CSS 30	3.41	2.53	2.97	1.91	1.24	1.57	26.4	23.4	24.9
SS 15	0.92	1.12	1.02	0.54	0.63	0.58	25.6	21.0	23.3
SS 30	0.60	1.12	0.86	0.20	0.62	0.41	25.0	27.0	26.0
VC 15	2.61	3.18	2.90	1.51	1.74	1.63	23.2	17.9	20.5
VC 30	3.19	3.23	3.21	1.87	1.75	1.81	27.8	26.2	27.0
Mean	2.66 ³	2.74 ³	2.34 ⁴	1.45 ³	1.49 ³	1.28 ⁴	26.4 ³	24.2 ³	24.3 ⁴
S.E. per plot	0.736 or 31.4%			0.438 or 34.2%			3.83 or 15.8%		

- (1) Excludes totally unmarketable produce and includes tops.
 (2) Excludes unmarketable produce
 (3) Excludes "No organic manure"
 (4) Mean of all plots

All standard errors have 17 d.f.

Yields on plots without organic Manure
 Sulphate of Ammonia, cwt. N per acre

	None	0.2	0.4	0.6	S.E.
Globe Beet					
Total produce: tons per acre					
1943	2.65	3.53	2.78	4.16	±1.246
1944	1.33	1.10	1.89	3.25	±0.775
1945	3.03	4.91	3.70	4.35	±0.748
1947	1.43	0.86	0.48	0.89	±0.520
Bulbs: tons per acre					
1945	1.51	2.73	2.17	2.31	±0.457
1946	0.51	0.88	1.35	0.51	±0.648
1947	0.87	0.46	0.29	0.47	±0.310
Peas					
Green peas: cwt. per acre					
1943	22.1	16.7	16.7	19.9	±4.37
1944	11.2	7.1	10.1	16.2	±2.61
1945	48.3	37.8	39.6	33.4	±7.79
1946	20.2	37.6	28.4	23.0	±8.61
1947	22.3	17.1	20.4	21.4	±2.71

Winter Cabbage

		Sulphate of Ammonia, cwt. N per acre								
		None	0.6	Mean	None	0.6	Mean	None	0.6	Mean
Organic	1	Total produce: tons/acre			Plant number thousands per acre			Total produce tons/acre		
Manares t. p. a.		(Series A)			(Series A)			(Series B)		
1942		±1.046			±0.740			±0.300		
O		5.27	7.68	6.48 _b	17.5	18.2	17.9 _d	1.30	2.51	1.91 _f
D	4	5.96 ^a	7.91 ^a	6.94 _b	17.6 ^c	18.5 ^c	18.0 _d	2.33 ^e	2.19 ^e	2.26 _f
n	8	7.63 ^a	8.90 ^a	8.27 _b	18.1 ^c	18.4 ^c	18.3 _d	2.30 ^e	2.66 ^e	2.48 _f
CTR	4	7.66	7.15	7.40	18.3	18.6	18.4	2.16	2.39	2.27
CTR	8	7.43	9.79	8.61	18.2	19.4	18.8	2.16	2.29	2.22
SS	4	8.75	9.60	9.18	18.8	19.1	19.0	2.14	2.43	2.28
SS	8	8.55	7.48	8.02	16.7	17.2	17.0	1.99	2.50	2.24
Mean		7.45 ²	8.46 ²	7.69 ³	17.9 ²	18.5 ²	18.2 ³	2.21 ²	2.41 ²	2.23 ³
S.E. per plot		1.479 or 19.2%			1.16 or 6.4%			0.424 or 19.0%		

Standard errors for D figures only: (a) 0.740 (b) 0.523 (c) 0.58 (d) 0.41
(e) 0.212 (f) 0.150

(1) Since there was no crop of globe beet and peas, organics and all the Sulphate of Ammonia (0.6 cwt. N per acre) were applied to the cabbages. No vegetable compost was available; instead dung was applied, so that the number of dunged plots was twice that in subsequent years.

(2) Excludes "No organic manure".

(3) Mean of all plots.

All standard errors have 17 d.f.

Symbols: O No organic manure.
D Dung

SS Sewage sludge
VC Vegetable compost
CTR Composted town refuse

Winter Cabbage and Leeks

Organic Manures t. p. a.	Sulphate of Ammonia, cwt. N per acre			Winter Cabbage (Series B)			Leeks (Series A)		
	None	0.4	Mean	Total produce: tons/acre	Plant number: thous./acre	Mean	Total produce: tons/acre	Plant number: thous./acre	Mean
	±0.336	±0.238	±0.67	±0.47	±0.191	±0.270	±0.191	±0.99	±0.70
1943	1.26	2.94	15.2	15.9	1.23	1.96	1.60	41.9	43.7
0	2.86	3.24	16.3	16.8	1.25	1.86	1.56	44.6	44.3
15	3.12	4.04	17.0	16.6	2.40	2.00	2.20	45.0	44.2
D	2.73	2.88	17.4	16.7	1.57	1.46	1.52	43.6	44.4
CTR	2.01	3.16	13.6	15.5	0.96	1.65	1.31	41.3	41.9
30	2.81	3.32	16.2	16.6	1.92	1.92	1.92	44.4	44.5
SS	3.61	3.04	16.7	17.0	1.50	1.38	1.44	43.7	43.4
SS	3.09	3.27	17.6	16.8	2.04	1.82	1.93	45.5	44.4
VC	3.57	3.50	17.1	17.4	1.57	2.07	1.82	43.5	44.1
VC	2.98 ²	3.31 ²	16.5 ²	16.6 ³	1.65 ²	1.77 ²	1.70 ³	44.0 ²	43.9 ³
Mean	0.475 or 15.8%	3.00 ³	0.95 or 5.7%	16.6 ³	0.382 or 22.4%	1.77 ²	1.70 ³	1.41 or 3.2%	43.9 ³

(2) Excludes "No organic manure"

(3) Mean of all plots.

(4) Organics applied to previous crop of globe beet and peas.

All standard errors have 17 d.f.

Symbols: 0 No organic manure. SS Sewage sludge. CTR Composted town refuse.
 D Dung. VC Vegetable compost.

Winter Cabbage and Leeks

Organic Manures t. p. a.	Sulphate of Ammonia, cwt. N per acre				Leeks (Series B)			
	None	0.4	Mean	Mean	None	0.4	Mean	Mean
	None	0.4	Mean	Mean	None	0.4	Mean	Mean
	Winter Cabbage (Series A)				Leeks (Series B)			
	Total produce: tons/acre				Total produce: tons/acre			
	Plant number: thous./acre				Plant number: thous./acre			
1944	±0.417	±0.76	±0.295	±0.54	±0.479	±0.339	±0.339	±2.36
0	0.49	13.7	1.00	15.0	1.54	1.24	1.24	27.1
	1.17	16.0	2.29	17.3	2.39	1.98	1.98	34.8
D	3.41	18.6	2.72	17.4	3.34	3.39	3.39	35.8
D	3.92	17.9	1.33	16.6	1.50	2.01	2.01	29.2
CSS	1.98	18.0	1.43	15.0	1.71	1.47	1.47	28.7
CSS	2.08	16.0	3.13	15.8	1.59	1.30	1.30	31.7
SS	4.09	16.8	4.29	16.4	0.77	1.23	1.23	29.1
SS	4.32	17.0	1.60	17.0	1.67	1.82	1.82	32.1
VC	2.28	17.0	2.03	15.9	3.21	2.95	2.95	35.2
VC	2.88	17.0	2.28 ³	16.3 ³	2.02 ²	1.89 ³	1.89 ³	32.1 ²
Mean	1.59 ²	15.6 ²	2.28 ³	16.3 ³	0.678 or 35.8%	0.678 or 35.8%	0.678 or 35.8%	4.73 or 15.2%
S. E. per plot	0.589 or 25.8%	1.07 or 6.6%	0.589 or 25.8%	1.07 or 6.6%				

(1) Organics applied to previous crop of globe beet and peas.

(2) Excludes "No organic manure".

(3) Mean of all plots.

All standard errors have 17 d.f.

Symbols: 0 No organic manure. SS Sewage sludge. CSS Composted sewage sludge
 D Dung. VG Vegetable compost.

Winter Cabbage and Leeks

Organic Manures t. p. a.	Sulphate of Ammonia, cwt. N per acre			Leeks (Series A)			
	None	0.4	Mean	None	0.4	Mean	
	Winter Cabbage (Series B)			Total produce:			
	Plant number: thous./acre			tons/acre			
1945	±0.956	±1.00	±0.71	±0.213	±0.151	±2.48	±1.75
0	4.26	16.5	5.47	1.17	1.20	47.6	41.6
D	7.82	19.2	7.58	1.73	1.33	44.8	41.7
D	6.97	17.5	7.25	1.80	1.26	42.5	38.4
CSS	5.85	17.6	6.40	1.43	1.09	43.7	42.6
CSS	6.77	18.2	8.04	1.25	1.13	41.1	35.5
SS	6.74	16.5	7.14	1.07	0.88	38.1	33.9
SS	8.57	17.5	8.76	1.49	1.25	39.6	35.4
VC	6.01	16.9	6.62	1.39	1.31	45.4	41.8
VC	7.97	17.3	8.47	1.97	1.47	43.1	36.8
Mean	7.09 ²	17.6 ²	7.42 ³	1.52 ²	1.21 ²	42.3 ²	38.3 ²
S.E. per plot	1.352 or 18.4%	1.42 or 8.2%	17.3 ³	0.301 or 22.6%		3.50 or 8.6%	40.9 ³

(1) Organics applied to previous crop of globe beet and peas.

(2) Excludes "No organic manure".

(3) Mean of all plots

All standard errors have 17 d.f.

Symbols: O No organic manure. SS Sewage sludge. CSS Composted sewage sludge.
 D Dung. VC Vegetable compost.

Winter Cabbage and Leeks

Organic Manures t.p.a.	Sulphate of Ammonia, cwt. N per acre			Leeks (Series B)		
	None	0.4	Mean	None	0.4	Mean
	Winter Cabbage (Series A)			Total produce:		
	Plant number: thous./acre			tons/acre		
1946	+0.404	+0.32	+0.286	+0.391	+0.276	+0.83
0	1.45	17.5	1.86	1.91	2.01	42.6
D	2.38	17.3	3.19	2.75	2.74	40.3
D	2.56	17.8	3.69	3.76	3.82	43.8
CSS	1.47	17.1	2.60	2.42	2.74	43.3
CSS	2.06	17.3	2.80	2.27	2.73	42.2
SS	2.62	17.5	3.56	2.82	2.82	43.7
SS	4.47	17.5	5.23	4.09	3.90	40.6
VC	1.17	17.8	1.99	2.61	3.10	43.3
VC	2.25	16.8	2.58	3.42	3.23	40.3
Mean	2.37 ²	17.4 ²	3.10 ³	3.02 ²	2.94 ³	42.2 ²
S.E. per plot	0.572 or 18.5%	0.45 or 2.6%		0.553 or 18.8%		1.66 or 3.9%

(1) Organics applied to previous crop of globe beet and peas.

(2) Excludes "No organic manure".

(3) Mean of all plots.

All standard errors have 17 d.f.

Symbols: O No organic manure. SS Sewage sludge. CSS Composted sewage sludge.
 D Dung VC Vegetable compost.

Winter Cabbage and Leeks

		Sulphate of Ammonia, cwt. N per acre					
		None	0.4	Mean	None	0.4	Mean
Organic Manures t.p.a.	1	Leeks Total produce: tons/acre			Leeks Plant number; thous./acre		
1947		±0.197		±0.140	±0.30		±0.57
O		1.68	1.82	1.75	42.5	42.6	42.6
D	15	1.80	1.92	1.86	42.2	40.6	41.4
D	30	2.24	2.03	2.13	42.9	42.8	42.8
CSS	15	1.92	1.74	1.83	42.5	42.1	42.3
CSS	30	1.97	2.01	1.99	42.4	42.6	42.5
SS	15	1.93	1.79	1.86	42.5	42.6	42.5
SS	30	1.93	1.87	1.90	43.2	43.7	43.5
VC	15	1.81	1.88	1.84	43.5	42.6	43.0
VC	30	2.01	2.32	2.16	42.7	44.4	43.6
Mean		1.95 ²	1.94 ²	1.89 ³	42.7 ²	42.7 ²	42.6 ³
S.E. per plot		0.279 or 14.8%			1.14 or 2.7%		

(1) Organics applied to previous crop or globe beet and peas.

(2) Excludes "No organic manure".

(3) Mean of all plots

All standard errors have 17 d.f.

Symbols: O No organic manure. CTR Composted town refuse.
 D Dung. SS Sewage sludge.
 VC Vegetable compost.

N

Yields on plots without organic manure

	Sulphate of Ammonia, cwt. N per acre				S.E.	Sulphate of Ammonia, cwt. N per acre				S.E.
	None	0.4	0.8	1.2		None	0.4	0.8	1.2	
	Total produce: tons per acre					Plant number: thous. per acre				
1942 ⁴	Winter Cabbage									
Series A	5.27	7.68	8.37	5.33	±1.046	17.5	18.2	19.4	17.1	±0.82
Series B	1.30	2.51	2.16	1.70	±0.300	No figures available				
1943	1.26	2.94	3.03	2.57	±0.336	15.2	16.6	16.9	16.1	±0.67
1944	0.49	1.51	3.38	2.62	±0.417	13.7	16.3	17.8	15.7	±0.76
1945	4.26	6.67	6.88	8.33	±0.956	16.5	16.8	16.7	18.4	±1.00
1946	1.45	2.27	2.75	4.23	±0.404	17.5	17.9	17.9	17.6	±0.32
	Leeks									
1943	1.23	1.96	1.90	1.56	±0.270	41.9	43.7	44.2	44.0	±0.99
1944	1.54	0.94	1.17	1.93	±0.479	27.1	29.0	28.1	31.0	±3.34
1945	1.17	1.20	1.21	1.17	±0.213	47.6	41.6	41.8	42.5	±2.48
1946	1.91	2.10	2.01	2.69	±0.391	42.6	40.6	46.4	43.1	±1.17
1947	1.68	1.82	1.85	1.24	±0.197	42.5	42.6	42.0	41.8	±0.80

(4) The dressings of nitrogen in 1942 were None, 0.6, 1.2, 1.8 cwt. per acre, since no globe beet or peas were grown.

All standard errors have 17 d.f.

CHEMICAL ANALYSES OF FERTILIZERS

Three, Four and Six Course Rotations, 1939-1947

Crop ₁ Year	% N Nitrate of soda	% Total P ₂ O ₅ Super- phosphate	% Total P ₂ O ₅ Mineral ²	% K ₂ O Sulphate ₃ of potash	% K ₂ O Muriate of potash
1939 a		17.0	25.9		53.2
b	16.0	16.9		49.5	52.2
1940 a		16.8	25.9		52.2
b	15.7	17.9		50.3	53.9
1941 a		18.9	25.7		57.0
b	15.7	18.0		49.8	53.8
1942 a		20.0	25.7		53.8
b	16.1	20.3		49.9	53.7
1943 a		20.3	26.4		53.7
b	15.9	20.4		49.8	57.4
1944 a		19.6 ⁴	27.0		57.7
b	16.1	19.6		49.8	57.4
1945 a		19.2	33.2		57.8
b	16.2	18.8		51.2	57.1
1946 a		19.0	33.3		60.6
b	15.8	19.6		50.7	59.9
1947	15.6	19.9	33.1		60.2

Analysis of Sulphate of ammonia 21% N assumed.

1. b refers to spring dressings in the 3-Course Rotation Experiment; a to all other dressings in the 3-, 4- and 6-Course Rotation Experiments. "Crop year 1939" includes 1938 autumn sowings.
2. Mineral phosphate (used in 4-Course only); Gafsa 1939-44, Moroccan 1945-47.
3. Sulphate of potash, applied in spring to potatoes in 3-Course until 1946, replaced by Muriate of potash in 1947.
4. 18.86 for Superphosphate in 4-Course.

Chemical Analysis of Manures used in Three and Four Course Rotations.

1939-47

Wheat Straw to Three and Four Course Rotations

Crop Year	% Organic Matter	% N	% P ₂ O ₅	% K ₂ O
1939	83.65	0.603	0.311	1.614
1940	77.00	0.541	0.244	1.600
1940 b	84.30	0.537	0.194	1.382
1941	82.87	0.445	0.142	1.185
1942	79.08	0.409	0.138	0.817
1943	84.02	0.525	0.170	0.950
1944	81.00	0.532	0.144	0.620
1945	82.40	0.299	0.088	0.688
1946	81.41	0.450	0.250	0.954
1947	80.38	0.555	0.171	1.011

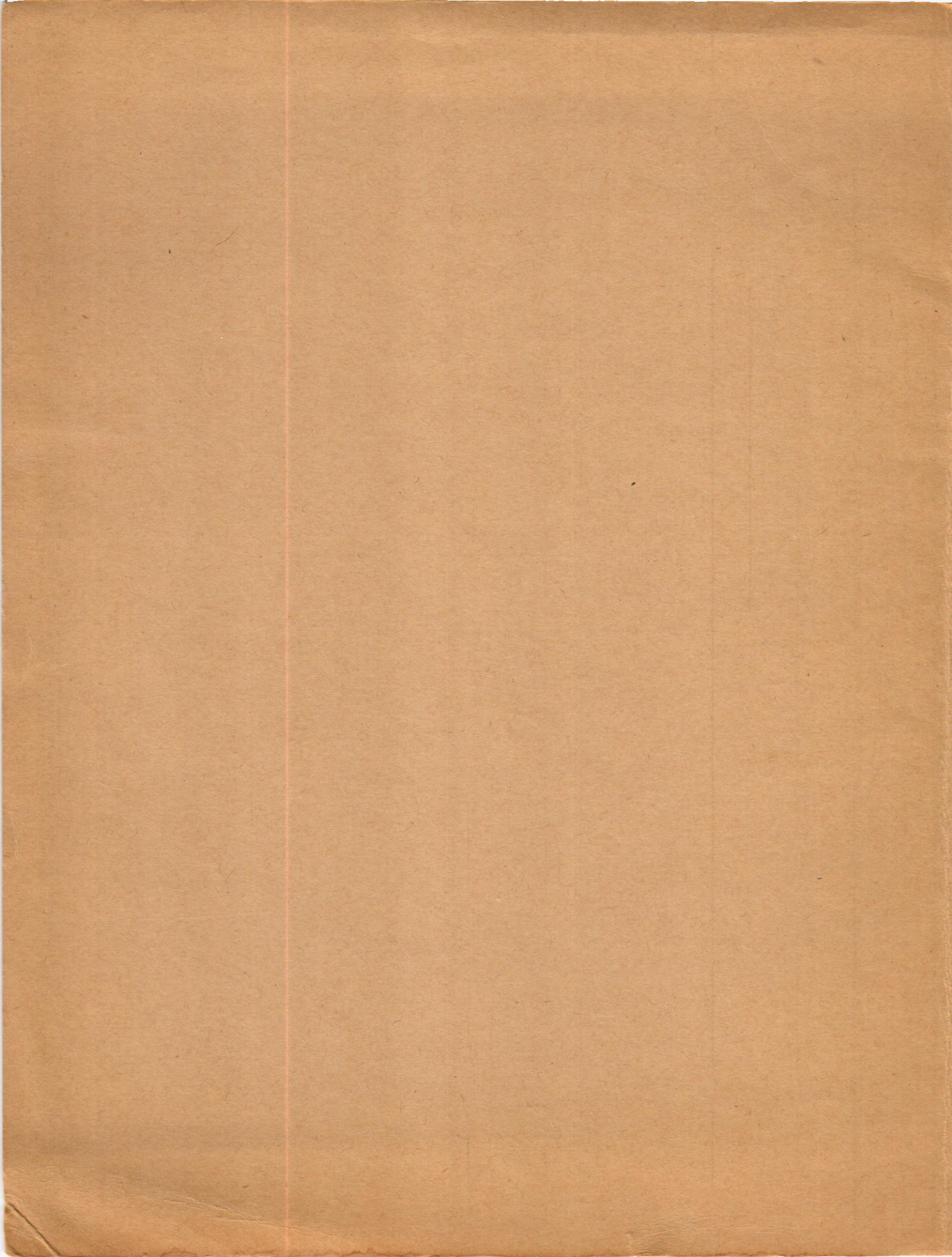
Adco Compost to Three and Four Course Rotations

1939	12.74	0.398	0.316	0.339
1940	13.73	0.404	0.235	0.332
1941	15.79	0.398	0.277	0.170
1942	14.44	0.398	0.257	0.146
1943	19.00	0.487	0.319	0.180
1944	20.10	0.528	0.284	0.230
1945	21.80	0.434	0.242	0.271
1946	18.04	0.527	0.372	0.322
1947	15.90	0.504	0.372	0.290

Dung to Four Course Rotation

1939	16.45	0.500	0.273	0.709
1940	17.62	0.435	0.164	0.414
1941	14.65	0.520	0.138	0.528
1942	18.08	0.510	0.253	0.858
1943	23.26	0.710	0.300	1.020
1944	35.20	0.846	0.288	1.355
1945	29.65	0.904	0.292	1.608
1946	14.29	0.515	0.203	0.691
1947	14.26	0.453	0.213	0.445

'b' refers to 3-Course Spring dressings



Rothamsted Field Experiments, 1939-47, Vol. I

CORRIGENDA

Misleading faults caused by defective correcting material used in the reproduction are listed.

Page	
A/1.6	1943 Plot 3 Grain Mean, 14.3; 1944 Plot 18 Grain Mean, 12.5; 1944 Plot 20 Grain Mean, 17.3.
A/1.7	1945 Plot 17 Grain Mean, 11.0; straw figures are 29.9, 15.9, 12.4 15.1, 18.3
A/2.3	1940 Plot 7-2, 35.6
A/5.4	1945 Plot 8 Roots, No Cross Dressing, 3.19
A/6.4	1939 Plot 1 Limed 2nd Crop, 11.8
A/6.6	1943 Plot 11-1 Limed 2nd crop, 9.8; Plot 12 Limed Total, nil.
A/6.9	1949 Plot 4 ¹ Unlimed, 2.0
A/6.10	1941 heading L (only), 1939 Sp.105 Unlimed 0.1
Ba/1.3	1942 Standard error (a), 0.517.
Ba/1.7	The four "In seed bed" rows immediately above the standard errors should be deleted.
Ba/3.2	Wheat Variety 1939-45 Yeoman 1946,47 Squareheads Master
Ba/4.1	Area of each plot at Woburn, 0.27 acre.
Ba/4.2	1947 Clover Sown 15.4.46
Ba/4.3	1939 Sugar % Woburn N increment, -0.05
Bc/1.10	1946 Dung response, Deep ploughing, -0.10
Bc/1.12	1944 Dung response, Phosphate absent, -1.4; 1945 Dung response, Deep Ploughing, -0.9 (delete "Dung Abs" figure).
Bc/1.13	1945 Delete 2nd decimal places without rounding-off.
Bc/1.14	1945 Dung response, Potash absent, 2.4 (delete "Dung Pres." figure)
Bc/1.16	1946 Delete all figures on same line as "Ploughing" except the standard errors ± 1.77 and ± 2.51 .
Bc/1.20	1947 All potash responses should be positive.
Bc/1.21	1944 Shallow ploughing, Potash in seed bed, 77.4
Be/1.1	Sulphate of ammonia treatment rates, 0.4, 0.8 cwt. N per acre.
Be/1.6	1947 Standard error of mean (bottom line) ± 0.54
Be/1.7	1947 Cabbages weight, response to Sulph.Amm. to Green crops in absence of Straw, +0.20; 1946 Plant Number, responses to Sulph.Amm. to Green Crops in abs. and pres. of straw, -1.5 and +0.5.
Be/1.10	Insert headings "Tares" and "Mustard".
Bf/1.3	Lucerne Block 3 1st Cycle Third year, No third cut.
Bf/1.4	1938 Sown Mar. 9. Harvested Aug. 25.
Bf/1.6	Block 2 First year Total increase, -0.02
Bf/1.17	1942 Barley Straw S.E. per sub-plot, 3.31