ROTHAMSTED RESEARCH

Yields of the Field Experiments 1955

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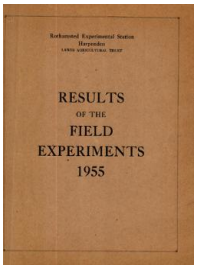

55/W/BE/1 Ley and Arable Rotations

Rothamsted Research

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55/Be/1.1

LEY AND ARABLE ROTATIONS

Woburn Stackyard - 1955, the 18th year.

For details of rotations and treatments etc., see "Results of the Field Experiments" 1939-47, Vol. 1, section Bf/1 with the following exceptions:-

In 1949 and subsequently rye replaced wheat.
In 1954 and 1955 the seeds hay plots were split into two after the first crop, for testing 0.15 v. 0.30 cwt N per acre applied as nitrochalk.
In 1955 each of the 16 plots of test potatoes was split into four for the application (in addition to the basal fertilizer) of all combinations of
Nitrogen: None; 0.56 cwt N per acre as sulphate of ammonia.
Potash: None; 0.84 cwt K_2O per acre as muriate of potash.

Cultivations, etc.:

Treatment crops

Ley rotations

Ley 1st year. Ploughed twice: Sept 30, 1954 and Feb 2, 1955. Basal fertilizers applied: Apr 29. Seed sown: Apr 30. Nitrochalk applied: July 5. Grazed 4 circuits: June 28 - July 2, July 18-26, Sept 26-29, Oct 15-26. Seeds mixture (sown at 40 lb per acre): 24 lb S24 Perennial Ryegrass, 12 lb S143 Cocksfoot, 6 lb S123 Late Flowering Red Clover, 3 lb S100 White Clover.

Ley 2nd year. Nitrochalk applied: May 9, 1955 and July 5. Grazed 7 circuits: Apr 30 - May 9, May 19-27, June 8-20, July 2-10, July 26 - Aug 3, Sept 29 - Oct 7, Oct 26 - Nov 3.

Ley 3rd year. Nitrochalk applied: May 11, 1955 and July 21. Grazed 6 circuits: May 9-17, May 31 - June 8, June 20-28, July 10-18, Sept 17-25, Oct 10-18.

Lucerne 1st year. Ploughed twice: Sept 30, 1954 and Feb 2, 1955. Basal fertilizers applied: Apr 29. Seed sown at 25 lb per acre: Apr 30. Cut twice: July 27 and Sept 16. Variety: Du Puits.

Lucerne 2nd year. Cut three times: June 13, July 27, Sept 16.

Lucerne 3rd year. Cut three times: June 13, July 27, Sept 16.

Arable rotations

Potatoes 1st Course. Ploughed twice: Sept 30, 1954 and Feb 2, 1955. Basal fertilizers applied, ridged, potatoes planted with dropper: Apr 19. Earthed up: June 28. Lifted: Sept 2. Variety: Majestic.

Rye 2nd Course. Ploughed: Oct 26, 1954. Seed drilled at $3\frac{1}{4}$ bushels per acre: Dec 20. Nitrochalk applied: Apr 29, 1955. Seeds hay mixture undersown on 4 plots: May 9. Harvested: Aug 25. Variety: King II.

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Seed Hay 3rd Course. Seeds undersown in Rye: May 7, 1954. Basal nitrochalk applied: Apr 19, 1955. 1st cut: June 13. Nitrochalk applied: June 14. 2nd cut: Sept 16. Seeds mixture per acre: 27 lb S24 Perennial Ryegrass, 12 lb Montgomery Red clover, 3 lb Canadian Alsike Clover.

Sugar beet 3rd Course. Ploughed twice: Oct 1, 1954 and Feb 1, 1955. Rubbed seed drilled at 8 lb per acre: Apr 16. Basal nitrate of soda applied: Apr 18. Sprayed with systemic insecticide, ½ pint in 40 gallons per acre: June 10. Singled: June 22. Lifted: Oct 28. Variety: Klein E.

Test crops

Potatoes 1st test crop. Ploughed twice: Nov 5, 1954 and Feb 4, 1955. Ridged, dung, basal and treatment fertilizers applied: Apr 21. Potatoes hand planted: Apr 22. Earthed up: June 28. Sprayed with copper fungicide, 5 lb per acre: Aug 19. Sprayed with arsenious compound, 1 gallon in 40 gallons per acre: Sept 27. Lifted: Oct 3. Variety: Majestic.

Barley 2nd test crop. Ploughed twice: Oct 28, 1954 and Feb 3, 1955. Ground chalk applied: Mar 14. Nitrochalk applied, seed drilled at 3⅓ bushels per acre: Mar 17. Harvested: Aug 15. Variety: Plumage Archer.

Standard errors per plot, Test Crops.

Potatoes, Total tubers.	Whole plot: 0.828 tons per acre or 10.8%	(4 d.f.)
	½ plot: 0.497 tons per acre or 6.5%	(4 d.f.)
	⅛ plot: 1.162 tons per acre or 15.2%	(24 d.f.)
Barley, Grain.	Whole plot: 3.25 cwt per acre or 10.6%	(4 d.f.)
	½ plot: 1.97 cwt per acre or 6.5%	(4 d.f.)

Note. Potato root eelworm was found in this experiment in 1955. On the treatment crop potatoes, several plots were very badly affected and the results are unreliable. The eelworm was present on some of the test crop potatoes but the yields were probably only slightly affected.

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Summary of Results

Treatment crops

Ley, Sheep days of grazing per acre

1st year	2nd year	3rd year
533	1575	1358

Lucerne, yield of hay (at 85% dry matter): cwt per acre

	1st crop	2nd crop	3rd crop	Total
1st year				
No dung	8.8	7.0		15.8
Dung in 1953	10.8	8.8		19.6
Increase	+2.0	+1.8		+3.8
Previous Rotation				
Lucerne	8.1	8.8		16.9
Arable with Sugar beet	11.5	7.0		18.5
Mean	9.8	7.9		17.7
2nd year				
No dung	33.1	30.4	14.2	77.7
Dung in 1952	40.8	38.2	15.8	94.8
Increase	+7.7	+7.8	+1.6	+17.1
Previous Rotation				
Lucerne	34.5	32.9	15.0	82.4
Arable with Hay	39.4	35.7	15.0	90.1
Mean	37.0	34.3	15.0	86.3
3rd year				
No dung	27.1	29.3	11.0	67.4
Dung in 1951	33.5	32.6	10.2	76.3
Increase	+6.4	+3.3	-0.8	+8.9
Previous Rotation				
Lucerne	26.6	27.9	8.9	63.4
Arable with Sugar beet	34.0	34.0	12.3	80.3
Mean	30.3	31.0	10.6	71.9

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Treatment crops

	Potatoes		Rye	
	Total tubers: tons per acre	Percentage ware ($1\frac{5}{8}$" riddle)	Grain: cwt per acre	Straw: cwt per acre
No dung	3.89	43.4	33.3	32.5
Dung*	4.62	49.2	34.4	35.9
Increase	0.73	5.8	1.1	3.4
Previous Rotation				
Ley	7.72	76.5	36.2	35.6
Lucerne	5.86	62.9	32.4	33.6
Arable with Hay	1.92	23.4	33.7	33.3
Arable with Sugar beet	1.51	22.6	33.1	34.3
Mean	4.25	46.3	33.9	34.2

Hay

Yield (at 85% D.M.): cwt per acre

	1st crop	2nd crop	Total	2nd crop Resp. to N
No dung	50.8	5.3	56.1	-1.2
Dung in 1951	56.9	6.8	63.7	+0.4
Increase	+6.1	+1.5	+7.6	+1.6
Previous Rotation				
Ley	58.1	7.4	65.5	-1.1
Arable with Hay	49.6	4.8	54.4	+0.3
Mean	53.8	6.1	59.9	-0.4

Sugar beet

	Roots (washed): tons per acre	Sugar percentage	Total sugar: cwt per acre	Tops: tons per acre
No dung	9.20	18.1	33.4	6.70
Dung in 1951	12.58	18.6	46.7	8.35
Increase	3.38	0.5	13.3	1.65
Previous Rotation				
Lucerne	10.91	18.2	39.6	7.28
Arable with Sugar beet	10.86	18.5	40.4	7.78
Mean	10.89	18.3	40.0	7.53

*Dung applied: Potatoes:- for test crop potatoes in 1953.
Rye:- for test crop potatoes in 1952.

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	Test Crop: Previous Rotation				
	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
Potatoes, Total tubers: tons per acre					
Mean (±0.586)	8.86	8.46	7.20	6.09	7.65
No dung (±0.636)	8.09	7.15	6.42	4.92	6.64
Dung	9.63	9.78	7.97	7.25	8.66
Response to 15 tons dung per acre (±0.497)	+1.54	+2.63	+1.55	+2.33	+2.02 (±0.249)
Response to additional 0.56 cwt N per acre					(±0.411)
No dung (±0.822)	-1.89	+1.69	+1.52	+0.53	+0.47
Dung	+1.41	+0.69	+0.88	+0.25	+0.81
Response to additional 0.84 cwt K_2O per acre					(±0.411)
No dung (±0.822)	+0.15	+1.11	+0.38	+1.44	+0.78
Dung	-0.61	+2.41	+0.06	-0.02	+0.46
Potatoes, Percentage ware ($1\frac{5}{8}$" riddle)					
Mean	87.7	87.4	86.0	80.2	85.3
No dung	88.0	86.0	85.6	80.5	85.0
Dung	87.5	88.7	86.5	80.0	85.7
Response to 15 tons dung per acre	-0.5	+2.7	+0.9	-0.5	+0.7
Response to additional 0.56 cwt N per acre					
No dung	+1.0	-1.1	+1.5	+1.5	+0.7
Dung	+0.4	+2.5	+1.1	+1.1	+1.3
Response to additional 0.84 cwt K_2O per acre					
No dung	-1.1	+4.6	+4.0	+1.9	+2.4
Dung	-0.7	-0.6	-0.8	+2.1	0.0

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Test Crop

Plots receiving no additional N or K

	Previous Rotation				
	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
Potatoes, Total tubers: tons per acre					
Mean (±0.675)	9.33	6.54	6.57	5.80	7.06
No dung (±0.955)*	9.35	5.54	5.27	4.28	6.11
Dung	9.32	7.54	7.87	7.32	8.01
Response to 15 tons dung per acre (±1.122)	-0.03	+2.00	+2.60	+3.04	+1.90
Potatoes, Percentage ware ($1\frac{5}{8}$" riddle)					
Mean	88.0	86.1	84.8	78.4	84.3
No dung	88.0	84.0	82.8	78.5	83.3
Dung	88.0	88.2	86.6	78.4	85.3
Response to 15 tons dung per acre	0.0	+4.2	+3.8	-0.1	+2.0

*For use in comparisons other than vertical.

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Test Crop

	Previous Rotation				
	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
Barley, Grain: cwt per acre					
No dung (±2.50)*	32.2	31.0	25.7	22.3	27.8
Dung in 1954	37.5	37.2	30.8	27.6	33.3
Mean (±2.30)	34.9	34.1	28.3	24.9	30.5
Increase (±1.97)	5.3	6.2	5.1	5.3	5.5 (±0.99)
Barley, Straw: cwt per acre					
No dung	34.2	29.6	25.7	22.3	27.9
Dung in 1954	38.0	38.2	33.3	28.5	34.5
Mean	36.1	33.9	29.5	25.4	31.2
Increase	3.8	8.6	7.6	6.2	6.6

*For use in comparisons other than vertical.

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