

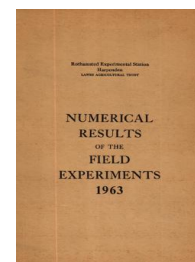
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# Yields of the Field Experiments 1963

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## 63/W/WLA/B/4 Ley and Arable Rotations

### Rothamsted Research

Rothamsted Research (1964) *63/W/WLA/B/4 Ley and Arable Rotations* ; Yields Of The Field Experiments 1963, pp 73 - 85 - DOI: <https://doi.org/10.23637/ERADOC-1-183>

63/B/4.1

LEY AND ARABLE ROTATIONS

(WIA)

Woburn Stackyard 1963 - the 26th year.

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

Corrective K dressings (in cwt  $K_2O$  per acre, applied to sugar beet).  
In 1962/3 two thirds of each dressing was applied in autumn before ploughing and one third broadcast on the plough furrow in February.

<u>Continuous rotations</u>	Fertiliser plots	Dung plots
<u>Rotation</u>		
Arable	6.0	6.0
Arable with hay	6.0	6.0
Lucerne	6.0	6.0
Grazed ley	3.0	0.0

<u>Alternating rotations</u>	Fertiliser plots	Dung plots
<u>Last two rotations in order</u>		
Arable/Ley	3.0	3.0
Lucerne/Arable with hay	6.0	6.0
Arable with hay/Lucerne	6.0	6.0
Ley/Arable	6.0	6.0

Revised NPK basal dressings (in cwt N,  $P_2O_5$  and  $K_2O$  per acre)

	Fertilisers* and time of application	N	$P_2O_5$	$K_2O$
Hay	'Nitro-Chalk' and 0/14/28 in spring	1.0	0.6	1.2
	16/0/16 after 1st cut	0.6	-	0.6
Lucerne	'Nitro-Chalk', superphosphate and muriate of potash in seedbed	0.5	1.5	1.0
		0.5	-	1.5
Grazed ley	'Nitro-Chalk', superphosphate and muriate of potash in seedbed	0.3	1.5	1.0
		0.6	-	0.6
2nd and 3rd year	16/0/16 in 2 equal dressings in early and late summer. Total:	0.6	-	0.6
		0.9	-	0.9
2nd and 3rd year	16/0/16 in 3 equal dressings in spring, early and late summer. Total:	0.6	-	0.6
		0.9	-	0.9

\* Granular compound fertilisers are described thus - 0/14/28 etc. to show percentages of N,  $P_2O_5$  and  $K_2O$  in order.

63/E/4.2

Cultivations, etc.,

Treatment crops

Ley rotations

Ley 1st year. Ploughed twice: Sept 3 and Dec 18, 1962. Seedbed fertilisers applied, seed sown: Apr 19, 1963. Compound fertiliser applied: June 14 and Aug 28. Grazed 5 circuits: July 5 - Oct 14.

Ley 2nd year. Compound fertiliser applied: Mar 15, June 6 and Aug 15, 1963. Grazed 6 circuits: Apr 30 - Oct 4.

Ley 3rd year. Compound fertiliser applied: Mar 15, June 14 and Aug 15, 1963. Grazed 5 circuits: May 8 - Sept 14.

Lucerne 1st year. Ploughed: Sept 3, 1962. Treated for control of stem eelworm by injection of 'D.D' soil fumigant at 600 lb per acre: Oct 25. Ploughed second time: Dec 18. Fertilisers applied, fumigated and inoculated seed drilled at 20 lb per acre: Apr 19, 1963. Cut 3 times: June 18, Aug 2, Sept 25.

Lucerne 2nd year. 'Nitro-Chalk' and muriate of potash applied: Mar 15, 1963. Cut 3 times: June 19, Aug 2, Sept 25.

Lucerne 3rd year. 'Nitro-Chalk' and muriate of potash applied: Mar 15, 1963. Cut 3 times: June 18, Aug 2, Sept 25.

Arable rotations

Potatoes. Ploughed twice: Sept 3 and Dec 18, 1962. Fertilisers applied, potatoes machine planted: Apr 19, 1963. Earthed up: June 19. Sprayed with copper oxychloride fungicide at 2.3 lb copper in 20 gallons per acre: July 25, and again at the same rate in 30 gallons plus 0.35 pints menazon per acre: Aug 22. Sprayed with undiluted BOV at 16 gallons per acre: Sept 13. Lifted: Oct 8.

Rye. Ploughed: Oct 11, 1962. Seed combine drilled at 3 bushels per acre with PK compound: Oct 22. 'Nitro-Chalk' applied, seeds hay mixture undersown on 4 plots: Apr 19, 1963. Combine harvested: Sept 14.

Seeds hay. Seeds undersown in rye at 30 lb per acre: Apr 10, 1962. 'Nitro-Chalk' and PK compound applied: Mar 15, 1963. Cut twice: June 18 and Aug 19. Compound fertiliser applied: June 21.

Carrots. Ploughed twice: Sept 10 and Nov 13, 1962. Fertilisers applied: Apr 22, 1963. Seed drilled at 2.25 lb per acre: Apr 23. Sprayed with demeton-methyl at 6 fluid oz in 40 gallons per acre: May 31. Thinned: June 12. Sprayed with demeton-methyl at 6 fluid oz in 40 gallons per acre: June 27. Lifted: Sept 16.



63/B/4.3

Test crops

Sugar beet. Dung equivalent K\* and two thirds of corrective K applied: Nov 22, 1962. Dung applied, all plots ploughed: Dec 19. One third of corrective K\*, basal superphosphate, muriate of potash and magnesium sulphate applied: Mar 21, 1963. 'Nitro-Chalk' and 'test' muriate of potash applied: Apr 22. Seed drilled at 4.9 lb per acre: Apr 23. Singled: May 27. Sprayed with demeton-methyl at 6 fluid oz in 40 gallons per acre: June 5. Lifted: Nov 4.

Barley. Ground chalk applied at 40 cwt per acre: Oct 27, 1962. Ploughed: Oct 29. 'Balancing' muriate of potash applied: Mar 14, 1963. Basal superphosphate applied: Mar 19. 'Nitro-Chalk' applied: Mar 28. Seed drilled at 2.25 bushels per acre: Apr 8. Sprayed with TBA/MCPA at 4 pints in 40 gallons per acre: May 21. Combine harvested: Sept 13.

\* The dung equivalent K for plot 58, which receives no dung, was applied in error to dung plot 56. With the spring application of corrective K, this error was rectified on plot 58, but no correction is to be made to plot 56. In calculating the means and analysis of variance no allowance has been made for this error.

Standard errors per plot. Test crops.

	Sugar beet. Roots (washed)	Whole plot: 0.206 tons per acre or 1.1% (4 d.f.)
	1/2 plot:	1.152 tons per acre or 6.2% (4 d.f.)
	1/4 plot:	0.206 tons per acre or 1.1% (24 d.f.)
	1/16 plot:	1.026 tons per acre or 5.5% (32 d.f.)
	Total sugar	Whole plot: 0.82 cwt per acre or 1.2% (4 d.f.)
	1/2 plot:	3.55 cwt per acre or 5.2% (4 d.f.)
	1/4 plot:	2.47 cwt per acre or 3.6% (24 d.f.)
	1/16 plot:	4.03 cwt per acre or 5.9% (32 d.f.)
	Tops	Whole plot: 0.405 tons per acre or 2.6% (4 d.f.)
	1/2 plot:	1.650 tons per acre or 10.6% (4 d.f.)
	1/4 plot:	0.923 tons per acre or 5.9% (24 d.f.)
	1/16 plot:	1.232 tons per acre or 7.9% (32 d.f.)
Barley.	Grain (at 85% dry matter)	Whole plot: 1.26 cwt per acre or 3.8% (4 d.f.)
	1/2 plot:	1.40 cwt per acre or 4.2% (4 d.f.)

63/B/4.4

Summary of Results

Treatment crops

Ley, sheep days of grazing per acre

1st year	2nd year	3rd year
1482	1807	1301

Lucerne, dry matter: cwt per acre

	1st cut	2nd cut	3rd cut	Total
<u>1st year</u>				
Dung in 1958: tons per acre				
None	1.0	13.6	12.8	27.4
15	2.0	18.1	15.6	35.8
Difference	+1.0	+4.5	+2.8	+8.4
Previous rotation				
Lucerne	0.9	13.4	12.4	26.6
Arable with hay	2.2	18.3	16.0	36.4
Mean	1.6	15.8	14.2	31.5
<u>2nd year</u>				
Dung in 1960: tons per acre				
None	15.2	15.1	16.9	47.2
15	18.8	17.4	19.6	55.8
Difference	+3.6	+2.3	+2.7	+8.6
Previous rotation				
Lucerne	18.5	15.9	18.8	53.2
Arable with hay	15.5	16.6	17.6	49.7
Mean	17.0	16.2	18.2	51.4
<u>3rd year</u>				
Dung in 1959: tons per acre				
None	24.5	11.8	1.8	38.1
15	29.2	9.2	3.5	41.9
Difference	+4.7	-2.6	+1.7	+3.8
Previous rotation				
Lucerne	24.1	11.8	2.4	38.3
Arable with roots	29.6	9.2	2.9	41.7
Mean	26.8	10.5	2.6	40.0

63/B/4.5

Treatment crops

	<u>Potatoes</u>		<u>Rye</u>	
	Total tubers: tons per acre (1.625 in.riddle)	Percentage ware	Grain: (at 85% dry matter) cwt per acre	Straw: cwt per acre
Dung: tons per acre				
None	9.07	81.5	29.8	19.7
15*	9.73	82.6	30.0	19.8
Difference	+0.66	+1.1	+0.2	+0.1
Previous rotation				
Ley	12.30	87.5	33.0	23.2
Lucerne	12.10	91.6	29.2	19.8
Arable with hay	6.51	71.0	29.2	18.4
Arable with roots	6.69	78.1	28.4	17.5
Mean	9.40	82.1	30.0	19.7

Hay

Yield, dry matter: cwt per acre.

	1st cut	2nd cut	Total
Dung in 1959: tons per acre			
None	44.9	19.5	64.4
15	50.0	19.4	69.4
Difference	+5.1	-0.1	+5.0
Previous rotation			
Ley	53.9	19.6	73.4
Arable with hay	41.0	19.4	60.4
Mean	47.5	19.4	66.9

\*Dung applied: Potatoes for test crop sugar beet in 1961  
Rye for test crop sugar beet in 1960

Mean dry matter % as harvested: Rye, Grain: 79.2  
Straw: 81.9

63/B/4.6

Carrots

	Roots (washed): tons per acre	Tops: tons per acre
Dung in 1959: tons per acre		
None	18.26	5.96
15	19.71	6.40
Difference	+1.45	+0.44
Previous rotation		
Lucerne	18.89	6.34
Arable with roots	19.08	6.02
Mean	18.98	6.18



63/B/4.7

1st Test crop

Sugar beet

Roots (washed): tons per acre

	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	
Mean ( $\pm 0.145$ )	18.66	19.50	16.89	19.41	18.61
Dung: tons per acre					
None ( $\pm 1.680$ )*	17.94	18.42	15.63	17.71	17.42
15	19.38	20.58	18.15	21.11	19.80
Difference ( $\pm 1.152$ )	+1.44	+2.16	+2.52	+3.40	+2.38
Response to additional 0.72 cwt N per acre					
		( $\pm 0.146$ )			( $\pm 0.073$ )
No dung	-0.71	+0.56	+1.61	+2.43	+0.97
Dung 15 tons per acre	-0.31	-0.07	-0.20	+1.27	+0.17
Response to additional 0.9 cwt K <sub>2</sub> O per acre					
		( $\pm 0.146$ )			( $\pm 0.073$ )
No dung	+0.03	+0.54	+0.52	-0.92	+0.04
Dung 15 tons per acre	+0.41	-0.79	-0.32	+0.54	-0.04

\*For use in horizontal and diagonal comparisons only.



63/B/4.8

1st Test crop

Sugar beet

Sugar Percentage

	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	
Mean	18.2	17.9	19.0	18.6	18.4
Dung: tons per acre					
None	18.5	18.3	19.3	18.8	18.7
15	17.9	17.6	18.6	18.3	18.1
Difference	-0.6	-0.7	-0.7	-0.5	-0.6
Response to additional 0.72 cwt N per acre					
No dung	-0.7	-0.6	-0.4	-0.7	-0.6
Dung 15 tons per acre	-0.5	-0.8	-0.7	-0.2	-0.6
Response to additional 0.9 cwt <u>K<sub>2</sub>O</u> per acre					
No dung	-0.3	+0.3	+0.2	+0.1	+0.1
Dung 15 tons per acre	0.0	-0.2	+0.1	-0.1	0.0

63/B/4.9

1st Test crop

Sugar beet

Total sugar: cwt per acre

	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	
Mean ( $\pm 0.58$ )	67.7	69.9	63.9	71.9	68.4
Dung: tons per acre					
None ( $\pm 5.28$ )*	66.2	67.4	60.2	66.6	65.1
15	69.2	72.4	67.6	77.2	71.6
Difference ( $\pm 3.55$ )	+3.0	+5.0	+7.4	+10.6	+6.5
Response to additional 0.72 cwt N per acre					
		( $\pm 1.75$ )			( $\pm 0.87$ )
No dung	-5.2	-0.3	+5.1	+6.6	+1.6
Dung 15 tons per acre	-3.1	-3.2	-3.4	+3.8	-1.4
Response to additional 0.9 cwt $K_2O$ per acre					
		( $\pm 1.75$ )			( $\pm 0.87$ )
No dung	-0.6	+3.0	+2.4	-2.8	+0.6
Dung 15 tons per acre	+1.5	-3.2	-1.0	+1.4	-0.4

\*For use in horizontal and diagonal comparisons only.

63/B/4.10

1st Test crop

Sugar beet

Tops: tons per acre

	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	
Mean ( $\pm 0.286$ )	17.61	17.74	13.30	13.80	15.61
Dung: tons per acre					
None ( $\pm 2.470$ )*	17.34	15.29	11.08	12.05	13.94
15	17.88	20.20	15.52	15.55	17.29
Difference ( $\pm 1.650$ )	+0.54	+4.91	+4.44	+3.50	+3.35
Response to additional 0.72 cwt N per acre					
No dung		( $\pm 0.653$ )			( $\pm 0.326$ )
Dung 15 tons per acre	+4.23	+3.83	+3.48	+4.02	+4.12
	+1.67	+1.81	+5.01	+2.88	+2.85
Response to additional 0.9 cwt $K_2O$ per acre					
No dung		( $\pm 0.653$ )			( $\pm 0.326$ )
Dung 15 tons per acre	+0.13	+0.40	+0.28	+0.11	+0.22
	-0.27	-0.42	+0.61	+0.42	+0.09

\*For use in horizontal and diagonal comparisons only.



63/B/4.11

1st Test crop

Sugar beet

Plots receiving no additional N or K

Dung: tons per acre	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	

Roots (washed): tons per acre

Mean	(±0.425)	18.65	19.43	16.29	18.38	18.19
None	(±0.820)*	18.36	17.89	14.32	16.57	16.78
15		18.94	20.97	18.26	20.20	19.59
Difference	(±1.402)	+0.58	+3.08	+3.94	+3.63	+2.81

Sugar percentage

Mean		18.6	18.2	19.2	18.8	18.7
None		18.9	18.3	19.4	19.2	18.9
15		18.3	18.1	19.0	18.4	18.4
Difference		-0.6	-0.2	-0.4	-0.8	-0.5

Total sugar: cwt per acre

Mean	(±1.62)	69.3	70.4	62.3	68.9	67.7
None	(±2.84)*	69.4	65.2	55.4	63.4	63.3
15		69.3	75.6	69.2	74.4	72.1
Difference	(±4.66)	-0.1	+10.4	+13.8	+11.0	+8.8

Tops: tons per acre

Mean	(±0.634)	16.14	15.89	11.07	11.92	13.75
None	(±1.184)*	15.17	12.89	9.09	9.59	11.68
15		17.11	18.89	13.06	14.24	15.82
Difference	(±2.001)	+1.94	+6.00	+3.97	+4.65	+4.14

\*For use in horizontal and diagonal comparisons only.

63/B/4.12

<u>1st Test crop</u>					
<u>Sugar beet</u>					
Magnesium sulphate: lb per acre	Previous rotation				Mean
	Ley	Lucerne	Arable with hay	Arable with roots	
<u>Roots (washed): tons per acre</u>					
	(±0.232)*				
None	18.43	19.39	16.40	19.41	18.41
500	18.88	19.61	17.38	19.40	18.82
Difference (±0.363)	+0.45	+0.22	+0.98	-0.01	+0.41 (±0.181)
<u>Sugar percentage</u>					
None	18.2	17.9	18.9	18.6	18.4
500	18.2	18.0	19.1	18.5	18.4
Difference	0.0	+0.1	+0.2	-0.1	0.0
<u>Total sugar: cwt per acre</u>					
	(±0.92)*				
None	66.9	69.4	61.8	72.0	67.5
500	68.6	70.4	66.1	71.8	69.2
Difference (±1.42)	+1.7	+1.0	+4.3	-0.2	+1.7 (±0.71)
<u>Tops: tons per acre</u>					
	(±0.360)*				
None	17.77	17.74	13.22	13.86	15.64
500	17.46	17.75	13.38	13.74	15.58
Difference (±0.436)	-0.31	+0.01	+0.16	-0.12	-0.06 (±0.218)

\*For use in horizontal and diagonal comparisons only.

63/B/4.13

2nd Test crop

Barley

Dung in 1962: tons per acre	Previous rotation				Mean	
	Ley	Lucerne	Arable with hay	Arable with roots		
<u>Grain (at 85% dry matter): cwt per acre</u>						
None	(±1.13)*	31.0	33.8	33.0	33.8	32.9
15		32.5	35.4	35.4	33.7	34.3
Mean	(±0.89)	31.8	34.6	34.2	33.8	33.5
Difference	(±1.40)	+1.5	+1.6	+2.4	-0.1	+1.4 (±0.70)

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

None		23.7	22.5	22.4	21.8	22.6
15		22.3	25.9	24.6	21.5	23.5
Mean		23.0	24.2	23.5	21.6	23.0
Difference		-1.4	+3.4	+2.2	-0.3	+0.9

\*For use in horizontal and diagonal comparisons only.

Mean dry matter % as harvested: Grain 77.5  
Straw 85.4