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ROTHAMSTED  
RESEARCH

## Report for 1937

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## Continuous Rotation Experiments

### Rothamsted Research

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## FOUR COURSE ROTATION EXPERIMENT, ROTHAMSTED

**RESIDUAL VALUES OF ORGANIC AND PHOSPHATIC FERTILISERS**  
For details, see 1932 Report, p. 127  
**MANURES APPLIED, SEASON 1936-7**

Treatment	Organic Fertilisers (cwt. per acre)				Additional Artificial Fertilisers (cwt. per acre)		
	Organic Matter	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N. as S. of A.	P <sub>2</sub> O <sub>5</sub> as Super.	K <sub>2</sub> O as Mur. of Pot.
1 .. ..	50 (as F.Y.M.)	1.706	0.704	2.465	0.094	0.496	0.535
2 .. ..	50 (as Adco)	1.615	0.918	0.661	0.185	0.282	2.339
3 .. ..	133.50 (as straw)	0.839	0.339	2.550	0.961	0.861	0.450
4 .. ..			None		0.36	1.2	0.6
5 .. ..			None		0.36	1.2*	0.6

\* As mineral phosphate.

### CULTIVATIONS, ETC.

	Barley	Ryegrass	Potatoes	Wheat
Variety .. ..	Plumage Archer	Western Wolths	Ally	Yeoman
Date of Sowing ..	March 30	Oct. 3	April 30	Oct. 22
Manures applied—				
Lime .. ..	Oct. 9			
Dung, Adco, and accompanying artificials ..	Dec. 22	Sept. 21-22	Dec. 22	Sept. 22
Straw .. ..	Dec. 24-30	Sept. 23-25	Dec. 31-Jan. 7	Oct. 2
Artificials to straw	Dec. 24-30, Feb. 2, March 25	Sept. 23-25, Dec. 3, April 9	Dec. 31-Jan. 7, Feb. 2, April 30	Oct. 2, Dec. 3, April 7
Treatments 4 and 5	March 25	Oct. 1	April 30	Oct. 8
Harvested .. ..	Aug. 30	June 14	Oct. 7	Aug. 11-12
Previous crop ..	Potatoes	Barley	Wheat	Ryegrass
Cultivations—				
Ploughed .. ..	Dec. 24-30	Sept. 23-25	Dec. 31-Jan. 7	Oct. 2
Harrowed .. ..	March 26, 30	Oct. 1, 2, 5	April 2, 13, 24, 26 May 10	Oct. 14-17, 22 May 4
Rolled .. ..	March 30	Oct. 1, 2, 5, April 26	April 26, May 10	Oct. 17
Hoed .. ..				June 4
Ridged .. ..			April 27, 29, May 22, June 18, July 14	
Grubbed .. ..			June 10, July 12	

PLAN AND YIELDS

Barley—AB, plots 1-25

Yields in lb., grain above, straw below

N.W.

5 76.3 85.7 V	2 37.5 45.0 III	1 58.7 80.8 I	3 30.4 73.6 IV	4 59.6 74.9 II
5 55.9 68.1 II	1 30.8 53.7 IV	3 39.0 54.5 III	4 62.4 80.1 V	2 50.8 71.2 I
3 40.2 46.8 II	2 25.9 44.1 V	5 53.0 78.0 IV	4 63.6 77.9 I	1 36.4 58.1 III
1 36.9 45.6 II	3 44.1 37.4 V	4 59.8 72.7 III	5 47.4 74.1 I	2 32.7 54.3 IV
4 58.7 64.8 IV	1 34.0 49.0 V	5 43.8 64.2 III	3 44.0 59.5 I	2 37.2 58.8 II

Ryegrass—AR, plots 26-50

Yields in lb., hay

N.W.

3 71.0 II	2 62.5 III	5 116.2 IV	4 116.1 I	1 53.4 V
4 138.8 III	2 86.4 I	1 79.2 II	5 118.4 V	3 64.1 IV
1 122.7 I	4 122.2 IV	3 72.5 V	5 126.7 III	2 73.0 II
4 131.6 V	5 124.2 II	3 193.7 I	2 67.3 IV	1 71.4 III
2 64.5 V	4 118.6 II	3 82.1 III	1 61.0 IV	5 99.8 I

Potatoes—AP, plots 51-75

Yields in lb.

N.W.

3 145 III	4 144 V	1 136 IV	2 110 I	5 124 II
3 156 IV	4 192 II	5 139 III	2 91 V	1 154 I
2 138 III	4 166 IV	3 123 II	1 96 V	5 132 I
5 141 IV	1 128 III	3 111 V	4 189 I	2 81 II
4 174 III	2 112 IV	1 141 II	5 125 V	3 145 I

Wheat—AW, plots 76-100

Yields in lb., grain above, straw below

N.W.

4 33.2 52.8 II	2 28.3 45.7 III	5 32.7 62.3 I	3 22.9 48.6 IV	1 24.8 44.7 V
5 40.1 70.4 IV	2 26.3 46.2 V	1 26.7 56.6 II	4 30.1 65.9 I	3 30.9 61.6 III
2 33.9 60.1 I	1 24.8 46.2 III	5 34.5 65.5 V	4 29.0 61.5 IV	3 29.3 56.2 II
2 29.0 52.0 II	4 31.1 62.4 V	1 25.0 45.5 IV	5 29.8 63.7 III	3 33.3 97.7 I
5 36.6 72.9 II	2 27.2 47.3 IV	3 25.0 48.5 V	1 31.0 74.0 I	4 33.0 74.0 III

SUMMARY OF RESULTS, 1937

Manure	Year of Cycle	Wheat		Potatoes tons per acre	Barley		Ryegrass cwt. per acre dry matter
		cwt. per acre Grain	Straw		cwt. per acre Grain	Straw	
Manure as F.Y.M.	I	11.9	28.3	2.81	21.5	29.6	25.4
	II	10.2	21.6	2.58	13.5	16.7	15.8
	III	9.5	17.7	2.34	13.3	21.3	15.5
	IV	9.6	17.4	2.49	11.3	19.7	13.5
	V	9.5	17.1	1.75	12.5	18.0	11.8
Manure as Adco	I	13.0	23.0	2.02	18.6	26.1	18.9
	II	11.1	19.9	1.48	13.6	21.6	15.6
	III	10.8	17.5	2.54	13.7	16.5	12.5
	IV	10.4	18.1	2.06	12.0	19.9	13.8
	V	10.1	17.7	1.67	9.5	16.2	17.9
Manure as Straw	I	12.7	37.4	2.66	16.1	21.8	38.8
	II	11.2	21.5	2.26	14.7	17.2	15.4
	III	11.8	23.6	2.66	14.3	20.0	17.6
	IV	8.8	18.6	2.85	11.1	27.0	16.3
	V	9.6	18.5	2.04	16.2	13.7	14.7
Super.	I	11.5	25.2	3.46	23.3	28.6	24.5
	II	12.7	20.2	3.52	21.8	27.5	26.2
	III	12.6	28.3	3.19	21.9	26.6	29.9
	IV	11.1	23.5	3.05	21.5	23.8	26.2
	V	11.9	23.9	2.65	22.9	29.4	28.8
Rock Phosphate	I	12.5	23.8	2.42	17.4	27.2	22.3
	II	14.0	27.9	2.27	20.5	25.0	27.0
	III	11.4	24.4	2.55	16.1	23.5	26.1
	IV	15.3	26.9	2.58	19.4	28.6	24.4
	V	13.2	25.0	2.30	28.0	31.4	23.5

## SIX COURSE ROTATION EXPERIMENT,

SEASONAL EFFECTS OF N, P<sub>2</sub>O<sub>5</sub> AND K<sub>2</sub>O  
(For details see 1932 Report, p. 131)

### CULTIVATIONS, Etc.—ROTHAMSTED

	Sugar Beet	Barley	Clover Hay	Wheat	Potatoes	Rye
Variety	Kuhn	Plumage Archer	Montgomery Red	Yeoman	Ally	
Date of sowing	May 3	March 30	May 1	Oct. 22	April 30	Oct. 29
Manures applied	May 1	March 25	Nov. 9, April 8	Oct. 8, April 1	April 27	Oct. 29, April 1
Lime applied		March 25				Oct. 9
Harvested	Nov. 15	Aug. 12	June 14	Aug. 11	Oct. 6	Aug. 3
Previous crop	Rye	Sugar Beet	Barley	Clover	Wheat	Potatoes
Cultivations—						
Ploughed	Sept. 9, Dec. 11	Dec. 10-12		July 29, Sept. 5	Sept. 11, April 2	Oct. 27
Harrowed	Sept. 12,14, April 13,23, 26, 30, May 1	Mar. 26, 30 April 30	May 2	Oct. 14, 15, 22, April 26	April 19, April 13,14, 23-26, May 10	Oct. 29
Rolled	Sept. 12, April 30, May 1, 4	March 30, April 30	May 2	April 30	April 26, May 10	Oct. 29
Singled	July 16, 17					
Hoed	May 31, July 21, Aug. 7, 13, 16, Sept. 2,3				Aug. 18	
Ridged						
Grubbed					April 26,27, May 25, June 18, July 27 June 9, July 26	

### CULTIVATIONS, Etc.—WOBURN

	Sugar Beet	Barley	Clover Hay	Wheat	Potatoes	Rye
Variety	Kuhn	Plumage Archer	Montgomery Red	Yeoman	Ally	
Date of sowing	April 29	March 23	April 16	Oct. 30	April 8	Nov. 2
Manures applied	April 29	March 23	Oct. 30, April 14	Oct. 30, April 14	April 8	Oct. 4, April 14
Lime applied		Feb. 18				Nov. 2
Harvested	Oct. 7, 8	Aug. 7	June 30	Aug. 9	Sept. 15	July 26
Previous crop	Rye	Sugar Beet	Barley	Clover hay	Wheat	Potatoes
Cultivations—						
Ploughed	Sept. 9, March 25	Feb. 9		Sept. 7	Sept. 8, March 24	Oct. 2
Harrowed	Sept. 24, April 29	March 23, May 3, 5	April 17	Sept. 24, Oct. 21, 30, April 7, 12, 14, May 3	Oct. 19, 21, 30, April 7, May 3, 5, 22	Oct. 4, 19, 21, April 7, 12, May 3
Rolled	May 3		April 17			
Singled	June 10, 17					
Hoed	June 7, 11, 17, Aug. 3, 12				June 11, 17	
Ridged					April 8, May 11, June 23	

### ROTHAMSTED, 1937

**Wheat—BW, Plots 1-15**  
Yields in lb., grain above, straw below

<b>2N</b>	<b>4K</b>	<b>4P</b>	<b>3P</b>	<b>1P</b>
61.7	64.1	61.8	57.2	65.1
139.8	148.9	156.2	141.8	144.9
<b>3K</b>	<b>1N</b>	<b>2K</b>	<b>4N</b>	<b>0P</b>
51.9	57.6	54.5	54.4	61.6
129.1	130.4	142.5	164.6	142.9
<b>0N</b>	<b>1K</b>	<b>0K</b>	<b>2P</b>	<b>3N</b>
69.4	66.2	58.4	71.0	78.9
123.1	158.8	135.1	146.0	168.1

N  
↑

**Sugar Beet—BS, Plots 16-30**  
Yields in lb., roots (dirty) above, tops centre, sugar percentage below

<b>2P</b>	<b>3K</b>	<b>1K</b>	<b>2K</b>	<b>2N</b>
444	519	497	509	463
289	352	338	328	336
17.22	17.83	17.16	16.93	16.91
<b>4K</b>	<b>1P</b>	<b>0K</b>	<b>4P</b>	<b>3P</b>
511	543	515	559	427
430	437	394	448	339
16.85	17.45	16.91	16.94	17.16
<b>0P</b>	<b>4N</b>	<b>3N</b>	<b>1N</b>	<b>0N</b>
569	562	655	525	397
472	531	422	366	307
16.59	17.28	17.16	17.02	17.22

**Barley—BB, Plots 31-45**  
Yields in lb., grain above, straw below

<b>1P</b>	<b>4N</b>	<b>4K</b>	<b>1N</b>	<b>2K</b>
74.5	85.9	72.2	59.4	68.6
102.0	121.1	108.8	86.6	96.9
<b>2P</b>	<b>0P</b>	<b>3K</b>	<b>3P</b>	<b>4P</b>
76.6	77.5	80.3	82.8	74.7
101.9	112.5	111.7	111.2	93.3
<b>3N</b>	<b>2N</b>	<b>0N</b>	<b>1K</b>	<b>0K</b>
68.2	72.3	55.8	69.7	49.2
92.8	102.7	89.2	97.8	69.8

N  
↑

**Clover Hay—BC, Plots 46-60**  
Yields in lb.

<b>2K</b>	<b>4N</b>	<b>0N</b>	<b>3P</b>	<b>1P</b>
127	127	128	118	126
<b>0K</b>	<b>3N</b>	<b>1N</b>	<b>2P</b>	<b>0P</b>
102	106	99	116	123
<b>1K</b>	<b>4P</b>	<b>2N</b>	<b>4K</b>	<b>3K</b>
117	134	104	129	127

**Potatoes—BP, Plots 61-75**  
Yields in lb.

<b>3N</b>	<b>4N</b>	<b>0N</b>	<b>4K</b>	<b>0K</b>
262.7	299.4	271.5	316.6	204.7
<b>2P</b>	<b>0P</b>	<b>1N</b>	<b>4P</b>	<b>3P</b>
279.1	305.1	279.6	294.2	286.5
<b>1P</b>	<b>2N</b>	<b>3K</b>	<b>1K</b>	<b>2K</b>
236.0	286.2	333.9	332.3	348.0

N  
↑

**Rye—BR, Plots 76-90**  
Yields in lb., grain above, straw below

<b>3N</b>	<b>4N</b>	<b>2N</b>	<b>4P</b>	<b>4K</b>
64.4	73.1	57.6	65.2	54.9
110.6	121.9	106.4	110.3	98.6
<b>1K</b>	<b>2K</b>	<b>3P</b>	<b>1P</b>	<b>2P</b>
57.0	57.4	62.4	59.6	63.3
100.0	99.6	108.1	103.4	105.7
<b>0K</b>	<b>1N</b>	<b>0N</b>	<b>3K</b>	<b>0P</b>
68.1	58.0	42.5	67.4	62.7
115.4	89.5	65.0	114.1	105.8

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Potatoes—CP, Plots 1-15  
Yields in lb.

1K	3P	2P	1P	2N
294	303	281	242	272
2K	4P	4N	4K	1N
280	329	365	277	219
0K	3N	0P	0N	3K
249	330	243	218	258

N.W.  
↑

Rye—CR, Plots 16-30  
Yields in lb., grain above, straw below

1N	4P	3K	2P	1K
40.0	56.0	61.7	56.7	55.7
64.2	80.2	84.2	86.2	87.2
0N	3P	0P	4N	3N
44.5	59.5	63.5	72.0	70.0
50.2	75.2	81.2	113.2	99.2
2N	1P	4K	2K	0K
55.0	59.5	55.5	59.7	63.7
84.2	91.2	94.2	85.2	96.2

Wheat—CW, Plots 31-45  
Yields in lb., grain above, straw below

2K	3P	2P	0P	0N
34.2	35.5	40.0	44.0	31.0
60.5	65.5	76.7	82.7	50.7
4P	1K	4N	4K	1N
39.2	38.7	52.0	43.5	31.5
71.5	68.5	97.5	74.7	56.5
0K	1P	3N	3K	2N
38.2	41.7	44.0	42.2	41.2
64.5	73.7	79.7	82.5	72.5

N.W.  
↑

Barley—CB, Plots 46-60  
Yields in lb., grain above, straw below

0P	4K	2K	4N	4P
71.0	68.2	77.5	79.7	77.7
76.7	73.7	79.7	97.7	81.7
1P	2P	0K	2N	3P
71.0	71.7	82.7	68.7	75.7
74.7	80.2	94.7	80.7	94.7
3K	1K	3N	0N	1N
49.2	61.2	85.0	39.0	50.2
57.7	62.7	90.7	61.7	80.7

Sugar Beet—CS, Plots 61-75  
Yields in lb., roots (dirty) above, tops centre, sugar percentage below

0P	4N	1N	3K	2K
431	567	523	573	537
235	321	283	309	304
16.50	17.45	17.45	18.23	18.15
3N	1P	4K	0K	4P
444	464	586	555	513
248	297	337	335	308
17.02	17.54	18.78	18.24	18.58
2P	2N	0N	3P	1K
474	496	478	582	567
262	301	291	390	315
18.55	18.20	18.52	18.49	18.44

N.W.  
↑

Clover Hay—CC, Plots 76-90  
Yields in lb., green weights

4P	0N	3K	4K	0K
828	826	741	728	801
1N	3P	2P	4N	3N
691	684	724	693	700
2N	0P	1P	1K	2K
700	762	767	695	743

### ROTHAMSTED, 1937

1.—Mean yields per acre and increments in yield per cwt. of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

		Average, 1937		Standard error, 1937			Average 1937		Standard error, 1937
		1930-36			1930-36		1937		
<b>Sugar Beet</b>	Yield	7.51	7.83		<b>Clover Hay</b>	Yield	18.7*	24.5	
Roots (washed) tons	N	1.17	6.13		Dry matter cwt.	N	14.4*	0.1	±3.5
	P	-0.24	-1.57			P	-0.3*	3.5	±3.5
	K	0.25	-0.09			K	0.9*	9.7	±2.1
<b>Tops tons</b>	Yield	8.56	6.89		<b>Wheat Grain cwt.</b>	Yield	23.8	22.2	
	N	3.26	<b>6.01</b>	±2.35		N	4.6†	-2.1	±6.3
	P	-1.17	-1.74	±2.35		P	0.3	-1.7	±6.3
	K	-0.54	0.61	±1.41		K	1.3	-0.4	±3.8
<b>Sugar percentage</b>	Mean	17.14	17.11		<b>Straw cwt.</b>	Yield	45.5	51.7	
	N	-0.38	0.17			N	20.5†	28.7	
	P	-0.59	0.27			P	2.3	5.6	
	K	0.50	0.22			K	2.5	-0.2	
<b>Total sugar cwt.</b>	Yield	26.4	26.8		<b>Potatoes tons</b>	Yield	6.72	5.16	
	N	3.5	<b>21.5</b>	±6.4		N	1.84	0.47	±1.37
	P	-1.8	-5.0	±6.4		P	1.11	0.34	±1.37
	K	1.8	0.1	±3.9		K	2.55	1.60	±0.82
<b>Barley Grain cwt.</b>	Yield	28.4	25.4		<b>Rye Grain cwt.</b>	Yield	22.5‡	21.8	
	N	5.1	<b>16.5</b>	±4.6		N	1.6‡	<b>16.1</b>	±3.4
	P	3.8	0.7	±4.6		P	1.3‡	1.9	±3.4
	K	-0.7	<b>8.1</b>	±2.7		K	-0.6‡	-2.3	±2.1
<b>Straw cwt.</b>	Yield	35.6	35.7		<b>Straw cwt.</b>	Yield	45.7‡	37.0	
	N	13.3	16.5			N	10.9‡	32.1	
	P	6.7	-7.0			P	4.8‡	3.3	
	K	3.3	13.2			K	-3.8‡	-2.8	

\* Crop failed in 1933 and 1935. † 1931-36. ‡ 1934-36. Significant results in heavy type. Negative sign means depression.

2.—Average percentage increments in yield for each application of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

	N		P		K		Standard error, 1937
	Average 1930-36	1937	Average 1930-36	1937	Average 1930-36	1937	
<b>Sugar Beet—Roots (washed)</b>	1.79	11.74	-0.16	-3.01	1.27	-0.28	
Tops	5.84	<b>13.07</b>	-1.91	-3.79	-0.92	2.22	±5.11
Sugar percentage	0.01	0.15	-0.38	0.24	0.73	0.32	
Total sugar	1.42	<b>12.06</b>	-0.70	-2.80	2.05	0.07	±3.60
<b>Barley—Grain</b>	2.89	<b>9.75</b>	2.06	0.39	-0.56	<b>7.94</b>	±2.70
Straw	5.63	6.95	3.10	-2.94	2.43	9.25	
<b>Clover Hay—dry matter</b>	9.64*	0.04	-3.11*	2.16	0.47*	<b>9.91</b>	±2.14
<b>Wheat—Grain</b>	3.87†	-1.44	0.20	-1.17	1.14	-0.49	±4.26
Straw	7.61†	8.32	0.60	1.62	1.18	-0.12	
<b>Potatoes</b>	4.17	1.36	2.57	0.99	9.60	7.77	±3.97
<b>Rye—Grain</b>	1.21‡	<b>11.08</b>	1.04‡	1.29	-0.86‡	-2.62	±2.36
Straw	4.21‡	13.00	1.30‡	1.32	-2.15‡	-1.86	

\* Crop failed in 1933 and 1935. † 1931-1936. ‡ 1934-1936. Significant results in heavy type. Negative sign means depression.



### WOBURN, 1937

1.—Mean yields per acre and increments in yield per cwt. of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

		Average 1930-36	1937	Standard error, 1937			Average 1930-36	1937	Standard error, 1937
<b>Sugar</b>					<b>Clover</b>				
Beet	Yield	7.32	8.32		Hay	Yield	23.0*	51.4	
Roots (washed)	N	3.86	1.05		Dry	N	-10.6*	-6.8	±8.1
	P	0.07	3.06		matter	P	-5.0*	-4.3	±8.1
tons	K	0.42	0.23		cwt.	K	6.6*	-3.8	±4.8
Tops	Yield	6.58	5.40		<b>Wheat</b>	Yield	12.2†	14.2	
tons	N	2.57	0.29	±1.36	Grain	N	14.2†	13.0	±2.1
	P	0.67	2.84	±1.36	cwt.	P	-1.0†	-3.7	±2.1
	K	1.15	-0.01	±0.82		K	-0.5†	2.0	±1.2
Sugar percentage	Mean	16.92	18.01		Straw	Yield	26.0†	25.7	
	N	-0.90	-1.71		cwt.	N	31.8†	27.8	
	P	0.06	3.41			P	-1.7†	-7.3	
	K	0.74	0.35			K	-2.4†	5.0	
Total Sugar cwt.	Yield	24.8	30.0		<b>Potatoes</b>	Yield	8.58	4.95	
	N	11.8	1.0	±6.0	tons	N	4.41	4.83	±0.63
	P	0.4	16.1	±6.0		P	0.36	2.77	±0.63
	K	2.5	1.5	±3.6		K	0.82	0.14	±0.38
<b>Barley</b>	Yield	23.4	24.5		<b>Rye</b>	Yield	20.2‡	20.8	
Grain	N	17.3	27.8	±6.7	Grain	N	11.5‡	20.2	±3.3
cwt.	P	0.4	4.3	±6.7	cwt.	P	-1.9‡	-3.6	±3.3
	K	2.2	-5.8	±4.0		K	-1.6‡	-1.6	±2.0
Straw	Yield	39.1	28.3		Straw	Yield	36.8‡	30.3	
cwt.	N	19.6	19.6		cwt.	N	27.2‡	38.3	
	P	-0.1	7.1			P	-3.1‡	-4.3	
	K	4.3	-6.7			K	-2.7‡	-1.0	

\*Crop failed in 1934. †1931-1936. ‡1934-1936. Significant results in heavy type. Negative sign means depression.

2.—Average percentage increments in yield for each application of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

	N		P		K		Standard error, 1937
	Average 1930-36	1937	Average 1930-36	1937	Average 1930-36	1937	
<b>Sugar Beet—</b>							
Roots (washed)	6.99	1.90	-0.01	5.52	2.16	0.70	
Tops	5.61	0.81	1.53	7.89	3.90	-0.04	±3.79
Sugar percentage	-0.54	-1.43	0.06	2.84	1.09	0.48	
Total sugar	6.25	0.50	0.05	8.06	3.10	1.27	±3.02
<b>Barley—Grain</b>	11.76	17.02	0.17	2.61	2.84	-5.92	±4.11
Straw	8.17	10.40	0.13	3.78	2.60	-5.94	
<b>Clover Hay—Dry matter</b>	-8.39*	-1.98	-1.46*	-1.24	8.45*	-1.87	±2.36
<b>Wheat—Grain</b>	16.15†	13.73	-1.63†	-3.94	0.82†	3.59	±2.17
Straw	18.74†	16.25	-1.39†	-4.25	0.34†	4.83	
<b>Potatoes</b>	8.23	14.62	0.08	8.38	2.20	0.73	±1.90
<b>Rye—Grain</b>	9.09‡	14.59	-1.18‡	-2.60	-2.03‡	-1.88	±2.39
Straw	10.95‡	18.99	-1.29‡	-2.15	-1.95‡	-0.86	

\*Crop failed in 1934. †1931-1936. ‡1934-1936. Significant results in heavy type. Negative sign means depression.

## THREE COURSE ROTATION EXPERIMENT, ROTHAMSTED, 1937

### EFFECT OF PLOUGHING IN STRAW AND OF WINTER GREEN-MANURE CROPS

For details, see 1933 Report, p. 118

#### CULTIVATIONS, Etc.

	Barley	Sugar Beet	Potatoes
Variety	Plumage Archer	Kuhn	Ally
Date of sowing	March 31	May 3	April 30
Manures applied—			
Artificials	Oct. 5, March 31	Sept. 23, May 3	Oct. 26, April 27
Adco and straw	Oct. 5	Sept. 23, 24	Oct. 26-28
Harvested	Sept. 2	Nov. 19-20	Oct. 7
Previous crop	Potatoes	Barley	Sugar Beet
Cultivations—			
Ploughed	Oct. 5, 6, March 19-22	Sept. 23, 24, March 25	Oct. 27, 28, March 23, 24
Harrowed	Oct. 14-17, March 30, 31	Oct. 14-17, April 13, 14, 24, 30, May 1, 3	Oct. 29, 30, April 2, 13, 14, 24, 26, May 10
Rolled	Oct. 16, 17, March 30, May 31	Oct. 16, April 30, May 1, 3, 4	April 26, May 10
Singled		June 14	
Hoed		June 2, July 11, Aug. 7, 19	Aug. 19
Ridged			April 26, 27, May 28, June 18, July 27
Grubbed			June 9, July 26

#### GREEN MANURE CROPS—GREEN WEIGHTS—TONS PER ACRE

Preceding		Manured 1936-37					Manured 1935-36				
		Art'ls.	Adco	St. 1	St. 2	Mean	Art'ls.	Adco	St. 1	St. 2	Mean
Barley	Vetches	0.79	0.83	0.93	1.02	0.89	1.00	0.98	0.77	0.71	0.86
	Rye ..	1.87	2.56	1.92	2.10	2.11	2.56	2.00	2.21	2.86	2.41
Sugar Beet	Vetches	1.66	1.05	1.48	1.35	1.38	1.26	1.25	1.20	1.41	1.28
	Rye ..	3.22	3.29	2.73	3.46	3.18	3.43	2.10	3.65	3.57	3.19
Potatoes	Vetches	0.70	1.28	1.29	0.97	1.06	0.72	1.28	0.84	1.00	0.96
	Rye ..	0.43	0.74	0.91	1.51	0.90	1.35	0.95	0.46	1.08	0.96

#### PERCENTAGE DRY MATTER

Preceding		Sample 1	Sample 2
Barley	Vetches	9.60	7.70
	Rye	7.55	10.15
Sugar-Beet	Vetches	5.98	5.88
	Rye	6.48	5.91
Potatoes	Vetches	8.65	6.67
	Rye	6.47	5.86

For each break of the rotation, two large samples each of rye and vetches were taken for dry matter determination. These were weighed fresh, dried at 100°C, cleaned from soil as far as possible and weighed again. The dry matter percentages thus include a dirt tare correction.

PLAN AND YIELDS

Potatoes—DP, Plots 49-72. Yields in lb.

N

St 1 R I 304	Ad R I 216	Ad V II 169	Ad V I 155	Ad R II 141	St 1 V I 202
St 1 O I 257	St 2 V II 189	St 1 V II 162	St 2 V I 193	St 2 R I 188	St 2 O I 194
Ar R I 195	Ar R II 143	Ar O I 191	Ad O I 149	St 1 O II 180	Ar V II 180
St 1 R II 186	Ad O II 163	St 2 R II 173	St 2 O II 184	Ar V I 302	Ar O II 190

Barley—DB, Plots 25-48. Yields in lb. grain above, straw below

N

St 1 O II 37.2 41.3	Ad O I 35.1 42.9	Ad R II 23.8 32.7	Ar V II 34.3 40.7	Ar R I 50.2 61.8	St 2 O I 43.1 45.8
St 2 O II 39.0 44.0	Ad V II 42.0 52.5	St 2 R I 37.6 45.9	St 2 V I 59.1 43.9	St 1 R II 29.3 39.7	Ar O I 56.9 62.1
Ar R II 29.1 38.9	Ad O II 43.6 52.9	St 2 R II 29.2 39.3	St 1 V I 56.3 60.7	St 1 R I 42.7 48.3	Ad V I 38.2 43.3
Ad R I 19.2 29.8	Ar V I 45.5 60.6	St 1 O I 46.2 44.8	Ar O II 34.0 37.0	St 2 V II 42.6 48.4	St 1 V II 34.7 42.8

Sugar Beet—DS, Plots 1-24. Yields in lb. roots (dirty) above, tops centre, sugar percentage below

N

St 1 R II 282 208 16.79	St 2 R I 322 251 17.40	Ar R I 374 272 17.19	St 2 O II 375 288 17.16	Ar O II 369 300 16.76	Ad O I 274 318 16.56
St 1 O I 419 370 17.54	St 2 R II 392 305 17.89	St 1 O II 374 319 17.54	Ar V II 428 320 17.74	Ad O II 390 321 17.48	St 2 O I 246 255 16.53
Ar R II 354 280 17.54	St 2 V II 469 368 17.54	Ar V I 504 458 17.05	St 1 R I 435 355 17.63	Ad R I 324 230 17.45	St 1 V II 292 211 17.40
Ad V II 464 404 17.25	Ar O I 531 490 17.77	Ad V I 386 342 16.82	St 2 V I 363 332 17.48	St 1 V I 338 305 17.05	Ad R II 244 182 17.63

SUMMARY OF RESULTS

		Manured 1936-7					Manured 1935-6				
		Artifi- cials	Adco	Straw St 1	Straw St 2	Mean	Artifi- cials	Adco	Straw St 1	Straw St 2	Mean
<b>Barley</b> Grain cwt. p.a.	None	25.4	15.7	20.6	19.2	20.2	15.2	19.5	16.6	17.4	17.2
	Vetches	20.3	17.1	25.1	26.4	22.2	15.3	18.7	15.5	19.0	17.1
	Rye	22.4	8.6	19.1	16.8	16.7	13.0	10.6	13.1	13.0	12.4
	<i>Mean</i>	22.7	13.8	21.6	20.8	19.7	14.5	16.3	15.1	16.5	15.6
Straw cwt. p.a.	None	27.7	19.2	20.0	20.4	21.8	16.5	23.6	18.4	19.6	19.5
	Vetches	27.1	19.3	27.1	19.6	23.3	18.2	23.4	19.1	21.6	20.6
	Rye	27.6	13.3	21.6	20.5	20.8	17.4	14.6	17.7	17.5	16.8
	<i>Mean</i>	27.5	17.3	22.9	20.2	22.0	17.4	20.5	18.4	19.6	19.0
<b>Sugar Beet</b> Roots washed tons p.a.	None	9.31	4.87	7.62	4.45	6.56	5.93	7.46	7.03	6.43	6.71
	Vetches	9.44	7.21	6.14	6.67	7.36	7.96	8.61	5.55	8.80	7.73
	Rye	6.99	6.08	8.57	5.75	6.85	6.44	4.60	4.85	6.97	5.72
	<i>Mean</i>	8.58	6.05	7.44	5.62	6.92	6.78	6.89	5.81	7.40	6.72
Tops tons p.a.	None	10.94	7.10	8.26	5.69	8.00	6.69	7.17	7.12	6.44	6.86
	Vetches	10.21	7.62	6.81	7.42	8.02	7.15	9.01	4.71	8.20	7.27
	Rye	6.08	5.13	7.92	5.60	6.18	6.25	4.07	4.63	6.81	5.44
	<i>Mean</i>	9.08	6.62	7.66	6.24	7.40	6.70	6.75	5.49	7.15	6.52
Sugar percentage	None	17.77	16.56	17.54	16.53	17.10	16.76	17.48	17.54	17.16	17.24
	Vetches	17.05	16.82	17.05	17.48	17.10	17.74	17.25	17.40	17.54	17.48
	Rye	17.19	17.45	17.63	17.40	17.42	17.54	17.63	16.79	17.89	17.46
	<i>Mean</i>	17.34	16.94	17.41	17.14	17.21	17.35	17.45	17.24	17.53	17.39
Total sugar cwt. p.a.	None	33.1	16.2	26.7	14.7	22.7	19.9	26.1	24.6	22.1	23.2
	Vetches	32.2	24.2	20.9	23.3	25.2	28.2	29.7	19.3	30.9	27.0
	Rye	24.0	21.3	30.2	20.0	23.9	22.6	16.2	16.3	25.0	20.0
	<i>Mean</i>	29.8	20.6	25.9	19.3	23.9	23.6	24.0	20.1	26.0	23.4
<b>Potatoes</b> tons p.a.	None	4.26	3.32	5.73	4.33	4.41	4.24	3.64	4.02	4.12	4.01
	Vetches	6.73	3.46	4.51	4.30	4.75	4.01	3.77	3.62	4.21	3.90
	Rye	4.35	4.82	6.78	4.18	5.03	3.19	3.14	4.15	3.85	3.58
	<i>Mean</i>	5.11	3.87	5.67	4.27	4.73	3.81	3.52	3.93	4.06	3.83

K

## LONG PERIOD CULTIVATION EXPERIMENT, 1937

### Long Hoos V

(For details see 1934 Report, p. 175)

#### CULTIVATIONS, Etc.

	Wheat	Mangolds	Barley
Variety	Victor	Yellow Globe	Plumage Archer
Date of sowing	Nov. 23	May 3	April 13
Manures applied—			
Cyanamide	April 5	April 28	March 30
Nitro-chalk	April 5	May 3, June 23	April 6
Super. & mur. pot.		May 3	
Harvested	Aug. 19	Oct. 26-28	Aug. 30
Previous crop	Barley	Wheat	Mangolds
Cultivations—			
Ploughed	Nov. 11	Sept. 13*, March 26	Nov. 16, March 25
Simared	Nov. 20	March 26	March 25
Cultivated	Nov. 20	March 26	Nov. 16, March 25
Harrowed	Nov. 23, May 3	Oct. 14, April 1, 23, 26, May 1, 3	April 1, 12, 13
Hoed		June 1, July 24	
Rolled	May 4	May 1, 3, 4	May 31
Singled		June 17-19	

\*All plots ploughed shallow.

#### PLAN AND YIELDS IN LB.

##### Mangolds

##### Roots Left, Tops Right

I	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 10%;">S D N</td><td style="width: 10%;">231.5</td><td style="width: 10%;">90.5</td></tr> <tr><td>S Sh N</td><td>293.0</td><td>83.5</td></tr> <tr><td>CD Cy</td><td>295.5</td><td>75.5</td></tr> <tr><td>P Sh Cy</td><td>296.0</td><td>77.5</td></tr> <tr><td>C Sh N</td><td>352.5</td><td>88.0</td></tr> </table>	S D N	231.5	90.5	S Sh N	293.0	83.5	CD Cy	295.5	75.5	P Sh Cy	296.0	77.5	C Sh N	352.5	88.0	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 10%;">S D Cy</td><td style="width: 10%;">326.5</td><td style="width: 10%;">68.0</td></tr> <tr><td>P D Cy</td><td>365.5</td><td>77.5</td></tr> <tr><td>P Sh N</td><td>316.0</td><td>71.0</td></tr> <tr><td>CD N</td><td>269.0</td><td>68.0</td></tr> <tr><td>P Sh Cy</td><td>291.0</td><td>65.0</td></tr> <tr><td>CD Cy</td><td>356.0</td><td>76.0</td></tr> <tr><td>C Sh Cy</td><td>271.0</td><td>61.0</td></tr> <tr><td>P D N</td><td>401.5</td><td>86.0</td></tr> <tr><td>S D N</td><td>377.0</td><td>77.0</td></tr> <tr><td>S Sh Cy</td><td>323.5</td><td>67.5</td></tr> <tr><td>S Sh N</td><td>325.5</td><td>68.5</td></tr> <tr><td>C Sh N</td><td>297.5</td><td>66.5</td></tr> </table>	S D Cy	326.5	68.0	P D Cy	365.5	77.5	P Sh N	316.0	71.0	CD N	269.0	68.0	P Sh Cy	291.0	65.0	CD Cy	356.0	76.0	C Sh Cy	271.0	61.0	P D N	401.5	86.0	S D N	377.0	77.0	S Sh Cy	323.5	67.5	S Sh N	325.5	68.5	C Sh N	297.5	66.5	73																					
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Wheat  
Grain Left, Straw Right

C	S Sh N	22.2	38.8	S Sh N	16.1	43.4	C
	C Sh N	18.3	34.2	S D Cy	27.8	44.2	
	C Sh Cy	22.7	39.3	P Sh Cy	35.2	48.8	
	P D N	40.4	57.6	P Sh N	36.5	56.5	
	CD N	23.0	39.5	P D Cy	31.3	48.2	
	P Sh Cy	36.4	49.1	CD Cy	11.7	27.8	
	CD Cy	21.6	37.9	S D N	14.9	36.1	
	S D Cy	25.8	41.7	P D N	31.2	52.3	
	P Sh N	36.2	55.8	S Sh Cy	13.8	29.2	
	S Sh Cy	20.7	34.8	C Sh N	9.8	29.2	
	S D N	25.1	41.4	CD N	14.2	31.3	
	P D Cy	39.0	59.0	C Sh Cy	10.0	28.5	
A	P Sh N	39.9	58.6	C Sh Cy	17.7	29.8	B
	CD Cy	23.8	33.7	CD Cy	17.0	33.0	
	CD N	17.4	35.6	S Sh N	12.6	32.9	
	C Sh N	14.8	34.2	P Sh Cy	24.6	43.9	
	S D N	23.6	41.4	S Sh Cy	13.3	26.7	
	P D N	37.1	54.4	S D N	19.5	37.0	
	S D Cy	32.7	48.3	CD N	24.0	42.0	
	S Sh N	34.7	48.3	P D Cy	33.6	45.9	
	C Sh Cy	25.0	37.0	P Sh N	30.0	48.5	
	S Sh Cy	33.7	43.8	P D N	31.9	52.6	
	P D Cy	37.2	53.8	C Sh N	23.1	38.9	
	P Sh Cy	34.4	48.1	S D Cy	22.2	38.8	

Barley  
Grain Left, Straw Right

C	C Sh N	26.8	42.2	S Sh N	27.5	39.5	A
	S Sh N	25.9	40.6	S D N	31.5	49.5	
	P Sh Cy	29.4	46.1	S Sh Cy	29.5	45.5	
	CD Cy	24.2	39.3	CD Cy	27.5	40.5	
	C Sh Cy	26.1	42.9	S D Cy	29.4	41.1	
	CD N	22.2	40.3	P Sh N	30.6	44.4	
	S Sh Cy	22.1	39.4	P D Cy	29.6	42.4	
	S D Cy	24.6	40.4	C Sh N	24.4	37.6	
	P D Cy	25.9	42.1	P D N	27.4	41.6	
	P Sh N	29.7	43.8	CD N	24.2	35.8	
	P D N	23.8	39.2	C Sh Cy	22.3	35.7	
	S D N	24.1	35.4	P Sh Cy	23.9	36.1	
B	C Sh N	24.8	38.2	S D Cy	30.1	42.9	C
	P D N	31.1	43.9	CD Cy	25.6	37.4	
	P Sh N	28.1	42.9	C Sh Cy	27.9	42.1	
	S Sh N	24.4	35.1	P Sh N	30.2	45.8	
	P Sh Cy	26.4	42.6	CD N	25.4	35.6	
	C Sh Cy	21.2	30.8	S Sh N	24.2	37.3	
	P D Cy	24.2	40.3	S D N	23.0	36.0	
	S D N	22.5	35.5	S Sh Cy	22.3	35.2	
	CD Cy	20.2	32.3	P D Cy	25.6	43.4	
	S D Cy	24.0	37.5	P D N	26.4	40.6	
	CD N	24.1	35.4	C Sh N	25.9	37.1	
	S Sh Cy	18.7	28.8	P Sh Cy	28.4	42.1	

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**Summary of Results**

Last Year This Year	Continuous			Mean	Cycle A			Cycle B			Mean
	P	S	C		C	P	S	S	C	P	
<b>Wheat</b>											
GRAIN : cwt. per acre											
N D ..	20.8	11.6	10.8	14.4	21.5	13.7	10.1	18.5	11.3	13.9	14.8
Sh ..	21.1	11.1	8.2	13.5	23.2	20.1	8.6	17.4	7.3	13.4	15.0
Cy D ..	20.4	15.6	9.7	15.2	21.6	19.0	13.8	19.5	12.9	9.9	16.1
Sh ..	20.8	10.0	9.5	13.4	20.0	19.6	14.5	14.3	7.7	10.3	14.4
St. Errors	±1.32			±0.762							
<b>STRAW : cwt. per acre</b>											
N D ..	31.9	22.5	20.5	25.0	31.6	24.0	20.7	30.5	21.5	24.4	25.4
Sh ..	32.6	23.9	18.4	25.0	34.0	28.0	19.8	28.1	19.1	22.6	25.3
Cy D ..	31.1	24.9	19.1	25.0	31.2	28.0	19.6	26.6	22.5	19.2	24.5
Sh ..	28.4	18.6	19.7	22.2	27.9	25.4	21.5	25.5	15.5	17.3	22.2
<b>Mangolds</b>											
ROOTS : tons per acre											
N D ..	18.01	21.53	16.84	18.79	23.30	21.88	15.61	25.62	13.44	19.06	19.82
Sh ..	20.44	23.30	18.05	20.60	18.34	18.89	17.27	22.49	17.00	20.46	19.08
Cy D ..	21.81	19.37	14.62	18.60	21.21	18.95	20.66	21.04	18.51	17.15	19.59
Sh ..	22.10	20.28	20.86	21.08	16.89	18.77	15.73	17.18	18.77	20.14	17.91
St. Errors	±1.25			±0.722							
<b>TOPS : tons per acre</b>											
N D ..	4.32	4.57	4.19	4.36	4.99	4.47	3.95	6.27	5.25	5.25	5.03
Sh ..	4.53	5.35	4.24	4.71	4.12	3.98	3.86	5.80	4.85	5.11	4.62
Cy D ..	4.79	4.43	3.77	4.33	4.50	3.95	4.41	5.22	4.50	4.38	4.49
Sh ..	4.83	4.08	4.98	4.63	3.77	3.92	3.54	4.50	4.38	4.90	4.17
<b>Barley</b>											
GRAIN : cwt. per acre											
N D ..	14.6	13.7	13.8	14.0	15.9	18.3	14.0	18.0	13.1	14.0	15.6
Sh ..	17.4	14.5	15.3	15.7	17.8	16.0	14.2	16.3	14.2	14.4	15.5
Cy D ..	14.9	15.9	14.4	15.1	17.2	17.1	16.0	14.0	13.9	11.7	15.0
Sh ..	16.8	12.9	15.7	15.1	13.9	17.1	12.9	15.3	10.9	12.3	13.7
St. Errors	±0.620			±0.358							
<b>STRAW : cwt. per acre</b>											
N D ..	23.2	20.7	22.0	22.0	24.1	28.7	20.8	25.5	20.6	20.5	23.4
Sh ..	26.0	22.6	23.0	23.9	25.8	22.9	21.8	24.9	20.4	22.2	23.0
Cy D ..	24.8	24.2	22.3	23.8	24.6	23.9	23.5	23.4	21.8	18.7	22.6
Sh ..	25.6	21.6	24.7	24.0	21.0	26.4	20.7	24.7	16.7	17.9	21.2

Mean of Nitro-Chalk and Cyanamide

Last year This year	Continuous			Mean	Cycle A			Cycle B			Mean
	P	S	C		C	P	S	S	C	P	

**Wheat** GRAIN : cwt. per acre

D .. ..	20.6 <sup>1</sup>	13.6 <sup>1</sup>	10.2 <sup>1</sup>	14.8 <sup>3</sup>	21.6	16.4	12.0	19.0	12.1	11.9	15.5
Sh .. ..	21.0 <sup>1</sup>	10.6 <sup>1</sup>	8.8 <sup>1</sup>	13.5 <sup>3</sup>	21.6	19.8	11.6	15.8	7.5	11.8	14.7
Mean ..	20.8 <sup>2</sup>	12.1 <sup>2</sup>	9.5 <sup>2</sup>	14.1	21.6	18.1	11.8	17.4	9.8	11.8	15.1

St. Errors (1) ±0.934, (2) ±0.661, (3) ±0.539.

STRAW : cwt. per acre

D .. ..	31.5	23.7	19.8	25.0	31.4	26.0	20.2	28.6	22.0	21.8	25.0
Sh .. ..	30.5	21.2	19.0	23.6	31.0	26.7	20.6	26.8	17.3	20.0	23.7
Mean ..	31.0	22.4	19.4	24.3	31.2	26.4	20.4	27.7	19.6	20.9	24.4

**Mangolds** ROOTS : tons per acre

D .. ..	19.91 <sup>1</sup>	20.45 <sup>1</sup>	15.73 <sup>1</sup>	18.70 <sup>3</sup>	22.26	20.42	18.14	23.33	15.98	18.10	19.70
Sh .. ..	21.27 <sup>1</sup>	21.79 <sup>1</sup>	19.46 <sup>1</sup>	20.84 <sup>3</sup>	17.62	18.83	16.50	19.84	17.88	20.30	18.50
Mean ..	20.59 <sup>2</sup>	21.12 <sup>2</sup>	17.60 <sup>2</sup>	19.77	19.94	19.62	17.32	21.58	16.93	19.20	19.10

St. Errors (1) ±0.884, (2) ±0.625, (3) ±0.510.

TOPS : tons per acre

D .. ..	4.56	4.50	3.98	4.35	4.74	4.21	4.18	5.74	4.88	4.82	4.76
Sh .. ..	4.68	4.72	4.61	4.67	3.94	3.95	3.70	5.15	4.62	5.00	4.39
Mean ..	4.62	4.61	4.30	4.51	4.34	4.08	3.94	5.44	4.75	4.91	4.58

**Barley** GRAIN : cwt. per acre

D .. ..	14.8 <sup>1</sup>	14.8 <sup>1</sup>	14.1 <sup>1</sup>	14.6 <sup>3</sup>	16.6	17.7	15.0	16.0	13.5	12.8	15.3
Sh .. ..	17.1 <sup>1</sup>	13.7 <sup>1</sup>	15.5 <sup>1</sup>	15.4 <sup>3</sup>	15.8	16.6	13.6	15.8	12.6	13.4	14.6
Mean ..	16.0 <sup>2</sup>	14.2 <sup>2</sup>	14.8 <sup>2</sup>	15.0	16.2	17.2	14.3	15.9	13.0	13.1	15.0

St. Errors (1) ±0.438, (2) ±0.310, (3) ±0.253.

STRAW : cwt. per acre

D .. ..	24.0	22.4	22.2	22.9	24.4	26.3	22.2	24.4	21.2	19.6	23.0
Sh .. ..	25.8	22.1	23.8	23.9	23.4	24.6	21.2	24.8	18.6	20.0	22.1
Mean ..	24.9	22.2	23.0	23.4	23.9	25.4	21.7	24.6	19.9	19.8	22.6



### Conclusions

For wheat grain the differences between the effects of the continuous cultivations were very striking, the plots ploughed every year giving a mean yield of 20.8 cwt. per acre, the simared plots giving 12.1 cwt. and the cultivated plots 9.5 cwt. The results were similar with the rotating cultivations, except that in cycle B the cultivated plots (ploughed last year) gave a higher yield than the simared plots.

For barley grain the plots ploughed every year gave a significantly higher yield than the simared or cultivated plots, there being little difference between the last two. The results were similar in cycle B of the rotating cultivations, but in cycle A the plots simared this year and ploughed last year gave the highest yields.

For mangolds roots there was little difference between the plots ploughed every year and those simared every year, but the cultivated plots gave significantly lower yields. Cycle A showed the same effects, but in cycle B the plots cultivated this year and ploughed last year gave higher yields than the plots simared this year and cultivated last year.

It will be noted from the above conclusions that in all three crops there is some indication of a beneficial residual effect of the ploughing last year compared with simaring and cultivating last year.

For mangolds roots the shallow cultivations gave a significantly higher yield than the deep cultivations on the continuous part of the experiment. This result did not however, appear with the rotating cultivations. For wheat and barley grain the differences between deep and shallow cultivations were not consistent.

There were no significant differences between nitro-chalk and cyanamide.

It should be noted that the ploughing, simaring and cultivating were again carried out at the same time, except on the wheat crop, when only a few days separated them.

## NEW GREEN MANURING EXPERIMENT

### STACKYARD, WOBURN (For details see 1936 Report, p. 203)

#### Cultivations, etc.,

UPPER HALF: Ploughed: March 3-16. Lime applied, harrowed and barley drilled: March 23. Harrowed, clover and ryegrass drilled: May 5. Horse hoed: June 11. Harvested: Aug. 19. Variety: Plumage Archer. Previous crop: Kale.

LOWER HALF: Ploughed (except clover and ryegrass plots): Sept. 17 and 18. Harrowed, mustard and tares drilled: Sept. 24. Mustard, tares and weeds on fallow plots ploughed in: April 13 and 14. Harrowed, mustard and tares redrilled: April 22. Clover and ryegrass cut: June 16. Dung applied: June 30-July 1. Straw applied and ploughed: July 3-9. Harrowed, rolled and kale drilled: July 10. Sulphate of ammonia applied to all plots: July 12. Harrowed, kale resown and rolled: Aug. 16. Horse hoed all plots: Sept. 9. Harvested: Jan. 11 and 14. Variety: Thousand head. Previous crop: Wheat.

SPECIAL NOTES: On the lower half of the experiment, clover and ryegrass were sown in the preceding wheat crop. A basal dressing of 4 cwt. per acre of mineral manures (3 parts superphosphate and 1 part muriate of potash) should have been applied on this half, but was unfortunately omitted.

#### WI—STACKYARD, 1937

##### Upper half—Barley. Plan and yields of grain in lb.

20	M(C)	—	—	N	1336		T	D	S	2N	1417		40
	M	—	—	N	1145		T(R)	—	—	N	920		
	F	—	S	2N	1145		F	—	—	2N	975		
	M	—	S	2N	1431		M	D	S	N	1410		
	T	D	S	N	1622		F	D	—	2N	1547		
	T	—	—	N	1438		M(C)	D	—	2N	1410		
	M(C)	D	S	2N	1560		T	—	S	N	1097		
	T(R)	D	—	2N	1642		F	D	S	N	1363		
	M(C)	—	S	N	1302		M(C)	—	S	2N	1002		
	T(R)	—	S	2N	1193		F	—	—	N	961		
	F	D	—	N	1383		T(R)	D	S	N	1281		
	M	—	—	2N	1261		F	D	S	2N	1547		
	M(C)	D	—	N	1451		T	D	—	N	1458		
	F	—	S	N	1090		T(R)	—	S	N	1036		
	M(C)	—	—	2N	1451		M	—	S	N	852		
	T(R)	D	S	2N	1635		M	D	—	N	1233		
	T	—	S	2N	1417		M	D	S	2N	1505		
	M(C)	D	S	N	1546		T	—	—	2N	1506		
	T(R)	—	—	2N	1001		T(R)	D	—	N	1370		
1	M	D	—	2N	1859		T	D	—	2N	2017		21

##### Lower half—Kale. Plan and yields in lb.

20	C	D	S	N	—*		R	—	S	2N	—*		40
	M	D	—	2N	—*		M	—	S	N	—*		
	F	D	—	2N	193.4*		F	—	—	N	124.0*		
	T	—	S	N	100.0*		R	D	—	N	148.4*		
	T	D	—	2N	307.7		T	D	S	2N	161.1*		
	F	D	S	N	316.1		F	—	S	2N	214.1		
	F	D	S	2N	419.0		R	D	S	N	183.7		
	T	—	S	2N	307.7		F	—	—	2N	251.1		
	R	—	S	N	205.3		C	D	—	2N	269.8		
	T	D	—	N	373.0		R	—	—	2N	226.7		
	M	—	—	N	234.0		T	—	—	2N	357.5		
	F	—	S	N	264.0		M	—	S	2N	309.0		
	C	—	S	2N	259.9		F	D	—	N	346.1		
	R	—	—	N	282.8		C	D	S	2N	346.6		
	R	D	S	2N	393.6		M	D	S	N	310.5		
	T	—	—	N	311.7		C	—	S	N	293.9		
	M	D	—	N	380.5		R	D	—	2N	412.4		
	M	—	—	2N	295.4		C	—	—	2N	355.4		
	T	D	S	N	440.7		M	D	S	2N	324.6		
1	C	D	—	N	329.7		C	—	—	N	214.3		21

\* Badly attacked by pigeons; not used in analysis.

**Leys and Green Manures : dry matter and nitrogen per cent.**

	Fallow	Tares	Mustard	Clover	Ryegrass
	Winter crop : buried.			Dry matter : carted off.	
Dry matter, cwt. ..	1.3	4.4	4.0	40.8	18.8
Nitrogen per cent. ..	2.78	3.69	3.01	2.94	0.97
	Spring crop : buried.			Stubble : buried.	
Dry matter : cwt. ..	8.8	15.8	16.1	21.6	24.1
Nitrogen : per cent. ..	2.05	2.31	1.58	1.84	0.53

Notes : The dry matter yields for the individual plots are also available. The fallow figures are the weights and nitrogen per cents. of the weeds on the plots.

**Summary of Results**

**Upper half : barley grain, cwt. per acre**

**Residual effects of green manures and fertilisers applied to Kale in 1936.**

Green manure .. .. Ley sown under barley	None None	Tares		Mustard		Mean ( $\pm 0.306$ )	Increase ( $\pm 0.433$ )
		None	Ryegrass	None	Clover		
No dung .. ..	9.3	12.2	9.2	10.5	11.4	10.5	
Dung .. ..	13.0	14.6	13.2	13.4	13.3	13.5	+ 3.0
No straw .. ..	10.8	14.3	11.0	12.3	12.6	12.2	
Straw .. ..	11.5	12.4	11.5	11.6	12.0	11.8	-0.4
2 cwt. sulph. amm. ..	10.7	12.5	10.2	10.4	12.6	11.3	
4 cwt. sulph. amm. ..	11.6	14.2	12.2	13.5	12.1	12.7	+ 1.4
Mean ( $\pm 0.484$ ) ..	11.2	13.4	11.2	12.0	12.4	12.0	

**Interactions of fertilisers**

**Grain cwt. per acre ( $\pm 0.613$ )**

	2 cwt. sulph. amm.		4 cwt. sulph. amm.	
	No dung	Dung	No dung	Dung
No straw ..	10.3	12.3	11.1	15.1
Straw ..	9.6	12.9	11.1	13.7

**Conclusions**

Upper half :—The green manures grown before the preceding kale crop increased the yield of barley grain, the increase to tares being 2.2 cwt. per acre and to mustard 0.8 cwt. per acre. The difference between these increases was not significant. Clover sown under the barley appears to have had little effect on the yield of barley grain, but there are indications that the undersowing of ryegrass reduced the yield of barley grain.

There were also significant residual effects of the manurial treatments applied to kale. Dung increased the barley grain by 3.0 cwt. per acre and sulphate of ammonia by 1.4 cwt. per acre. Straw had little effect.

Lower half :—The crop of kale was a very poor one. Nine plots had to be rejected on account of partial or complete failure. The mean yield on the remaining plots was 3.74 tons per acre. There were no significant differences between the effects of the green manures or leys. Dung produced a significant increase of 0.88 tons per acre, but sulphate of ammonia and straw had little effect.