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Yields of the Field Experiments 1959

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Classical Experiments

Rothamsted Research

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59/A/2.2

Summary of Results

Plot	Grain (at 85% dry matter): cwt per acre	Straw (at 85% dry matter): cwt per acre
1 O	9.7	4.7
2 O	14.0	9.0
3 O	10.5	4.7
4 O	14.9	7.3
5 O	15.6	9.2
1 A	16.5	7.9
2 A	21.4	11.7
3 A	21.0	13.2
4 A	28.3	17.2
5 A	31.0	20.3
1 AA	18.9	11.7
2 AA	25.1	14.4
3 AA	23.8	15.5
4 AA	27.3	14.3
1 AAS	24.7	13.9
2 AAS	27.3	16.0
3 AAS	26.3	12.6
4 AAS	30.0	19.3
1 C	24.9	12.1
2 C	25.4	12.9
3 C	26.4	15.9
4 C	27.7	15.5
7 - 1	12.2	5.9
7 - 2	28.7	19.3
6 - 1	8.6	4.2
6 - 2	10.4	4.8
1 N	18.3	7.7
2 N	21.5	12.9
Mean dry matter % as harvested:	85.7	89.6

59/A/3

WHEAT AFTER FALLOW - HOOSFIELD 1959

Without manure 1851 and since

For history, treatments etc., see "Details of the Classical and Long Term Experiments" 1956. In 1957 the original plots were reduced in size to 0.0628* acres to provide additional land for the study of Wheat Bulb Fly.

Area harvested: 0.0334 acres.

Cultivations, etc.:

Cropped plots. Ploughed: Oct 21, 1958. Seed sown at 3 bushels per acre: Nov 21. Combine harvested: Aug 20, 1959. Variety: Squarehead's Master 13/4.

Fallowed plots. Ploughed: Oct 21, 1958 and June 2, 1959.

*Note: This is the full area; the area given in previous reports is the area harvested before allowing for sampling.

Note: Counts of plant shoot and ear number and estimates of incidence of Eyespot (*Cercospora herpotrichoides*) and Take-All (*Ophiobolus graminis*) were made. There was no lodging.

Summary of Results

Grain (at 85% dry matter): cwt per acre

Plot	B ₁	B ₂	B ₃	Mean
No. of years of fallow	1	1	3	
	9.1	8.2	9.4	8.9

Mean dry matter % as harvested: 86.2

59/1/4.1

GRASS AND MULTIPLE CROPPING X P

AGDELL 1959

For history, treatments, etc., see "Details of the Classical and Long Term Experiments" 1956.

In 1959 a system of multiple cropping designed to measure crop responses to phosphate was added to the 1958 scheme, the fallow half of each main plot carrying potatoes, sugar beet and barley in 3 strips, each divided into 4 blocks of 3 sub-plots each.

Area of each sub-plot: 0.0034 acres. Area of grass harvested: 0.0023 acres.

Treatments applied to sub-plots: none; 0.25; 1.00 cwt P_2O_5 per acre as superphosphate.

Basal dressings:

To grass: 0.80 cwt N applied in spring and after each silage cut.
To potatoes and sugar beet: 1.00 cwt N per acre as sulphate of ammonia and 1.20 cwt K_2O per acre as sulphate of potash.
To barley: 0.50 cwt N per acre as sulphate of ammonia and 0.60 cwt K_2O per acre as sulphate of potash.

Cultivations, etc.: Ground chalk applied to plots 1 and 2 at 36 cwt per acre: February 10th, 1959. Fallow halves ploughed: February 12th.

Grass. "Nitro-Shell" applied: April 10th. Cut 3 times for silage: May 27th, July 7th and August 24th. "Nitro-Shell" applied after 1st and 2nd cuts, "Nitro-Chalk" 21 after the last.
Variety: Italian Ryegrass S22.

Barley. Fertilizers broadcast, seed drilled at $2\frac{1}{2}$ bushels per acre: April 2nd. Harvested: August 12th. Variety: Proctor.

Potatoes. Ridged, fertilizers applied, potatoes planted: May 11th. Sprayed with copper fungicide at 5lb. in 40 gallons per acre: August 24th. Lifted: October 9th. Variety: Majestic (chitted).

Sugar beet: Fertilizers applied, seed drilled at 19 lb. per acre: May 5th. Hand sprayed with miscible DDT at 3 pints in 8 gallons per acre against mangold fly: May 26th. Singled: June 19th-27th. Hand sprayed with demeton methyl at 16 fluid oz. in 8 gallons per acre against aphids: July 3rd. Lifted: November 18th.
Variety: Klein E.

59/A/4.2

Summary of Results

Manure to turnips until 1948 Plot Rotation	None since 1848		Mineral manure* no nitrogen		Mineral* and nitrogenous manure+		Mean
	5 Fallow	6 Clover	3 Fallow	4 Clover	1 Fallow	2 Clover	

<u>Grass Dry Matter: cwt per acre</u>							
1st cut	30.0	12.8	39.1	36.3	38.1	31.6	31.3
2nd cut	7.5	5.7	12.4	13.7	16.7	15.8	12.0
3rd cut	5.6	3.5	12.2	9.6	11.9	11.4	9.0
Total of 3 cuts	43.1	22.0	63.6	59.6	66.8	58.7	52.3

<u>Potatoes total tubers: tons per acre</u>							
<u>P₂O₅ cwt per acre</u>							
None	3.58	3.50	8.42	7.32	7.32	6.41	6.09
0.25	6.32	5.24	9.53	8.62	9.02	7.72	7.74
1.00	8.48	6.77	10.32	9.96	10.89	9.60	9.34
Mean	6.13	5.17	9.42	8.63	9.08	7.91	7.72

<u>Sugar Beet: Roots (washed) tons per acre</u>							
None	8.50	9.80	14.95	13.80	11.56	8.94	11.26
0.25	10.54	9.78	15.61	12.52	11.58	9.57	11.60
1.00	10.65	10.13	14.92	13.28	11.84	10.55	11.90
Mean	9.90	9.90	15.16	13.20	11.66	9.69	11.58

<u>Sugar Beet: Sugar Percentage</u>							
None	15.4	15.4	17.6	16.5	16.4	15.6	16.2
0.25	15.9	15.3	17.2	16.6	16.2	16.1	16.2
1.00	16.0	15.6	17.1	16.5	16.2	16.2	16.3
Mean	15.8	15.4	17.3	16.5	16.3	16.0	16.2

* P, K, Na, Mg.

+ Rape dust (or castor meal + ammonium sulphate)

59/A/4.3

Maure to turnips until 1948 Plot Rotation	Mineral manure*				Mineral* and nitrogenous manure†		Mean
	None since 1848		no nitrogen		1	2	
	5 Fallow	6 Clover	3 Fallow	4 Clover	Fallow	Clover	

Sugar Beet: Total Sugar cwt per acre

P₂O₅ cwt per acre

None	26.2	30.1	52.5	45.4	37.8	28.0	36.7
0.25	33.4	30.0	53.7	41.6	37.5	30.8	37.8
1.00	34.1	31.6	50.9	43.7	38.5	34.1	38.8
Mean	31.2	30.6	52.4	43.6	37.9	31.0	37.8

Sugar Beet: Tops tons per acre

None	7.43	8.59	8.91	10.49	10.24	8.79	9.08
0.25	9.04	9.32	9.51	10.21	9.12	9.19	9.40
1.00	9.89	11.25	10.16	10.71	10.43	10.37	10.47
Mean	8.79	9.72	9.53	10.47	9.93	9.45	9.65

Barley grain(at 85% dry matter): cwt per acre

None	15.5	12.8	34.1	28.7	21.4	26.1	23.1
0.25	20.2	20.9	34.1	30.7	22.5	27.6	26.0
1.00	26.9	32.0	34.5	35.5	21.5	23.9	29.0
Mean	20.9	21.9	34.2	31.6	21.8	25.9	26.0

Barley straw(at 85% dry matter): cwt per acre

None	18.4	18.9	30.6	29.2	19.3	19.5	22.6
0.25	21.2	22.0	30.1	29.4	20.0	22.5	24.2
1.00	24.2	31.8	32.6	31.8	20.4	20.8	26.9
Mean	21.3	24.2	31.1	30.1	19.9	20.9	24.6

Mean dry matter % as harvested:	Grass	1st cut	23.4
		2nd cut	35.9
		3rd cut	56.7
		Total of 3 cuts	38.7
	Barley	grain	79.0
		straw	63.1

* P, K, Na, Mg.

† Rape dust (or castor meal + ammonium sulphate)

59/A/5.1

MANGOLDS AND SUGAR BEET - BARNFIELD

The 8th and 14th years

For history, treatments etc., see "Details of the Classical and Long Term Experiments" 1956.

Cultivations, etc.: Dung applied: Nov 24 - 27, 1958. Dung ploughed in: Dec 3, remainder ploughed: Feb 10, 1959. Fertilizers applied: May 4 - 6. Sugar beet drilled at 19 lb per acre, mangolds drilled at 8 lb per acre: May 11. Singled: June 26 - July 9. Top dressings applied: July 14. Lifted: Oct 22 - Nov 12. Varieties: Mangolds - Yellow Globe, sugar beet - Klein E.

Summary of Results

Strip	Cross dressing				
	0	N	A	AC	C
<u>Mangolds, roots: tons per acre</u>					
1	11.13	20.75	20.26	21.48	15.26
2	10.89	16.99	14.46	16.41	12.29
4	3.82	(a) 10.83* (b) 13.02*	11.40	17.79	12.97
5	2.77	11.91	5.42	6.31	6.95
6	2.38	9.87	9.78	14.87	10.91
7	3.02	12.18	11.83	14.42	11.89
8	3.00	7.24	5.04	6.66	6.60
9	11.65				
<u>Mangolds, leaves: tons per acre</u>					
1	2.08	2.96	3.25	3.44	2.74
2	1.93	2.69	3.08	3.03	2.44
4	1.39	(a) 2.08* (b) 2.76*	2.27	3.59	2.37
5	1.24	2.27	1.95	2.00	2.44
6	1.18	2.76	2.39	3.54	2.12
7	1.37	3.42	3.27	4.45	2.42
8	0.85	2.88	2.15	2.83	2.61
9	2.88				
<u>Mangolds, plant number: thousands per acre</u>					
1	18.5	20.8	20.4	21.0	19.8
2	21.3	22.0	20.7	20.9	20.8
4	20.8	(a) 19.1* (b) 19.8*	20.8	20.0	20.5
5	18.2	21.7	17.3	17.2	19.2
6	15.7	19.4	20.6	20.6	21.2
7	17.8	23.0	20.6	21.7	21.1
8	16.1	20.0	19.5	20.0	20.6
9	21.4				

*No nitrate of soda. Nitrogen applied as calcium and potassium nitrates.

59/A/5.2

Strip	Cross dressing				
	0	N	A	AC	C
<u>Sugar beet, roots (washed): tons per acre</u>					
1	6.63	9.54	9.34	10.82	8.93
2	5.54	7.44*	8.34	8.54	8.57
4	2.05	(b) 6.64*	6.44	9.66	7.79
5	2.47	6.63	4.63	5.48	5.58
6	1.60	4.80	6.68	7.80	6.06
7	2.44	6.90	7.05	8.27	6.80
8	2.70	5.84	4.09	5.79	4.92
9	7.14				
<u>Sugar beet, tops: tons per acre</u>					
1	4.30	7.96	7.47	10.75	7.03
2	4.01	6.74*	8.50	8.70	6.89
4	1.71	(b) 5.76*	5.03	8.11	4.89
5	2.04	6.40	3.86	7.62	5.76
6	1.47	2.39	4.64	7.86	6.20
7	1.62	8.40	5.18	8.06	7.23
8	1.84	6.06	4.01	5.08	7.08
9	5.81				
<u>Sugar beet, plant number: thousands per acre</u>					
1	22.1	22.2	21.2	22.0	22.8
2	20.1	23.2*	24.3	24.0	24.2
4	19.7	(b) 22.0*	22.7	22.0	23.1
5	22.5	21.5	19.7	20.6	22.1
6	18.6	19.1	18.9	20.4	20.8
7	16.6	20.7	20.9	23.7	24.2
8	21.2	22.5	19.1	22.6	19.8
9	19.9				
<u>Sugar beet, sugar percentage</u>					
1	18.0	16.3	16.0	17.1	16.6
2	17.0	15.8*	16.1	16.1	16.7
4	17.0	(b) 16.5*	17.4	16.8	17.4
5	16.7	15.8	17.0	15.5	16.4
6	16.9	16.2	17.7	16.9	16.7
7	17.6	15.8	17.6	17.0	16.6
8	17.2	16.2	16.7	15.7	15.7
9	17.1				

*No nitrate of soda. Nitrogen applied as calcium and potassium nitrates.

59/A/6.1

HAY - THE PARK GRASS PLOTS 1959

For history, treatments etc. see "Details of the Classical and Long Term Experiments" 1956.

Use of flail-type forage harvester

At the time of the first cut the forage harvester was tested on small sample areas of 4 plots (1, 7, 11-1 and 13) and comparable samples were cut by cutter-bar machine. The produce was carted green. The grass remaining on these plots as well as that from the other plots of the experiment was harvested as in previous years, and the yields given in the summary are based on this method. At the second cut the forage harvester alone was used, the produce being carted green. The yields are based on sample cuts, 2 each from plots 1, 2, 3, 4-1, 4-2, 11-1, 11-2, 12, 14, 15, 16, 17, 19 and 20-1, 20-2, 20-3, and 4 each from the remainder. The area harvested per plot for the second cut varied from 0.0143 to 0.0784 acres.

Cultivations, etc.: Mineral fertilizers applied: Feb 18, 1959.
Nitrogenous fertilizers applied: 1st dressing - Mar 25; 2nd dressing - Apr 10. Cut twice: June 15 and Sept 14 - 19.

59/A/6.2

Summary of Results

Yield of hay: cwt per acre

Plot	Not Limed			Limed		Total
	1st crop	2nd crop	Total	1st crop	2nd crop	
1	1.0	6.0	7.0	15.8	23.0	38.8
2	4.6	11.0	15.6	14.8	22.6	37.4
3	5.1	14.2	19.3	14.4	19.4	33.8
4-1	16.4	16.9	33.3	17.0	22.9	39.9
4-2	4.9	15.5	20.4	27.6	16.9	44.5
5-1	3.8	12.2	16.0			
5-2	24.7	19.9	44.6			
6	30.6	19.8	50.4			
7	34.1	16.2	50.3	44.1	19.9	64.0
8	18.5	19.1	37.6	16.8	17.5	34.3
9	14.4	29.6	44.0	55.1	15.6	70.7
10	7.6	20.4	28.0	34.6	13.1	47.7
11-1	1.4	47.6	49.0	55.7	21.1	76.8
11-2	12.0	45.9	57.9	66.9	33.0	99.9
12	5.8	17.6	23.4			
13	35.0	18.4	53.4	34.4	24.4	58.8
14	50.9	21.0	71.9	60.6	30.5	91.1
15	26.7	16.4	43.1	45.4	23.6	69.0
16	37.8	16.4	54.2	53.3	27.8	81.1
17	12.9	14.5	27.4	20.8*	19.2	40.0
18	1.4	5.5	6.9	18.8*	15.2	34.0
				16.0 ⁺	17.9	33.9
19	17.4	16.6	34.0	30.3*	18.8	49.1
				19.7 ⁺	16.2	35.9
20	33.7	16.6	50.3	35.3*	26.1	61.4
				33.5 ⁺	22.1	55.6

*Heavy liming. ⁺Light liming.

Note: The second crop was carted green; hay yields were estimated from the dry matter.

Mean dry matter % as weighed: 1st crop 82.1; 2nd crop 16.1.

59/A/7.1

BARLEY - EXHAUSTION LAND HOOSFIELD 1959

For history, treatments etc., see "Details of the Classical and Long Term Experiments" 1956.

In 1959 the whole experiment was sown to barley again.

Combine harvesting 1959:- One central cut was taken down the length of each plot except plots 5 and 9, 90 links at the end of plots 2, 4, 6, 8 and 10 being discarded; parts of plots 5 and 9 were harvested separately as microplots and the remainder discarded.

The following should be added to the details for 1958:

Combine harvesting 1958:- The barley crop on the western halves was combine harvested, one central cut being taken from plots 4, 6, 8 and 19, and from plot 2, two cuts separately, one on the north side and the other on the south side.

Basal dressing: 0.5 cwt N per acre as 'Nitro-Shell'.

Cultivations, etc.: Ploughed: Feb 16, 1959. 'Nitro-Shell' applied, seed drilled at $2\frac{3}{4}$ bushels per acre: Mar 17. Sprayed with CMPP at 4 pints in 40 gallons per acre: May 27. Plots 5 and 9 cut by hand: Aug 5. Remaining plots combine harvested: Aug 18. Variety: Plumage Archer.

59/A/7.2

Summary of Results

Barley

Yields (at 85% dry matter): cwt per acre

Plots not cross cropped in 1957 and 1958 and combined harvested in 1959

Plot. Manuring to potatoes 1876 - 1901*	Grain	Straw
2 Unmanured after dung 1876 - 81	21.1	13.5
4 Dung	28.5	17.7
6 Nitrate of soda	19.0	11.1
8 Nitrate of soda and complete minerals	25.3	14.9
10 Complete minerals	23.5	14.9

Plots cross cropped in 1957 and 1958 and combined harvested in 1959

Plot. Manuring to potatoes 1876 - 1901*	Grain	Straw
1 Unmanured	26.3	16.0
3 Dung	32.0	20.5
7 Ammonium salts and complete minerals	29.9	19.9
Mean dry matter % of combine harvested plots	87.2	88.2

*For certain changes see history.

Barley

Yields (at 85% dry matter): cwt per acre

Plots cross cropped in 1957 and 1958 and harvested by hand as microplots in 1959.

Previous crop

Strip	Treatment for 1957 crop (1958 fallow)	Potatoes		Sugar beet		Kale		Barley		Wheat		Swedes	
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
5	P ⁰	30.1	39.5	25.9	31.8	28.0	38.0	16.8	18.9	24.4	30.3	26.8	33.5
	P ¹	24.1	27.7	27.2	38.0	25.8	34.8	25.9	26.1	27.6	37.8	24.8	32.5
	P ²	26.5	30.4	29.8	41.3	31.2	41.2	24.9	25.7	27.3	32.9	25.7	30.0
	P ⁴	33.1	38.7	27.4	36.1	35.1	47.7	20.7	20.5	25.6	28.7	29.7	34.1
	P ⁰ ₄	31.5	38.6	34.5	42.6	33.8	33.2	30.9	33.2	28.8	30.4	43.0	39.5
9	P ⁰ ₄	28.1	37.6	33.6	45.2	36.8	36.0	33.6	34.1	25.8	29.9	29.5	31.7
	P ⁰	29.2	38.3	21.3	24.9	31.4	40.5	20.6	26.0	17.6	30.5	25.2	33.6
	P ¹	30.8	39.1	24.3	28.5	27.5	36.8	23.4	29.6	20.7	29.5	24.9	34.1
	P ²	28.5	35.4	21.4	24.8	27.9	39.2	26.1	31.9	21.5	28.3	27.7	36.3
	P ⁴	27.9	35.5	24.8	28.9	27.4	36.4	27.2	33.4	26.5	33.0	21.0	34.9
5	P ⁰	36.7	36.8	26.3	29.8	29.7	40.7	27.8	29.9	27.5	29.3	31.8	33.7
	P ⁰ ₄	34.9	32.1	31.7	34.1	33.5	41.2	28.3	30.9	27.5	29.3	29.0	32.4
	P ¹	29.2	38.3	21.3	24.9	31.4	40.5	20.6	26.0	17.6	30.5	25.2	33.6
	P ²	30.8	39.1	24.3	28.5	27.5	36.8	23.4	29.6	20.7	29.5	24.9	34.1
	P ⁴	28.5	35.4	21.4	24.8	27.9	39.2	26.1	31.9	21.5	28.3	27.7	36.3

Mean dry matter % of hand harvested plots:

Grain: 84.9

Straw: 84.7

59/A/8

CLOVER - ROTHAMSTED GARDEN 1959

The 106th year

For history, etc. see "Details of the Classical and Long Term Experiments" 1956.

Cultivations, etc.: Muriate of potash applied: Jan 5, 1959.
Blank patches resown: May 2 and July 17. Cut twice: July 17, Sept 21.

Summary of Results

Dry matter: cwt per acre

Muriate of potash: cwt per acre	Cuts		Total
	1st	2nd	
None	4.1	3.1	7.2
2	11.2	9.2	20.4

59/A/9.1

WHEAT AND BARLEY - WOBURN STACKYARD 1959

For history, treatments, etc., see "Details of the Classical and Long Term Experiments" 1956.

Strip cropping 1959: To investigate the residual effects of early manures, winter wheat and spring barley were sown in strips across these two experiments. Yields were estimated from sample combine cuts.

Cultivations, etc.: The site of the Continuous Wheat was ploughed on May 28 and Sept 26, 1958 and that of the Continuous Barley on May 27 and Oct 28.

Wheat: Seed drilled at 3 bushels per acre: Dec 5. 'Nitra-Shell' (20.5% N) applied at $4\frac{1}{2}$ cwt per acre: Mar 25, 1959. Sprayed with TCB/MCPA at 4 pints in 40 gallons per acre: Apr 29. Combine harvested: Aug 20. Variety: Squarehead's Master 13/4.

Barley: Seed drilled at 3 bushels per acre: Mar 16, 1959. 'Nitra-Shell' (20.5% N) applied at $4\frac{1}{2}$ cwt per acre: Mar 25. Sprayed with TCB/MCPA at 4 pints in 40 gallons per acre: May 11. Combine harvested: Aug 19. Variety: Plumage Archer.

59/A/9.2

Summary of Results

Yields (at 85% dry matter): cwt per acre

Crop in 1959 Previous crop	Wheat		Barley	
	Continuous Wheat	Continuous Barley	Continuous Wheat	Continuous Barley

Plots	<u>Grain</u>			
	Continuous Wheat	Continuous Barley	Continuous Wheat	Continuous Barley
1	20.7	23.2	20.7	19.2
2	13.5	17.6	15.1	19.3
3	21.1	29.2	21.3	19.3
4	19.3	21.4	24.4	21.0
5	17.9	21.0	28.8	21.0
6	18.4	24.8	24.3	22.1
7	17.0	23.8	23.0	19.7
8	19.7	23.7	21.7	23.9
9	18.2	25.5	24.1	22.3
10a	19.0	26.5	17.9	16.1
10b	20.1	25.6	17.4	17.0
11a	20.3	29.0	21.4	21.5
11b	23.9	31.4	25.6	25.8

Plots	<u>Straw</u>			
	Continuous Wheat	Continuous Barley	Continuous Wheat	Continuous Barley
1	27.1	31.8	14.4	11.4
2	18.4	25.8	11.8	10.4
3	25.1	38.7	13.4	10.1
4	32.0	34.2	22.9	14.6
5	27.6	33.6	19.4	14.9
6	32.1	42.9	21.0	18.1
7	24.4	32.0	15.9	11.9
8	26.9	46.9	12.8	16.1
9	29.8	42.5	16.6	18.1
10a	23.0	34.5	12.7	10.2
10b	20.3	30.6	11.1	8.3
11a	26.2	39.1	14.6	13.3
11b	30.2	41.4	18.1	16.6

Mean dry matter %
as harvested: Grain 87.4 88.2
 Straw 91.4 90.0

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SIX COURSE ROTATION EXPERIMENT

The 30th year

Seasonal effects of fertilizers - Rothamsted Long Hoos IV and Woburn Stackyard 1959.

For history, treatments, etc., see "Details of the Classical and Long Term Experiments" 1956.

In 1959 the cereals on the Woburn experiment were combine harvested the yields being estimated from one central cut.

Magnesium test 1959 (Woburn only): Magnesium sulphate was applied to half plots on the potato crop to give a test of MgO chemically equivalent to 0 v 1 cwt K_2O per acre.

Area of each plot (acres): Rothamsted - 0.0250; Woburn - 0.0265.
Area harvested: Rothamsted - full area; Woburn - Sugar beet - full area; Barley, wheat, rye - 0.0101; Potatoes (sub plot) - 0.0095.

Cultivations, etc.:

Rothamsted

Sugar beet.

Ploughed twice: Sept 24, 1958 and Apr 7, 1959. Fertilizers applied, seed drilled at $18\frac{3}{4}$ lb per acre: Apr 22. Hand sprayed with miscible DDT at 3 pints in 8 gallons per acre: May 27. Singled: June 4 - 9. Sprayed with demeton methyl at 12 fluid oz in 60 gallons per acre: June 11. Lifted: Oct 26. Harvested: Nov 6 - 14. Variety: Klein E.

Barley.

Sugar beet tops spread: Dec 9, 1958. Ground chalk applied at 19 cwt per acre: Feb 10, 1959. Ploughed: Feb 11. Fertilizers applied: Mar 12. Seed drilled at $2\frac{3}{4}$ bushels per acre: Mar 17. Clover seed undersown: Apr 29. Harvested: Aug 4. Variety: Plumage Archer.

Clover.

Seed undersown in barley at 40 lb per acre: Apr 25, 1958. Autumn fertilizers applied: Jan 2, 1959. Sulphate of ammonia applied: Apr 2. Cut: June 17. Variety: S123 Late Flowering Red.

Wheat.

Ploughed twice: July 18 and Oct 17, 1958. Autumn fertilizers applied, seed drilled at $2\frac{3}{4}$ bushels per acre: Oct 22. Sulphate of ammonia applied by hand: Apr 2, 1959. Sprayed with CMFP, 6 pints in 40 gallons per acre: Apr 23. Harvested: Aug 4. Variety: Yeoman.

Potatoes.

Ploughed: Oct 17, 1958. Ridged, fertilizers applied, potatoes planted: Apr 14, 1959. Earthed up: June 18. Sprayed with copper fungicide, 5 lb in 40 gallons per acre: Aug 24. Sprayed with

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sulphuric acid, 15% BOV at 100 gallons per acre: Sept 7. Lifted: Sept 28. Variety: Majestic.

Rye.

Ploughed: Oct 17, 1958. Ground chalk applied at 16 cwt per acre, autumn fertilizers applied, seed drilled at 3 bushels per acre: Oct 22. Sulphate of ammonia applied: Apr 3, 1959. Sprayed with CMFP at 6 pints in 40 gallons per acre: Apr 23. Harvested: Aug 4. Variety: King II.

Woburn

Sugar beet.

Ploughed twice: Sept 23 and November 25, 1958. Fertilizers applied: Apr 1, 1959. Seed drilled at 12 lb per acre: Apr 6. Sprayed with dieldrin at 2 pints in 40 gallons per acre: May 26. Singled: May 27. Sprayed with demeton methyl at 12 oz in 40 gallons per acre: June 3 and June 20. Lifted: Oct 28. Variety: Klein E.

Barley.

Ploughed: Nov 1, 1958. Fertilizers applied: Mar 2, 1959. Seed drilled at 3 bushels per acre: Mar 13. Hydrated lime applied at 16 cwt per acre: May 12. Combine harvested: Aug 5. Variety: Herta.

Clover.

Ploughed: Sept 25 and Nov 21, 1958. Fertilizers applied, seed broadcast at 40 lb per acre: Mar 2, 1959. Sprayed with dieldrin at 2 pints in 40 gallons per acre: Apr 30. Sprayed with 2,4-D at 2 pints in 40 gallons per acre: May 12. Ploughed: June 3.

Wheat.

Ploughed twice: July 16 and Sept 25, 1958. Autumn fertilizers applied: Oct 17. Seed drilled at 2½ bushels per acre: Oct 21. Sulphate of ammonia applied: Apr 13, 1959. Sprayed with TCB/MCPA at 4 pints in 40 gallons per acre: Apr 29. Combine harvested: Aug 18. Variety: Yeoman.

Potatoes.

Ploughed twice: Sept 23 and Nov 21, 1958. Fertilizers applied and potatoes hand planted: Apr 8, 1959. Earthed up: June 22. Sprayed with zineb at 2 lb and demeton methyl at 12 oz in 40 gallons per acre: Aug 15. Haulms destroyed mechanically: Sept 22. Lifted: Sept 30. Variety: Majestic.

Rye.

Ploughed: Oct 16, 1958. Ground chalk applied at 22 cwt per acre: Oct 18. Fertilizers applied, seed drilled at 2½ bushels per acre: Oct 21. Sulphate of ammonia applied: Apr 13, 1959. Combine harvested: Aug 18. Variety: King II.

Note: At Woburn the clover was heavily infested with weeds and was therefore abandoned.

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Summary of Results

Mean yields per acre and responses in yield per cwt of N, P₂O₅ and K₂O

	Rothamsted	Woburn	Rothamsted	Woburn
Sugar Beet, roots (washed): tons per acre			Barley, grain: cwt per acre	
Mean	11.55	12.39	21.5*	28.6*
Response to: N	+2.67	+1.09	+20.0	+8.3
P	-0.99	+1.01	+0.9	+6.8
K	+0.17	-1.73	+1.7	-2.0
Mean dry matter % as harvested:			84.8	84.4
Sugar Beet, sugar percentage			Barley, straw: cwt per acre	
Mean	18.7	18.8	20.6*	18.3*
Response to: N	-0.5	-1.0	+23.5	+2.6
P	+1.1	+0.5	+2.7	+5.2
K	+0.4	-0.2	+1.4	-3.4
Mean dry matter % as harvested:			86.5	84.8
Sugar Beet, total sugar: cwt per acre			Clover, hay, dry matter: cwt per acre	
Mean	43.3	46.5	37.6	
Response to: N	+8.5	+1.8	+2.5	(Ploughed in)
P	-0.9	+4.9	-5.7	
K	+1.8	-7.2	+7.0	
Mean dry matter % as harvested:			81.4	
Sugar Beet, tops: tons per acre			Wheat, grain: cwt per acre	
Mean	6.10	6.52	30.6*	16.2*
Response to: N	+2.59	+3.21	+0.9	+17.5
P	-2.19	+0.55	+9.3	+1.2
K	-0.52	-0.77	+4.0	-1.7
Mean dry matter % as harvested:			85.2	86.4
Sugar Beet, plant number: thousands per acre			Wheat, straw: cwt per acre	
Mean	26.8	**	51.8*	20.0*
Response to: N	-3.7		+21.6	+19.8
P	+0.5		+3.4	+5.6
K	+0.3		+6.8	-4.4
Mean dry matter % as harvested:			88.4	92.3

*(At 85% dry matter).

** Not recorded.

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Mean yields per acre and responses in yield per cwt of N, P₂O₅ and K₂O

	Rothamsted	Woburn		Rothamsted	Woburn
	Potatoes, total tubers: tons per acre			Rye, grain: cwt per acre	
		Without Mg	With Mg		
Mean	8.59	8.17	7.98	29.4*	27.1*
Response to: N	+4.42	+3.08	+3.82	+16.5	+19.6
P	+3.14	-1.88	-1.80	+0.9	-6.1
K	+0.31	+0.57	+0.48	+2.9	-0.4
Mean dry matter % as harvested:				84.6	86.3
	Potatoes, percentage ware			Rye, straw: cwt per acre	
	(1)	(2)			
Mean	90.5	77.1	77.9	40.2*	29.2*
Response to: N	+5.1	+8.0	+7.8	+36.3	+13.0
P	-3.5	+4.6	+12.2	+3.5	-8.7
K	-1.3	+3.6	+5.4	+1.0	+3.6
Mean dry matter % as harvested:				88.7	90.9

*(At 85% dry matter)

Riddle: (1) 1½"; (2) 1⅝".

LEY AND ARABLE ROTATIONS

Highfield and Fosters Field 1959 - the 11th year.

For details of treatments, rotations, etc. see "Details of the Classical and Long Term Experiments" 1956.

The following addition should be made to the 1958 details:-

Sheep grazing: Live weight records were discontinued this year.

Rates of application of supplementary (corrective) potash
(K₂O: cwt per acre)

Crop	Year of cycle	Field etc.	Rate	
Permanent grass	"1st treatment"	Highfield (blocks 6 & 7)	2.5	(2 previous hay crops taken)
Reseeded grass	"1st treatment"	Highfield (blocks 6 & 7) Fosters (blocks 8 & 9)	3.0	(2 previous hay crops taken)
Lucerne	"1st treatment"	Highfield Fosters	3.0 4.0	(3 years previous lucerne)
Cut grass	"1st treatment"	Highfield Fosters	3.5 4.0	(3 years previous cutting)

The following should be added to the list for 1957:

Permanent and reseeded grass	"2nd treatment"	Highfield (blocks 5 & 8) Fosters (blocks 5 & 7)	1.0	(1 previous hay crop taken)
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Cultivations, etc.:

HIGHFIELD

1st year Treatment Crops

- Cut grass. Ploughed twice: Sept 4, 1958 and Nov 20. Supplementary K applied: Nov 24. Basal PK compound applied: Apr 8, 1959. 'Nitra-Shell' applied Apr 10. Seeds sown at 33 lb per acre: Apr 11. Sprayed with MCPB at 4 pints in 40 gallons per acre: May 28. Cut 3 times: June 26, Aug 8, Sept 16. 'Nitra-Shell' applied after every cut except the last.
- Grazed ley. Ploughed twice: Sept 4, 1958 and Nov 20. Basal PK compound applied: Apr 8, 1959. 'Nitra-Shell' applied: Apr 10. Seed sown at 44 lb per acre: Apr 11. Sprayed with MCPB at 4 pints in 40 gallons per acre: May 28. 'Nitra-Shell' applied: July 16. Grazed: 4 circuits, June 5 - Aug 12.
- Lucerne. Ploughed twice: Sept 4, 1958 and Nov 20. Supplementary K applied: Nov 24. Basal PK compound applied: Apr 8, 1959. Seed drilled at 28 lb per acre: Apr 13. Cut twice: July 22 and Sept 8. Variety: Du Puits.

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Hay. Seeds undersown in barley at 28 lb per acre: Apr 24, 1958.
Basal PK compound applied: Feb 16, 1959. 'Nitra-Shell'
applied: Mar 25. Cut: June 9.

2nd year Treatment Crops

Cut grass. Basal PK compound applied: Feb 16, 1959. Nitrogen and potash applied as compound fertilizer (16% N, 16% K₂O):
Apr 3 and after every cut, except the last. Cut 4 times:
May 25, June 25, Aug 8, Sept 16.
Grazed ley. Basal PK compound applied: Feb 14, 1959. 'Nitra-Shell' applied: June 1 and July 16. Grazed: 5 circuits,
Apr 22 - Aug 8.
Lucerne. Basal PK compound applied: Feb 14, 1959. Cut 4 times:
June 9, July 9, Aug 31, Nov 12.
Potatoes. Ploughed twice: June 16 and Nov 20, 1958. Ridged:
Apr 14, 1959. Basal PK compound applied: Apr 23. Sulphate of ammonia and dung applied, potatoes planted: Apr 25. For later cultivations see Potato Test Crop.

3rd year Treatment Crops

Cut grass. Basal PK compound applied: Feb 16, 1959. Nitrogen and potash applied as compound fertilizer (16% N, 16% K₂O):
Apr 3, and after every cut except the last. Cut 4 times:
May 25, July 3, Aug 10, Sept 8.
Grazed ley. Basal PK compound applied: Feb 14, 1959. 'Nitra-Shell' applied: June 6 and July 16. Grazed: 7 circuits,
Apr 26 - Aug 30.
Lucerne. Basal PK compound applied: Feb 14, 1959. Cut 3 times:
June 9, July 9, Aug 31.
Oats. Ploughed: Oct 15, 1958. Seed drilled at 3½ bushels per acre with basal PK compound: Mar 13, 1959. 'Nitra-Shell' applied: Mar 14. First sowing damaged by birds. Resown: Apr 11. Combine harvested: Aug 17. Variety: Sun II.

1st Test Crop, Wheat

Ploughed after oats: Sept 5 and Oct 20, 1958. Ploughed ley: Oct 11. Seed combine drilled at 2¾ bushels per acre with basal PK compound: Oct 27. 'Nitra-Shell' applied: Mar 26, 1959. Sprayed with CMPP at 6 pints in 40 gallons per acre: Apr 20. Combine harvested: Aug 15. Variety: Cappelle.

2nd Test Crop, Potatoes

Ploughed: Sept 5 and Nov 20, 1958. Ridged: Apr 14, 1959. Basal PK applied: Apr 23. Sulphate of ammonia, additional P and K and dung applied, potatoes planted: Apr 25. Earthed up: June 30. Sprayed with copper fungicide at 5 lb in 40 gallons per acre: Aug 24. Sprayed with sulphuric acid, 15% BOV, at 100 gallons per acre: Sept 18. Lifted: Sept 30. Variety: Majestic.

*Note: Plots 85 and 86 were also ploughed on June 16, 1958 owing to failure of the lucerne.