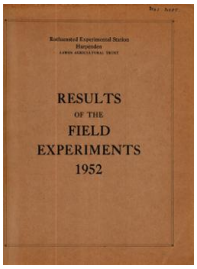
ROTHAMSTED RESEARCH

Yields of the Field Experiments 1952

Full Table of Content



Long-term Experiments

Rothamsted Research

Rothamsted Research (1953) *Long-term Experiments ;* Yields Of The Field Experiments 1952, pp 14 - 67 **- DOI: https://doi.org/10.23637/ERADOC-1-178**

52/Ba/1.1

THREE COURSE ROTATION EXPERIMENT

1st year of revised scheme

This experiment was recast commencing with the crops of 1952 from the old design, full details of which can be found in the 1951 Station report page 135, together with a summary of 18 years results.

The present design is as follows. The rotation is as before - 3 series, each in turn carrying potatoes, barley and sugar beet. The compost and magnesium sulphate treatments are stopped, the present experiment being confined to testing straw. The plots formerly receiving only inorganic fertilizers now test inorganic nitrogen applied as sulphate of ammonia in alternate years. One third of the original plots testing straw or compost continue to receive straw in alternate years, while the remainder test, in the presence and absence of sulphate of ammonia, the effect of an amount of muriate of potash equivalent to the K_2O contained in the straw application. In the original experiment the straw received a quantity of nitrogen at the conventional rate - 0.7% of the dry weight of straw, but in the new experiment the straw receives nitrogen at two rates - 0.4% and 1.2% respectively: the straw plots having the lower rate of nitrogen being supplemented by a direct addition of sulphate of ammonia in the second year. No further nitrogen is added in the second year to the straw plots receiving the high level of nitrogen.

Every plot is divided into two to test an addition of muriate of potash. The half plots are only weighed separately when the crop is potatoes, as this crop is most likely to reveal differences in potash responses in the presence and absence of straw.

The above remarks may be summarised as follows:-

For each of the three crops potatoes, barley, sugar beet there are available:-

(a) 6 main plots of the former Ar treatment, 3 in each phase.
(b) 12 main plots of the former St_1 and St_2 treatments, 6 in each phase.
(c) 6 main plots of the former Ad treatment, 3 in each phase.

The main plot treatments for (a) are 0 v. 0.4 cwt. N

		1950	1951
Phase 1	0.4 N v. 0 v. 0.4 N	(Ar)	Ar
Phase 2	0 v. 0.4N v. 0	Ar	(Ar)

The main plot treatments for (b) are (0 v. 0.4 N) v. (0 v. St0.2N v. K_s) where K_s is muriate of potash supplying as much K_2O as the straw.

							1950	1951
Phase 1	St0.2N v.	St0.6N v.	0.4N v.	0 v.	K_s0.4N v.	K_s	(St)	St
Phase 2	0.4N v.	0 v.	0 v.	0.4N v.	0 v.	0.4N	St	(St)

N.B. The brackets indicate treatments applied the previous year.

https://doi.org/10.23637/ERADOC-1-178

The main plot treatments for (c) are:

		1950	1951
Phase 1	St0.6N v. 0.4N v. K_s0.4N	(Ad)	Ad
Phase 2	0 v. 0 v. 0	Ad	(Ad)

All main plots will be split in every crop to test 0 v. 0.5 cwt K_2O. To prevent build up of K_2O on one half of the splits the side which received high potash one year will receive low potash the next.

Basal Dressings:-	cwt per acre N	P_2O_5	K_2O
Barley	0	0.2	0
Sugar beet	0.2	0.4	0.25
Potatoes	0.4	0.6	0.5

The form of fertilizer is:

(a) nitrogen as sulphate of ammonia.
(b) phosphate as superphosphate.
(c) potash as muriate of potash.

All fertilizers are spring applied, including the potash equivalent of the straw.

Potato fertilizers are broadcast on the flat. The land is ridged and the tubers planted by dropper in the ridges.

Area of each plot: Potatoes (sub-plot) - 0.0092 acre; barley - 0.0200 acre; sugar beet - 0.0204 acre.

Cultivations etc.:

Potatoes: Straw applied, ploughed all plots: Dec 15, 1951. Fertilizers applied: Apr 18, 1952. Ridged: Apr 22. Potatoes planted with mechanical dropper: Apr 24. Earthed up ridges: July 8. Sprayed with medium volume copper sulphate solution, 5 lb per acre: Aug 12 and again Sept 4. Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 6. Variety: Majestic.

Barley: Straw applied, ploughed all plots: Dec 15, 1951 1 ton. Ground chalk per acre applied: Feb 26, 1952. Seed drilled at 3 bushels per acre: Mar 3. Fertilizers applied: Mar 4. Sprayed with low volume MCPA 5 lb per acre: May 10. Harvested: July 30. Variety: Plumage Archer.

Sugar beet. Straw applied, ploughed all plots: Dec 15, 1951. Fertilizer applied, seed drilled at 18 lb per acre: Mar 21, 1952. Singled: May 26. Lifted: Dec 28. Variety: Klein E.

https://doi.org/10.23637/ERADOC-1-178

Summary of Results

Potatoes

Previous Treatments 1950	1951	Treatments 1952: No N; cwt K_2O per acre: None	0.5	0.4 cwt N per acre as sulphate of ammonia; cwt K_2O per acre: None	0.5	$53\frac{1}{3}$ cwt per acre cut straw; 0.2 cwt N per acre; cwt K_2O per acre: None	0.5	$53\frac{1}{3}$ cwt per acre cut straw; 0.6 cwt N per acre; cwt K_2O per acre: None	0.5	K_2O in $53\frac{1}{3}$ cwt cut straw; cwt K_2O per acre: None	0.5	0.4 cwt N per acre as sulph.amm.+ K_2O in $53\frac{1}{3}$ cwt cut straw; cwt K_2O per acre: None	0.5	Mean
Total clean tubers: tons per acre														
Art	Art	4.05*	4.49*	4.66	4.66									
	Straw	3.93	4.41	3.71*	5.00*									
Straw	Art	5.30†	4.98†	5.21†	5.97†									
	Straw	4.22	5.14	4.41	4.75	5.09	4.56	4.46	6.55	5.24	4.56	4.36	5.29	
Adco	Art	4.87†	4.58†											
	Adco			4.27	4.56			5.24	4.80			4.03	4.17	
Mean														4.80
Percentage Ware														
Art	Art	51.6*	54.3*	56.5	62.7									
	Straw	58.3	66.4	50.4*	60.9*									
Straw	Art	65.2†	65.6†	65.9†	67.8†									
	Straw	62.1	64.5	64.4	67.8	65.9	61.6	64.7	72.4	62.2	58.4	60.3	63.9	
Adco	Art	63.1†	65.4†											
	Adco			60.8	65.3			70.1	67.8			65.1	61.2	
Mean														62.8

* means of 2 sub plots
† means of 3 sub plots
remainder means of 1 sub plot only.

52/Ba/1.3

Barley

Treatments 1952

Previous Treatments 1950	1951	No N	0.4 cwt N per acre as sulphate of ammonia	0.2 cwt N per acre as sulphate of ammonia	0.6 cwt N per acre as sulphate of ammonia	K_2O in $5\frac{1}{3}$ cwt cut straw	0.4 cwt N per acre as sulph. amm. + K_2O in $5\frac{1}{3}$ cwt cut straw	Mean
Grain: cwt per acre								
	Art	28.7*	33.3					
Art		26.4	31.6*					
	Straw	27.4†	34.0†					
Straw		28.1	33.8	19.8	30.5	29.1	33.9	
	Adco	25.1†						
Adco			33.9		35.2		33.6	
Mean								29.9
Straw: cwt per acre								
	Art	27.2*	38.4					
Art		26.3	35.7*					
	Straw	26.2†	40.0†					
Straw		28.1	35.9	20.4	34.5	29.2	41.3	
	Adco	23.0†						
Adco			37.7		39.8		37.4	
Mean								31.8

* means of 2 sub plots
† means of 3 sub plots
remainder means of 1 sub plot only.

52/Ba/1.4

Sugar Beet

Treatments 1952

Previous Treatments 1950	1951	No N	0.4 cwt N per acre as sulphate of ammonia	0.2 cwt N per acre (53⅓ cwt per acre cut straw)	0.6 cwt N per acre (53⅓ cwt per acre cut straw)	K_2O in 53⅓ cwt cut straw	0.4 cwt N per acre as sulph. amm. + K_2O in 53⅓ cwt cut straw	Mean
Roots (washed): tons per acre								
	Art	10.92	12.55					
Art		9.65	13.15					
	Straw	10.29	12.80					
Straw		10.34	12.16	9.10	12.75	11.55	11.76	
	Adco	11.08						
Adco			12.88		9.76		11.85	
Mean								11.46
Sugar percentage								
	Art	16.63	16.53					
Art		16.39	16.56					
	Straw	16.71	16.24					
Straw		16.76	15.55	16.68	16.65	16.96	16.42	
	Adco	16.56						
Adco			16.59		16.50		16.30	
Mean								16.51

52/Ba/1.5

Sugar Beet

Treatments 1952

Previous Treatments 1950	Previous Treatments 1951	No N	0.4 cwt N per acre as sulphate of ammonia	$53\frac{1}{3}$ cwt per acre cut straw: 0.2 cwt N per acre as sulphate of ammonia	$53\frac{1}{3}$ cwt per acre cut straw: 0.6 cwt N per acre as sulphate of ammonia	K_2O in $53\frac{1}{3}$ cwt cut straw	0.4 cwt N per acre as sulph. amm. + K_2O in $53\frac{1}{3}$ cwt cut straw	Mean
Total sugar: cwt per acre								
	Art	36.3	41.5					
Art		31.6	43.6					
	Straw	34.4	41.5					
Straw		34.7	37.8	30.4	42.4	39.2	38.6	
	Adco	36.6						
Adco			42.7		32.2		38.6	
Mean								37.8
Plant number: thousands per acre								
	Art	23.9	23.0					
Art		28.2	25.2					
	Straw	26.6	21.6					
Straw		25.2	26.6	24.8	24.4	25.5	19.4	
	Adco	25.0						
Adco			23.9		22.3		25.8	
Mean								24.5

52/Ba/1.6

52/Ba/2.1

FOUR COURSE ROTATION EXPERIMENT

The 23rd year

Direct and residual effects of organics and phosphates - Hoosfield 1952.

For details of treatments and rotation see "Results of the Field Experiments 1939-47".

Area of each plot: Potatoes: 0.0242 acre. Barley and wheat: 0.0244 acre. Ryegrass: 0.0233 acre.

Manures (cwt per acre) applied 1951-52

	Organic manures				Supplementary fertilizers		
	Organic matter	N	P_2O_5	K_2O	N as Sulph. of amm.	P_2O_5 as Super	K_2O as Mur. of potash
Dung†	50	1.191	0.526	2.485	0.609	0.674	0.515
Adco	50	1.140	0.795	0.351	0.660	0.405	2.649
Straw	132	0.684	0.262	1.395	1.116	0.938	1.605
Super			None		0.36	1.2	0.6
Rock phosphate			None		0.36	1.2*	0.6

*As rock phosphate

†Note: The application of Dung to the Ryegrass and Wheat was made in error at a rate to supply:

Organic matter	N	P_2O_5	K_2O
59	1.413	0.625	2.950

Cultivations, etc.:

Potatoes:

Ploughed: Sept 13, 1951. Dung, Adco and supplementary fertilizers and first dressing to straw plots applied: Dec 18. Straw applied, all plots ploughed: Dec 19. Second dressing to straw plots applied: Feb 7, 1952. Ridged: Apr 25. Spring fertilizers, including third dressing to straw plots, and sulphate of ammonia to half plots, applied: Apr 26. Potatoes planted: Apr 28. Earthed up: July 10. Sprayed with copper fungicide 5 lb per acre: Sept 4. Sprayed with sulphuric acid, 20% B.O.V.: Sept 23. Lifted: Oct 7. Variety: Majestic.

Barley:

Dung and Adco applied: Dec 18, 1951. Supplementary fertilizers to dung and Adco, and first dressing to straw plots applied: Dec 19. Straw applied, all plots ploughed: Dec 20. Second dressing to straw plots applied: Feb 7, 1952. Ground chalk 22½ cwt per acre applied: Feb 26. Spring fertilizers and

https://doi.org/10.23637/ERADOC-1-178

third dressing to straw plots applied, seed drilled at 3 bushels per acre: Mar 3. Sprayed with M.C.P.A. 5 pints per acre: May 10. Harvested: July 30. Variety: Plumage Archer.

Ryegrass:

Dung, Adco and supplementary fertilizers, and first dressing to straw plots applied: Sept 24, 1951. Straw applied, all plots ploughed: Sept 25. Autumn fertilizers applied: Oct 22. Seed sown at 112 lb per acre: Oct 25. Second dressing to straw plots applied: Dec 20. Sulphate of ammonia and third dressing to straw plots applied: Apr 16, 1952. Sprayed with M.C.P.A. 5 pints per acre: May 10. Harvested: June 16. Variety: Western Wolths.

Wheat:

Ploughed: Aug 1, 1951. Dung, Adco and supplementary fertilizers, and first dressing to straw plots applied: Sept 25. Straw applied, ploughed all plots: Sept 26. Autumn fertilizers applied, seed drilled at 3 bushels per acre: Oct 20. Second dressing to straw plots applied: Dec 20. Sulphate of ammonia and third dressing to straw plots applied: Apr 24, 1952. Sprayed with M.C.P.A. 5 pints per acre: May 10. Harvested: July 29. Variety: Squareheads Master 13/4.

https://doi.org/10.23637/ERADOC-1-178

Summary of Results

Manure[+]	Year of Cycle	Potatoes: Total tubers, tons per acre — Additional N Without	With	Mean	Response to N	Potatoes: Percentage Ware — Additional N Without	With	Mean	Response to N	Barley: Grain cwt per acre	Barley: Straw cwt per acre	Ryegrass: Dry Matter cwt per acre	Wheat: Grain cwt per acre	Wheat: Straw cwt per acre
Manure as F.Y.M.	I	11.59	11.62	11.60	0.03	87.1	82.4	84.8	-4.7	35.0	38.1	25.0	16.6	38.0
	II	5.93	7.07	6.50	1.14	77.1	79.3	78.2	2.2	20.0	18.3	15.6	9.9	20.4
	III	6.56	9.19	7.88	2.63	74.1	83.0	78.6	8.9	20.4	19.0	14.0	7.0	15.5
	IV	6.74	9.66	8.20	2.92	80.0	83.9	82.0	3.9	16.9	14.3	11.4	10.4	18.2
	V	3.21	5.73	4.47	2.52	60.0	78.7	69.4	18.7	17.2	16.5	13.6	10.4	19.5
Manure as Adco	I	7.38	7.26	7.32	-0.12	79.2	73.1	76.2	-6.1	31.1	34.2	23.0	19.7	*
	II	5.38	6.14	5.76	0.76	81.0	77.8	79.4	-3.2	26.1	25.4	15.0	13.4	24.9
	III	7.34	7.30	7.32	-0.04	80.9	82.9	81.9	2.0	19.1	15.4	15.1	9.7	18.7
	IV	5.65	8.52	7.08	2.87	76.5	85.4	81.0	8.9	20.7	18.3	15.5	8.2	14.0
	V	5.65	6.48	6.06	0.83	72.1	78.2	75.2	6.1	14.1	12.6	12.8	11.8	23.8
Manure as Straw	I	5.89	8.55	7.22	2.66	76.9	74.6	75.8	-2.3	31.9	35.6	31.4	14.3	36.6
	II	6.60	6.95	6.78	0.35	78.9	81.1	80.0	2.2	17.4	14.3	14.2	8.7	16.4
	III	6.68	9.46	8.07	2.78	74.6	75.0	74.8	0.4	20.1	17.8	17.5	10.7	22.4
	IV	8.27	9.94	9.10	1.67	76.9	80.0	78.4	3.1	19.8	21.8	13.7	8.8	18.5
	V	5.46	7.09	6.28	1.63	75.5	81.1	78.3	5.6	18.2	16.6	14.5	8.8	16.2
Super-phosphate	I	8.97	8.72	8.84	-0.25	76.4	75.9	76.2	-0.5	28.3	28.5	24.5	13.7	32.7
	II	8.45	9.39	8.92	0.94	82.8	81.1	82.0	-1.7	24.9	26.3	24.6	8.6	23.6
	III	4.05	5.58	4.82	1.53	64.9	77.9	71.4	13.0	23.5	29.2	26.2	10.0	19.7
	IV	5.10	5.22	5.16	0.12	80.3	78.5	79.4	-1.8	27.5	27.5	22.5	7.3	20.0
	V	6.52	7.82	7.17	1.30	72.0	81.2	76.6	9.2	28.2	30.1	24.3	10.6	23.1
Rock phosphate	I	4.20	5.27	4.74	1.07	60.0	71.7	65.8	11.7	26.0	26.3	21.1	15.2	28.8
	II	5.41	6.56	5.98	1.15	84.8	81.4	83.1	-3.4	26.1	26.5	22.8	12.5	21.7
	III	3.22	2.76	2.99	-0.46	69.9	62.2	66.0	-7.7	27.6	29.2	21.6	13.5	26.5
	IV	3.77	6.25	5.01	2.48	76.2	79.0	77.6	2.8	24.6	25.6	25.9	10.2	20.6
	V	6.20	6.35	6.28	0.15	82.1	87.4	84.8	5.3	25.8	28.4	21.6	16.8	31.0

52/Ba/2.3

[+]Note: All manures are supplemented by fertilizers as shown in table on page 52/Ba/2.1

*Recorded yield obviously incorrect. No estimate possible at this stage.

52/Ba/3.1

SIX COURSE ROTATION EXPERIMENT

The 23rd year

Seasonal effects of fertilizers - Rothamsted Long Hoos IV and Woburn Stackyard, 1952.

For details of rotation and treatments etc. see "Results of the Field Experiments 1939-47".

Area of each plot: Rothamsted - 0.0250 acre. Woburn - 0.0266 acre.

Cultivations, etc.:

Rothamsted

Sugar beet.
Ploughed: Aug 28, 1951 and again Dec 22. Fertilizers applied: Mar 18, 1952. Seed drilled at 18 lb per acre: Mar 21. Singled: May 23. Lifted: Dec 31. Variety: Klein E.

Barley.
Ploughed: Dec 17, 1951. Ground chalk applied at 20 cwt per acre: Feb 25, 1952. Fertilizers applied, seed drilled at 3 bushels per acre: Mar 3. Harvested: July 28. Variety: Plumage Archer.

Clover.
Seed undersown in barley at 40 lb per acre: Apr 17, 1951. Autumn fertilizers applied: Nov 4. Sulphate of ammonia applied: Apr 16, 1952. Cut: June 25. Variety: Late flowering Montgomery Red.

Wheat.
Ploughed: Aug 7, 1951. Autumn fertilizers applied: Oct 18. Seed drilled at 3 bushels per acre: Oct 19. Sulphate of ammonia applied: Apr 24, 1952. Sprayed with M.C.P.A. 5 pints per acre: May 10. Harvested: July 26. Variety: Yeoman.

Potatoes.
Ploughed: Aug 25, 1951 and again Dec 18. Ridged, fertilizers applied, potatoes planted: Apr 25, 1952. Earthed up: July 8. Sprayed with copper fungicide 5 lb per acre: Sept 3. Sprayed with sulphuric acid, 20% B.O.V: Sept 23. Lifted: Oct 7. Variety: Majestic.

Rye.
Cultivated: Oct 10, 1951. 25 cwt ground chalk per acre and autumn fertilizers applied: Oct 17. Seed drilled at 3 bushels per acre: Oct 18. Sulphate of ammonia applied: Apr 17, 1952. Harvested: July 26. Variety: King II.

https://doi.org/10.23637/ERADOC-1-178

Woburn

Sugar beet.
Ploughed: Sept 13, 1951 and again Jan 7, 1952. Fertilizers applied and seed drilled at 18 lb per acre: Apr 18. Singled: May 29. Lifted: Oct 8. Variety: Klein E.

Barley.
Ploughed: Oct 12, 1951 and again Feb 9, 1952. Ground chalk applied at 20 cwt per acre: Feb 29. Fertilizers applied: Mar 13. Seed drilled at 3 bushels per acre: Mar 14. Harvested: July 31. Variety: Plumage Archer.

Clover.
Seed undersown in barley at 40 lb per acre: Apr 18, 1951. Autumn fertilizers applied: Dec 3. Sulphate of ammonia applied: Apr 23, 1952. Cut: June 30. Variety: Late flowering Montgomery Red.

Wheat.
Ploughed: July 24, 1951 and again Sept 7. Autumn fertilizers applied: Oct 23. Seed drilled at 3 bushels per acre: Oct 26. Sulphate of ammonia applied: May 2, 1952. Sprayed with D.N.B.P.: May 24. Harvested: July 28. Variety: Red Standard.

Potatoes.
Ploughed: Sept 7, 1951 and again Jan 9, 1952. Ridged: Apr 23. Fertilizers applied, potatoes planted: Apr 24. Earthed up: June 16. Sprayed with copper fungicide 5 lb per acre: Aug 11 and again Sept 22. Sprayed with sulphuric acid, 15% B.O.V: Sept 22. Lifted: Oct 7. Variety: Majestic.

Rye.
Ploughed: Oct 9, 1951. Autumn fertilizers applied: Oct 23. Ground chalk applied at 20 cwt per acre: Oct 25. Seed drilled at 3 bushels per acre: Oct 26. Sulphate of ammonia applied: May 2, 1952. Harvested: July 25. Variety: King II.

https://doi.org/10.23637/ERADOC-1-178

Summary of Results

Mean yields per acre and responses in yield per cwt of N, P_2O_5 and K_2O

	Rothamsted	Woburn	Rothamsted	Woburn
	Sugar Beet, roots (washed): tons per acre		Barley, grain: cwt per acre	
Mean	12.37	9.21	32.0	25.3
Response to: N	+1.39	+0.73	+16.5	+30.7
P	-2.69	-2.43	+1.3	+2.4
K	-2.40	+3.11	+1.0	+2.7
	Sugar Beet, sugar percentage		Barley, straw: cwt per acre	
Mean	17.07	19.58	37.2	29.8
Response to: N	-0.34	-0.37	+40.0	+47.9
P	-0.05	+0.37	+4.1	-1.1
K	-0.50	+0.20	+0.8	+2.5
	Sugar Beet, total sugar: cwt per acre		Clover, hay, dry matter: cwt per acre	
Mean	42.2	36.1	37.6	43.8
Response to: N	+3.9	+1.9	-7.1	+10.0
P	-9.3	-8.8	+7.1	-15.3
K	-9.3	+12.5	-0.7	+14.8
	Sugar Beet, tops: tons per acre		Wheat, grain: cwt per acre	
Mean	*	4.79	34.3	8.6
Response to: N		+2.10	+14.0	+10.0
P		-1.75	-4.7	+7.1
K		+1.76	+1.0	-0.2
	Sugar Beet, plant number: thousands per acre		Wheat, straw: cwt per acre	
Mean	28.6	*	60.6	15.8
Response to: N	+2.8		+31.8	+18.2
P	-4.9		-1.9	+6.8
K	0.0		-0.4	+2.4

*not recorded.

https://doi.org/10.23637/ERADOC-1-178

	Rothamsted	Woburn	Rothamsted	Woburn
	Potatoes, total tubers: tons per acre		Rye, grain: cwt per acre	
Mean	8.15	6.29	27.3	22.8
Response to: N	+1.87	+4.39	+12.5	+24.4
P	+0.26	+1.79	+10.8	-0.7
K	+3.03	-1.43	+1.2	+3.0
	Potatoes, percentage ware		Rye, straw: cwt per acre	
Mean	75.0	86.8	38.2	26.0
Response to: N	+1.5	-2.1	+21.3	+24.9
P	+7.1	+11.7	+17.2	+1.8
K	+7.4	-3.6	+3.3	+1.8

https://doi.org/10.23637/ERADOC-1-178

52/Bb/1.1

DEEP CULTIVATION ROTATION EXPERIMENT

The 9th Year

Deep ploughing, fertilizers and dung - Long Hoos I and II 1952.

For details of rotation and treatments etc. see "Results of the Field Experiments 1939-47".

Area of each plot: 0.0312 acre. Area harvested: Sugar beet (half plot), 0.0119 acre; barley, wheat, spring oats, 0.0265 acre; ley, 0.0275 acre; potatoes (half plot), 0.0107 acre.

Cultivations, etc.:

Sugar beet (Series 1)
Fertilizers for ploughing in applied: Sept 28, 1951. Dung applied and ploughed in 'deep': Oct 9. Dung applied and ploughed in 'shallow': Oct 10. Fertilizers for surface application broadcast, seed drilled at 16 lb per acre: Mar 22, 1952. Singled: May 26. Lifted: Jan 2, 1953. Variety: Klein E.

Barley (Series 6)
Ploughed: Dec 18, 1951. Ground chalk applied at 1 ton per acre: Feb 25, 1952. Basic slag and sulphate of ammonia applied: Feb 27. Seed drilled at 3 bushels per acre: Feb 28. Harvested: July 31. Variety: Plumage Archer.

Ley (Series 2)
Seeds undersown in barley: Apr 18, 1951. Cut: June 24, 1952. Seeds mixture (per acre): 18 lb S.24 perennial ryegrass, 8 lb Montgomery red clover, 2 lb American Alsike clover.

Wheat (Series 3)
Ploughed 'deep' plots: July 30, 1951. Ploughed 'shallow' plots: Aug 8. Ploughed all plots: Sept 25. Seed drilled at 3 bushels per acre: Oct 20. Basal sulphate of ammonia applied: Apr 16, 1952. Harvested: July 26. Variety: Yeoman.

Potatoes (Series 4)
Fertilizers for ploughing in applied: Sept 28, 1951. Dung applied and ploughed in 'deep': Oct 9. Dung applied and ploughed in 'shallow': Oct 10. Ridged: May 1, 1952. Fertilizers applied in ridges, potatoes planted: May 2. Earthed up ridges: July 10. Sprayed with copper fungicide 5 lb per acre: Aug 12 and again Sept 3. Sprayed with sulphuric acid, 20% B.O.V: Sept 23. Lifted: Oct 18. Variety: Majestic.

https://doi.org/10.23637/ERADOC-1-178

Spring oats (Series 5)
Ploughed: Oct 29, 1951. Ground chalk applied at 1 ton per acre: Feb 25, 1952. Basal sulphate of ammonia drilled: Feb 27. Seed drilled at 3½ bushels per acre: Feb 28. Harvested: July 22.
Variety: Star.

Standard errors per plot:

Sugar beet,	Total sugar,	whole plot:	2.49 cwt per acre or 4.4%	(4 d.f)
		sub-plot:	3.65 cwt per acre or 6.5%	(7 d.f)
Barley,	Grain:		2.16 cwt per acre or 8.4%	(4 d.f)
Ley,	Hay:		2.48 cwt per acre or 4.0%	(4 d.f)
Wheat,	Grain:		2.34 cwt per acre or 6.9%	(4 d.f)
Potatoes,	Total tubers,	whole plot:	0.510 tons per acre or 7.3%	(4 d.f)
		sub-plot:	1.093 tons per acre or 15.7%	(7 d.f)
Spring oats,	Grain:		2.84 cwt per acre or 8.3%	(4 d.f)

52/Bb/1.3

Summary of Results

Series 1: Sugar Beet

Responses to treatments

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Roots (washed): Mean yield 17.83 tons per acre									
Ploughing deep-shallow	+2.91	-	-	+3.42	+2.40	+2.85	+2.97	+2.60	+3.22
Dung	+3.63	+4.14	+3.12	-	-	+3.94	+3.32	+4.78	+2.48
Phosphate	+0.24	+0.18	+0.30	+0.55	-0.07	-	-	-0.02	+0.50
Potash	+1.07	+0.76	+1.38	+2.22	-0.08	+0.81	+1.33	-	-
Sugar Percentage: Mean 15.77									
Ploughing deep-shallow	-0.13	-	-	-0.08	-0.18	-0.05	-0.21	-0.20	-0.06
Dung	-0.16	-0.11	-0.21	-	-	-0.34	+0.02	-0.19	-0.13
Phosphate	+0.06	+0.14	-0.02	-0.12	+0.24	-	-	+0.26	-0.14
Potash	-0.07	-0.14	0.00	-0.10	-0.04	+0.13	-0.27	-	-
Total Sugar: Mean yield 56.2 cwt per acre									
	(±1.25)					(±1.76)			
Ploughing deep-shallow	8.7	-	-	10.6	6.8	8.8	8.6	7.5	9.9
Dung	10.9	12.8	9.0	-	-	11.2	10.6	14.5	7.3
Phosphate	1.0	1.1	0.9	1.3	0.7	-	-	1.0	1.0
Potash	3.2	2.0	4.4	6.8	-0.4	3.2	3.2	-	-
Plant Number: Mean 26.6 thousands per acre									
Ploughing deep-shallow	+1.2	-	-	+1.2	+1.2	+1.4	+1.0	+0.9	+1.5
Dung	+0.1	+0.1	+0.1	-	-	+0.5	-0.3	+0.3	-0.1
Phosphate	-0.6	-0.4	-0.8	-0.2	-1.0	-	-	-0.9	-0.3
Potash	+0.2	-0.1	+0.5	+0.4	0.0	-0.1	+0.5	-	-
Noxious Nitrogen: Mean 25.0 mg. per 100 g.									
Ploughing deep-shallow	+0.6	-	-	+1.2	0.0	+0.6	+0.6	-0.6	+1.8
Dung	+2.5	+3.1	+1.9	-	-	+1.9	+3.1	+1.9	+3.1
Phosphate	-1.9	-1.9	-1.9	-2.5	-1.3	-	-	-1.9	-1.9
Potash	+0.6	-0.6	+1.8	0.0	+1.2	+0.6	+0.6	-	-

https://doi.org/10.23637/ERADOC-1-178

Series 1: Sugar beet

	Phosphate			Potash			
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	Mean
Roots (washed): tons per acre							
Shallow	16.28	16.98	15.95	16.00	17.42	16.09	16.37
Deep	19.13	19.32	19.55	18.59	19.89	20.06	19.28
No dung	15.74	16.36	16.22	14.91	17.18	17.07	16.02
Dung	19.68	19.94	19.28	19.68	20.13	19.08	19.64
Mean	17.71	18.15	17.75	17.29	18.65	18.08	17.83
Sugar Percentage							
Shallow	15.76	15.64	16.16	15.90	15.70	15.82	15.83
Deep	15.71	15.71	15.69	15.71	15.62	15.79	15.71
No dung	15.91	15.58	16.00	15.90	15.77	15.82	15.85
Dung	15.57	15.77	15.84	15.71	15.55	15.78	15.69
Mean	15.74	15.68	15.92	15.80	15.66	15.80	15.77
Total Sugar: cwt per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	51.3	53.2	51.5	50.8	54.7	50.9	51.8
Deep	60.1	60.7	61.3	58.3	62.1	63.3	60.5
No dung	50.1	51.0	51.8	47.4	54.2	54.1	50.7
Dung	61.3	62.9	61.0	61.8	62.6	60.2	61.6
Mean	55.7	56.9	56.4	54.6	58.4	57.1	56.2
Plant Number: thousands per acre							
Shallow	26.2	25.8	25.8	26.1	25.9	26.0	26.0
Deep	27.6	26.9	26.7	26.9	27.2	27.8	27.2
No dung	26.7	26.6	26.2	26.3	26.7	26.9	26.6
Dung	27.1	26.1	26.2	26.6	26.4	26.9	26.6
Mean	26.9	26.3	26.2	26.5	26.5	26.9	26.6

(a) ±1.25 for use in comparisons other than horizontal.
(b) ±1.82 for use in horizontal comparisons.
(c) ±1.79 as (a).

https://doi.org/10.23637/ERADOC-1-178

Series 1: Sugar beet

	Phosphate			Potash			
	None	Ploughed in	In seed bed	None	Ploughed in	In seed bed	Mean
Noxious Nitrogen: mg. per 100 mg.							
Shallow	25.6	23.8	23.8	25.0	25.0	23.8	24.7
Deep	26.2	25.0	23.8	24.4	27.5	25.0	25.3
No dung	25.0	22.5	22.5	23.8	23.8	23.8	23.8
Dung	26.9	26.2	25.0	25.6	28.8	25.0	26.2
Mean	25.9	24.4	23.8	24.7	26.2	24.4	25.0

Series 6: Barley

Responses to treatments to previous Sugar Beet

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 25.7 cwt per acre									
	(±1.08)				(±1.53)				
Ploughing deep-shallow	-2.6	-	-	-1.3	-3.9	-3.0	-2.2	-3.7	-1.5
Dung	+1.5	+2.8	+0.2	-	-	+1.9	+1.1	+2.6	+0.4
Phosphate	+0.2	-0.2	+0.6	+0.6	-0.2	-	-	-0.2	+0.6
Potash	+1.1	0.0	+2.2	+2.2	0.0	+0.7	+1.5	-	-
Straw: Mean yield 26.5 cwt per acre									
Ploughing deep-shallow	-2.6	-	-	-0.9	-4.3	-2.9	-2.3	-3.4	-1.8
Dung	+3.4	+5.1	+1.7	-	-	+3.5	+3.3	+4.2	+2.6
Phosphate	+0.3	0.0	+0.6	+0.4	+0.2	-	-	0.0	+0.6
Potash	+0.5	-0.3	+1.3	+1.3	-0.3	+0.2	+0.8	-	-

Series 2: Ley

Hay: Mean yield 62.5 cwt per acre									
	(±1.24)				(±1.75)				
Ploughing deep-shallow	-0.1	-	-	-0.7	+0.5	+0.1	-0.3	-2.7	+2.5
Dung	+4.8	+4.2	+5.4	-	-	+4.1	+5.5	+6.1	+3.5
Phosphate	-0.6	-0.4	-0.8	-1.3	+0.1	-	-	-2.7	+1.5
Potash	+1.3	-1.3	+3.9	+2.6	0.0	-0.8	+3.4	-	-

https://doi.org/10.23637/ERADOC-1-178

Series 3: Wheat

Responses to treatments*

Response to	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 33.7 cwt per acre									
	(±1.17)				(±1.66)				
Ploughing deep-shallow	+0.1	-	-	0.0	+0.2	-1.0	+1.2	+0.7	-0.5
Dung	+0.7	+0.6	+0.8	-	-	-0.1	+1.5	-1.7	+3.1
Phosphate	-1.6	-2.7	-0.5	-2.4	-0.8	-	-	+0.9	-4.1
Potash	-1.0	-0.4	-1.6	-3.4	+1.4	+1.5	-3.5	-	-
Straw: Mean yield 62.3 cwt per acre									
Ploughing deep-shallow	+5.1	-	-	+2.6	+7.6	-0.3	+10.5	+6.0	+4.2
Dung	+5.4	+2.9	+7.9	-	-	+8.7	+2.1	+1.3	+9.5
Phosphate	-4.7	-10.1	+0.7	-1.4	-8.0	-	-	-4.2	-5.2
Potash	+2.8	+3.7	+1.9	-1.3	+6.9	+3.3	+2.3	-	-

* Cultivation treatments direct to wheat, remainder to previous sugar beet.

Series 4: Potatoes

Total tubers: Mean yield 6.96 tons per acre

	(±0.255)			(±0.361)					
Ploughing deep-shallow	-1.27	-	-	-1.38	-1.16	-1.27	-1.27	-1.35	-1.19
Dung	+2.54	+2.43	+2.65	-	-	+2.10	+2.98	+3.60	+1.48
Phosphate	+1.61	+1.61	+1.61	+1.17	+2.05	-	-	+0.72	+2.50
Potash	+0.99	+0.91	+1.07	+2.05	-0.07	+0.10	+1.88	-	-
Percentage Ware: Mean 76.0									
Ploughing deep-shallow	-1.0	-	-	-2.8	+0.8	-1.1	-0.9	-1.9	-0.1
Dung	+8.0	+6.2	+9.8	-	-	+6.8	+9.2	+10.2	+5.8
Phosphate	-2.9	-3.0	-2.8	-4.1	-1.7	-	-	-1.3	-4.5
Potash	+5.4	+4.5	+6.3	+7.6	+3.2	+7.0	+3.8	-	-

Series 4: Potatoes

	Phosphate None	Phosphate Ploughed in	Phosphate In ridges	Potash None	Potash Ploughed in	Potash In ridges	Mean
Total tubers: tons per acre							
	(a)	(b) and (c)		(a)	(b) and (c)		
Shallow	6.79	7.78	9.03	7.15	6.99	9.11	7.60
Deep	5.53	6.27	8.00	5.80	6.11	7.62	6.33
No dung	5.11	5.32	7.25	4.67	5.81	7.62	5.70
Dung	7.21	8.73	9.79	8.27	7.29	9.11	8.23
Mean	6.16	7.03	8.52	6.47	6.55	8.36	6.96
Percentage Ware							
Shallow	78.0	76.0	74.0	74.2	78.1	79.4	76.5
Deep	76.8	72.1	76.1	72.3	76.9	80.4	75.5
No dung	74.0	69.6	70.3	68.2	75.4	76.2	72.0
Dung	80.9	78.6	79.7	78.4	79.6	83.6	80.0
Mean	77.4	74.1	75.0	73.3	77.5	79.9	76.0

Series 5: Spring Oats

Responses to treatments to previous potatoes

	Mean	Ploughing Shallow	Ploughing Deep	Dung Abs.	Dung Pres.	Phosphate Abs.	Phosphate Pres.	Potash Abs.	Potash Pres.
Grain: Mean yield 34.4 cwt per acre									
	(±1.42)				(±2.01)				
Ploughing deep-shallow	-4.0	-	-	-1.9	-6.1	-4.3	-3.7	-3.3	-4.7
Dung	-1.1	+1.0	-3.2	-	-	-0.5	-1.7	-1.2	-1.0
Phosphate	+1.7	+1.4	+2.0	+2.3	+1.1	-	-	+0.3	+3.1
Potash	-1.4	-0.7	-2.1	-1.5	-1.3	-2.8	0.0	-	-
Straw: Mean yield 43.6 cwt per acre									
Ploughing deep-shallow	-3.4	-	-	-1.8	-5.0	-4.1	-2.7	-2.9	-3.9
Dung	+4.1	+5.7	+2.5	-	-	+4.3	+3.9	+2.7	+5.5
Phosphate	+0.9	+0.2	+1.6	+1.1	+0.7	-	-	-0.1	+1.9
Potash	-0.2	+0.3	-0.7	-1.6	+1.2	-1.2	+0.8	-	-

(a) ±0.255 for use in comparisons other than horizontal.
(b) ±0.547 for use in horizontal comparisons.
(c) ±0.463 as (a).

https://doi.org/10.23637/ERADOC-1-178

52/Bc/1.1

LEY AND ARABLE ROTATIONS

Highfield and Fosters Field 1952 - the 4th year.

This experiment was started in autumn 1948 for cropping in 1949 on two fields, Highfield previously old grassland, and Fosters previously old arable. The cropping treatments tested are:

1. Three year ley grazed by sheep.
2. Three year cut grass, as for drying.
3. Three year lucerne, cut as for hay.
4. Three year arable rotation of hay, potatoes, barley.

The three test crops which follow all the above four cropping treatments are. Wheat in the first year, potatoes in the second and barley in the third. Outside this sequence of treatment and test crops there are permanent grass treatments of old grass and of reseeded grass on Highfield and of reseeded grass only on Fosters. All the permanent grass plots are grazed with sheep for two years and hayed on the third. The experiment on Highfield is set out in blocks of 6 plots and on Fosters in blocks of 5 plots each. The cropping in the 6 plot blocks on Highfield for the first six year cycle is illustrated by the following table.

Phase		Plots					
A	B	(1)	(2)	(3)	(4)	(5)	(6)
1949	1952	L	Lu	CG	H	G	R
1950	1953	L	Lu	CG	P	G	R
1951	1954	L	Lu	CG	B	G	R
1952	1949	W	W	W	W	G	R
1953	1950	P	P	P	P	G	R
1954	1951	B	B	B	B	G	R

L = 3 year ley Lu = Lucerne CG = Cut grass
G = Old permanent grass R = Reseeded grass B = Barley
H = 1 year arable hay. P = Potatoes W = Wheat

Hay = 1 cut then fallow. Lucerne: cut for hay.
Cut grass: Several cuts. Ley: Grazed with sheep.
Reseeded and old grass: Grazed 2 years with sheep, hay with aftermath grazing in the 3rd year.

In the first year (1949) two blocks were started in phase A (treatment crops followed by test crops) and a further two blocks in phase B which is 3 years behind phase A, starting with the three test crops before the treatment crops. The arrangement is the same for Fosters except that there is no treatment G.

In 1950 an exactly similar set of four blocks were started on each field, and again in 1951, when all six stages of all the rotations were represented in duplicate.

https://doi.org/10.23637/ERADOC-1-178

In 1952 the fertility effects built up by the leys, lucerne and other treatment crops, can be measured for the first time on the test crops of wheat on two blocks on each field.

Treatment and basal dressings: Tests are made on nitrogen and dung as follows:

Nitrogen: 2 levels appropriate to the crop (none to lucerne) are applied to the treatment crops, and the effects of the treatment crop grown at each level is measured at two levels of nitrogen in the subsequent test crops. Nitrogen is applied as sulphate of ammonia to potatoes and as nitrochalk to the other crops according to the following schedule, which also shows the basal dressing applied.

Dung: None: 12 tons per acre applied in the ridges to potatoes both in the arable rotation and to the test crop. It is applied to quarter plots to test all combinations of (0 v.D) x (N_1 v.N_2).

Crop	Crop Symbol	Treatments cwt. N per acre as Nitrochalk N_1		N_2	Basal dressing per acre
1st year Lucerne	Lu_1	-		-	
1st year Cut Grass	Cg_1	0.15	(a)	0.3	0.6 cwt.P_2O_5 0.6 cwt.K_2O in seedbed
1st year Grazed Ley	L_1	0.075	(b)	0.15	
2nd year Lucerne	Lu_2	-		-	
3rd year Lucerne	Lu_3	-		-	
2nd year Cut Grass	Cg_2	0.15	(a)	0.3	
3rd year Cut Grass	Cg_3	0.15	(a)	0.3	
2nd year Grazed Ley	L_2	0.075	(b)	0.15	0.3 cwt.P_2O_5 0.3 cwt.K_2O in winter
3rd year Grazed Ley	L_3	0.075	(b)	0.15	
Reseeded and Old Permanent Grass 1st and 2nd years	R G	0.075	(b)	0.15	
Reseeded and Old Permanent Grass 3rd year	R G	0.15	(b)	0.30	0.6 cwt.P_2O_5 0.6 cwt.K_2O in winter
Wheat	W	0.3		0.6	0.15 cwt.P_2O_5 0.15 cwt.K_2O Combine drilled with the seed
Barley	B	0.2		0.4	0.15 cwt.P_2O_5 0.15 cwt.K_2O Combine drilled with the seed
1 year Seeds Hay	H	0.3		0.6	0.15 cwt.P_2O_5 0.15 cwt.K_2O in winter
Potatoes	P	0.5	(c)	1.0	0.9 cwt.P_2O_5 0.9 cwt.K_2O in ridges
		0vD (12 tons dung per acre)			

For footnote of (a), (b) and (c) see next page.

https://doi.org/10.23637/ERADOC-1-178

A suitable dressing of calcium carbonate will be applied every 6 years before the Test Barley crop.

(a) 1st dressing of N_1 and N_2 in spring. Repeated dressings of N_1 and N_2 at the same rates after the 1st, 2nd, 3rd, 4th etc.cuts (not the last).
(b) 1st dressing of N_1 and N_2 in spring. A second dressing at the same rates later in the summer (in third year after hay is cut).
(c) N as sulphate of ammonia to Potatoes only.

The basal dressing is applied as a Granulated Compound containing 13% P_2O_5, 13% K_2O.

Sheep Grazing Technique. This has been modified since the experiment started, the present scheme being as follows:

The grazing unit is a half plot of about 1/25 acre. This is presented to the sheep as two or more folds, the team being of such a size that it will graze a single fold to about the level of the sample cut (2") in one day. The intention is to provide fresh untainted grazing every day, leaving the grazed area as a run back. To equalize conditions between the folds within one sub plot, the order of grazing the folds is reversed at every cycle, i.e. the fold which was grazed first on one cycle is grazed last on the next.

Quarter plot area: 0.0220 acre.

Areas harvested (acres): Wheat: 0.0187. Potatoes: 0.0174. Barley: Highfield - 0.0198, Fosters:- 0.0187. Hay, Cut Grass: 0.0199. Grazed ley, Permanent grass, Reseeded: ½ plot - 0.0398. Cut grass 0.000979. Lucerne: ½ plot - 0.0398.

Cultivations, etc:

Highfield

Wheat (Blocks 2 and 3). Ploughed: Oct 4, 1951. Seed drilled at 3 bushels per acre with basal fertilizers: Oct 20. Nitrochalk applied: Apr 30, 1952. Harvested: Aug 1. Variety: Yeoman.

Potatoes (Blocks 9-12). Ploughed: Sept 7, 1951 and again Feb 7, 1952. Ridged, dung, sulphate of ammonia and basal fertilizers applied, potatoes planted: Apr 30. Earthed up: July 9. Sprayed with copper sulphate solution 5 lb per acre, medium volume: Aug 12 and Sept 6. Sprayed with 20% sulphuric acid: Oct 8. Lifted: Oct 16. Variety: Majestic.

Barley (Blocks 5-8). Ploughed: Jan 22, 1952. Ground chalk applied to Blocks 6 and 7: Feb 28. Seed drilled at 3 bushels per acre with basal fertilizers: Feb 29. Nitrochalk applied: Mar 1. Harvested: July 29. Variety: Plumage Archer.

https://doi.org/10.23637/ERADOC-1-178

Cut Grass, Grazed Ley, Lucerne and all 1st year (Blocks 1 and 4). Ploughed: Oct 4, 1951. Basal fertilizers applied: Apr 5, 1952. Nitrochalk applied (none to Lucerne): Apr 18.

Cut Grass. Seeds sown at 38 lb per acre: Apr 19. Cut: 3 times - July 21, Sept 3 and Sept 27. Nitrochalk applied after each cut except the last.
Grazed Ley. Nitrochalk applied: June 28. Grazed: 6 circuits plots 11-12, 5 circuits 45 and 46.
Lucerne. Seed drilled at 33 lb per acre: Apr 19. Cut twice: July 21 and Sept 11. Variety: Du Puits.

Hay 1st year (Blocks 1 and 4). Seeds sown at 38 lb per acre: Apr 18, 1951. Basal fertilizers applied: Dec 20. Nitrochalk applied: Mar 27, 1952. Cut: June 8.

Reseeded grass 4th year (Blocks 1-4). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 27, 1952. Cut: May 15. Nitrochalk applied: June 18. Grazed: 4 circuits, May 29 - Sept 22.

Permanent grass (Blocks 1-4). Basal fertilizers applied: Dec 20,1951. Nitrochalk applied: Mar 27, 1952. Pre-grazing cut: May 15. Nitrochalk applied: June 18. Grazed: 3 circuits, May 29-Sept 26.

Cut Grass, Grazed Ley, Lucerne, Resceded Grass all 2nd year. Permanent Grass (Blocks 9 and 12, Reseeded and Permanent Grass 9-12). Basal fertilizers applied: Dec 20. Nitrochalk applied (none to Lucerne): Mar 27.

Cut Grass. Cut: 5 times - May 16, June 16, July 21, Sept 3 and Sept 26. Nitrochalk applied after each cut except the last.
Grazed Ley. Pre-grazing cut: May 13. Nitrochalk applied: June 18. Grazed: 4 circuits, May 21-Sept 14.
Lucerne. Cut: 3 times - June 11, July 21, Sept 10.
Reseeded Grass. Pre-grazing cut: May 13. Nitrochalk applied: June 17 and 28. Grazed:4 circuits, May 21-Oct 8.
Permanent Grass. Cut: May 14. Nitrochalk applied: June 28. Grazed: 4 circuits, May 21-Oct 12.

Cut Grass 3rd year (Blocks 5 and 8). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 27, 1952. Cut: 5 times May 16, June 16, July 21, Sept 3, Sept 26. Nitrochalk applied after each cut except the last.

Grazed Ley. 3rd year (Blocks 5 and 8). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 27, 1952. Pre-grazing cut: May 15. Nitrochalk applied: June 28. Grazed: 4 circuits, May 25-Sept 12.

Lucerne 3rd year (Blocks 5 and 8). Basal fertilizers applied: Dec 20, 1951. Cut: 3 times, June 11, July 21, Sept 10.

https://doi.org/10.23637/ERADOC-1-178

Reseeded grass. 3rd year (Blocks 5-8). Basal fertilizers applied: Dec 20, 1951. Ground chalk applied to Blocks 6 and 7: Feb 28,1952. Nitrochalk applied: Mar 27. Cut: June 13. Nitrochalk applied: June 17. Grazed: 2 circuits, Aug 29-Sept 30.

Permanent grass. 3rd year (Blocks 5-8). Basal fertilizers applied: Dec 20, 1951. Ground chalk applied to Blocks 6 and 7: Feb 28, 1952. Nitrochalk applied: Mar 27. Cut: June 13. Nitrochalk applied: June 17. Grazed: 2 circuits, Aug 31-Oct 4.

Fosters

Wheat (Blocks 2 and 4). Ploughed: Oct 13, 1951. Seed drilled at 3 bushels per acre with basal fertilizer: Oct 20. Nitrochalk applied: Apr 29, 1952. Harvested: July 25. Variety: Yeoman.

Potatoes (Blocks 6, 10, 11, 12). Ploughed: Aug 28, 1951 and again Jan 22, 1952. Ridged, dung and artificials applied, potatoes planted: Apr 29. Earthed up: June 19. Sprayed with copper sulphate solution, 5 lb per acre: Aug 12 and again Sept 4. Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 18. Variety: Majestic.

Barley (Blocks 5, 7, 8, 9). Ploughed: Jan 18, 1952. Seed drilled at 3 bushels per acre with basal fertilizers, nitrochalk applied: Feb 29. Sprayed with MCPA low volume, 5 pints per acre: May 10. Harvested: July 25. Variety: Plumage Archer.

Cut Grass, Grazed Ley, Lucerne, all 1st year (Blocks 1 and 3). Ploughed: Oct 3 , 1951 and again Jan 19, 1952. Basal fertilizer applied: Apr 5. Nitrochalk applied (none to Lucerne): Apr 17.

Cut grass. Seeds sown at 38 lb per acre: Apr 17. Topped: twice July 10 and 18. Cut twice: Sept 5 and 27. Nitrochalk applied: Sept 5.
Grazed Ley. Seeds sown at 55 lb per acre. Topped twice: July 10 and 18. Grazed: 3 circuits, June 3-Sept 14.
Lucerne. Seed drilled at 33 lb per acre: Apr 17. Cut: twice July 18 and Sept 11. Variety: Du Puits.

Hay 1st year (Blocks 1 and 3). Seeds sown at 38 lb per acre: Apr 18, 1951. Basal fertilizers applied: Dec 20. Cut: June 12, 1952.

Reseeded Grass 4th year (Blocks 1-4). Basal fertilizers applied: Dec 20, 1951. Cut: May 10, 1952. Nitrochalk applied: June 21. Grazed: 4 circuits, May 30-Sept 30.

Cut Grass 2nd year (Blocks 6 and 11). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 26, 1952. Cut: 5 times May 19, June 16, July 18, Sept 4 and Sept 26. Nitrochalk applied after each cut except the last.

Grazed Ley 2nd year (Blocks 6 and 11). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 26, 1952. Pre-grazing cut: May 9. Nitrochalk applied: June 19. Grazed: 4 circuits, May 22-Sept 12.

Lucerne 2nd year (Blocks 6 and 11). Basal fertilizers applied: Dec 20, 1951. Cut: 3 times June 12, July 18 and Sept 9, 1952.

Reseeded grass 2nd year (Blocks 6, 10, 11, 12). Basal fertilizers applied: Dec 20. Nitrochalk applied: Mar 26. Pre-grazing cut: May 9. Nitrochalk applied: June 17. Grazed: 4 circuits, May 22-Oct 4.

Cut Grass 3rd year (Blocks 5 and 7). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 26, 1952. Cut: 5 times May 19, June 16, July 18, Sept 4 and Sept 26. Nitrochalk applied after each cut except the last.

Grazed Ley 3rd year (Blocks 5 and 7). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 26, 1952. Pre-grazing cut: May 10. Nitrochalk applied: June 27. Grazed: 4 circuits, May 26 to Sept 10.

Lucerne 3rd year (Blocks 5 and 7). Basal fertilizers applied: Dec 20, 1951. Cut: 3 times June 12, July 18 and Sept 9, 1952.

Reseeded grass 3rd year (Blocks 5, 7, 8, 9). Basal fertilizers applied: Dec 20, 1951. Nitrochalk applied: Mar 26, 1952. Pre-grazing cut: June 12. Nitrochalk applied: June 17. Grazed: 2 circuits, Aug 26-Sept 26.

Standard errors per $\frac{1}{4}$ plot

Wheat, grain. Highfield: 2.49 cwt per acre or 6.5% (13 d.f.)
Fosters: 0.83 cwt per acre or 2.3% (13 d.f.)

Potatoes, total tubers.
Highfield: 1.61 tons per acre or 12.8% (21 d.f.)
Fosters: 1.35 tons per acre or 10.7% (21 d.f.)

Barley, grain. Highfield: 2.34 cwt per acre or 8.3% (21 d.f.)
Fosters: 1.53 cwt per acre or 4.3% (21 d.f.)

https://doi.org/10.23637/ERADOC-1-178

Summary of Results

Wheat (1st Test Crop)

Grain: cwt per acre

cwt N per acre	Treatment crops for previous 3 years: Lucerne	Ley	Cut Grass	Arable with hay	Mean
		Highfield			
Mean (±0.88)	40.7	36.1	34.1	43.1	38.5
To Test Crop					
0.3 (±1.24)	42.6	37.0	37.0	44.0	40.1
0.6	38.9	35.2	31.1	42.3	36.9
Diff. (±1.76)	-3.7	-1.8	-5.9	-1.7	-3.2 (±0.88)
To Treatment Crops					
Single rate (±1.24)		35.7	34.4	43.2	37.8
Double rate		36.4	33.8	43.1	37.8
Diff. (±1.76)		+0.7	-0.6	-0.1	0.0 (±0.88)
		Fosters			
Mean (±0.29)	40.5	34.7	36.2	35.3	36.7
To Test Crop					
0.3 (±0.42)	40.1	33.5	35.8	33.6	35.8
0.6	41.0	35.8	36.5	37.1	37.6
Diff. (±0.59)	+0.9	+2.3	+0.7	+3.5	+1.8 (±0.29)
To Treatment Crops					
Single rate (±0.42)		34.8	36.5	35.1	35.5
Double rate		34.6	35.8	35.6	35.3
Diff. (±0.59)		-0.2	-0.7	+0.5	-0.2 (±0.29)

https://doi.org/10.23637/ERADOC-1-178

Wheat (1st Test Crop)

Straw: cwt per acre

cwt N per acre	Treatment crops for previous 3 years: Lucerne	Ley	Cut grass	Arable with hay	Mean
Highfield					
Mean	83.5	79.0	72.6	88.0	80.8
To Test Crop					
0.3	85.1	78.9	74.5	86.9	81.3
0.6	82.0	79.2	70.7	89.2	80.3
Diff.	-3.1	+0.3	-3.8	+2.3	-1.0
To Treatment Crops					
Single rate		77.8	72.2	87.3	79.1
Double rate		80.3	73.0	88.8	80.7
Diff.		+2.5	+0.8	+1.5	+1.6
Fosters					
Mean	74.7	68.7	65.4	61.7	67.6
To Test Crop					
0.3	73.5	67.0	62.8	58.7	65.5
0.6	75.8	70.4	68.0	64.7	69.7
Diff.	+2.3	+3.4	+5.2	+6.0	+4.2
To Treatment Crops					
Single rate		69.1	65.4	61.5	65.3
Double rate		68.3	65.4	61.9	65.2
Diff.		-0.8	0.0	+0.4	-0.1

https://doi.org/10.23637/ERADOC-1-178

Wheat (1st Test Crop)

Grain: cwt per acre

cwt N per acre	N: To previous treatment crop — Single rate	Double rate	Mean	Dung: tons per acre — To previous potato crop — None	12	Mean
Highfield						
To Test Crop	(±1.02)			(±1.76)		
0.3	39.2	39.4	39.3	44.9	43.1	44.0
0.6	36.3	36.1	36.2	42.1	42.5	42.3
Mean	37.8	37.8	37.8	43.5	42.8	43.1
	(±0.72)			(±1.24)		
To previous treatment crop				(±1.76)		
Single rate				43.0	43.4	43.2
Double rate				44.0	42.2	43.1
Mean				43.5	42.8	43.1
				(±1.24)		
Fosters						
To Test Crop	(±0.34)			(±0.59)		
0.3	35.0	33.6	34.3	35.4	31.9	33.6
0.6	35.9	37.1	36.5	36.6	37.5	37.1
Mean	35.5	35.3	35.4	36.0	34.7	35.3
	(±0.24)			(±0.42)		
To Previous treatment crop				(±0.59)		
Single rate				35.8	34.3	35.1
Double rate				36.2	35.1	35.6
Mean				36.0	34.7	35.3
				(±0.42)		

https://doi.org/10.23637/ERADOC-1-178

Wheat (1st Test Crop)

Straw: cwt per acre

cwt N per acre	N: To previous treatment crop: Single rate	N: To previous treatment crop: Double rate	N: Mean	Dung: tons per acre: To previous potato crop: None	Dung: tons per acre: To previous potato crop: 12	Dung: tons per acre: Mean
Highfield						
To Test Crop						
0.3	79.9	80.2	80.1	88.0	85.8	86.9
0.6	78.2	81.2	79.7	83.7	94.7	89.2
Mean	79.1	80.7	79.9	85.8	90.3	88.0
To previous treatment crop						
Single rate				85.1	89.4	87.3
Double rate				86.6	91.1	88.8
Mean				85.8	90.3	88.0
Fosters						
To Test Crop						
0.3	63.9	61.7	62.8	63.3	54.1	58.7
0.6	66.7	68.7	67.7	59.6	69.9	64.7
Mean	65.3	65.2	65.3	61.4	62.0	61.7
To previous treatment crop						
Single rate				62.1	60.9	61.5
Double rate				60.7	63.0	61.9
Mean				61.4	62.0	61.7

N. B. There are no pages numbered 52/Bc/1.11 and 12.

https://doi.org/10.23637/ERADOC-1-178

Potatoes (2nd Test Crop)

Dung: tons per acre	Highfield cwt N per acre 0.5	1.0	Mean	Fosters cwt N per acre 0.5	1.0	Mean
	Total tubers: tons per acre					
			(±0.402)			(±0.337)
None	11.32	12.31	11.81	11.51	11.91	11.71
		(±0.568)			(±0.447)	
12	12.60	13.88	13.24	13.48	13.66	13.57
Mean	11.96	13.09	12.53	12.49	12.79	12.64
		(±0.402)			(±0.337)	
	Percentage ware					
None	73.3	78.0	75.7	79.2	78.8	79.0
12	73.0	77.9	75.5	82.9	83.6	83.2
Mean	73.2	78.0	75.6	81.1	81.2	81.1

Barley (3rd Test Crop)

Dung to potatoes: tons per acre	Highfield cwt N per acre 0.2	0.4	Mean	Fosters cwt N per acre 0.2	0.4	Mean
	Grain: cwt per acre					
			(±0.58)			(±0.38)
None	27.2	26.4	26.8	34.5	35.6	35.1
		(±0.83)			(±0.54)	
12	30.5	29.0	29.8	35.4	36.5	35.9
Mean	28.9	27.7	28.3	34.9	36.1	35.5
		(±0.58)			(±0.38)	
	Straw: cwt per acre					
None	61.2	60.9	61.0	42.7	49.9	46.3
12	66.5	64.8	65.6	44.8	52.5	48.6
Mean	63.8	62.8	63.3	43.8	51.2	47.5

https://doi.org/10.23637/ERADOC-1-178

52/Bc/1.14

One Year Hay

Dry Matter: cwt per acre

	Nitrogen to 3 previous test crops		Dung to Potatoes 1950 tons per acre		
	Single rate	Double rate	0	12	Mean
Highfield					
Nitrogen to Hay					
0.3 cwt	66.0	65.3	67.3	64.0	65.6
0.6 cwt	68.4	64.4	63.7	69.1	66.4
N to test crop					
Single rate			65.8	68.6	67.2
Double rate			65.2	64.5	64.8
Mean			65.5	66.6	66.0
Fosters					
Nitrogen to Hay					
0.3 cwt	62.5	62.4	60.4	64.5	62.5
0.6 cwt	67.3	60.5	61.7	66.1	63.9
N to test crop					
Single rate			63.9	66.0	64.9
Double rate			58.3	64.7	61.5
Mean			61.1	65.3	63.2

https://doi.org/10.23637/ERADOC-1-178

52/Bc/1.15

Cut Grass

Dry Matter: cwt per acre

Nitrogen (1) to cut grass	Nitrogen to previous 3 test crops: Single rate	Nitrogen to previous 3 test crops: Double rate	Dung to potatoes 1950 tons per acre: 0	Dung to potatoes 1950 tons per acre: 12	Mean
1st year		Highfield			
Single rate	46.5	44.9	43.3	48.1	45.7
Double rate	44.5	47.9	46.0	46.4	46.2
N to test crops					
Single rate			43.6	47.5	45.5
Double rate			45.8	47.0	46.4
Mean			44.7	47.2	46.0

	N to cut grass (1) Single rate	N to cut grass (1) Double rate	Mean
2nd year (5 cuts)	56.4	63.1	59.8
3rd year (5 cuts)	49.2	57.4	53.3

Nitrogen (1) to cut grass	Nitrogen to previous 3 test crops: Single rate	Nitrogen to previous 3 test crops: Double rate	Dung to potatoes 1950: 0	Dung to potatoes 1950: 12	Mean
1st year		Fosters			
Single rate	11.7	10.0	11.0	10.7	10.8
Double rate	11.3	12.5	12.3	11.5	11.9
N to test crops					
Single rate			11.1	11.9	11.5
Double rate			12.2	10.3	11.2
Mean			11.7	11.1	11.4

	N to cut grass (1) Single rate	N to cut grass (1) Double rate	Mean
2nd year (5 cuts)	59.4	68.0	63.7
3rd year (5 cuts)	47.7	51.3	49.5

(1) 0.15 v. 0.3 cwt N as nitrochalk for every cut.

https://doi.org/10.23637/ERADOC-1-178

Ley

Dry Matter: cwt per acre

	Cutting (1) Nitrogen (2) Single rate	Double rate	Mean	Grazing from sampling cuts Nitrogen (2) Single rate	Double rate	Mean
Highfield						
1st year				34.2	37.2	35.7
2nd year	27.3	27.2	27.3	25.2	27.1	26.1
3rd year	26.1	28.9	27.5	19.9	21.5	20.7
Fosters						
1st year				18.2	18.6	18.4
2nd year	19.6	19.7	19.7	21.0	21.6	21.3
3rd year	16.4	18.2	17.3	22.6	23.4	23.0

(1) Preliminary before grazing
(2) The nitrogen applied is 0.15 v. 0.3 cwt per acre in all for the preliminary cut and the grazing

Reseeded Grass

Dry Matter: cwt per acre

	Cutting Nitrogen (3) Single rate	Double rate	Mean	Grazing from sampling cuts Nitrogen (3) Single rate	Double rate	Mean
Highfield						
4th year grazing (1)	30.4	34.0	32.2	21.8	21.8	21.8
2nd year grazing (1)	22.3	26.1	24.2	27.1	27.6	27.3
3rd year hay	65.4	68.8	67.1	15.9(2)	18.2(2)	17.0
Fosters						
4th year grazing (1)	18.2	19.7	18.9	22.3	25.0	23.6
2nd year grazing (1)	14.2	17.3	15.8	25.1	24.8	25.0
3rd year hay	47.4	52.3	49.8	12.1(2)	14.5(2)	13.3

(1) Preliminary cut before grazing
(2) Aftermath grazing
(3) N for preliminary cut and grazing 0.15 v. 0.3 cwt in all
N for preliminary cut and hay 0.15 v. 0.3 cwt
N for preliminary cut and aftermath 0.15 v. 0.3 cwt.

https://doi.org/10.23637/ERADOC-1-178

Permanent Grass

Dry Matter: cwt per acre

	Blocks	Cutting Nitrogen (3) Single rate	Double rate	Mean	Grazing from sampling cuts Nitrogen (3) Single rate	Double rate	Mean
		Highfield					
Grazing (1)	1-4	28.2	29.9	29.0	17.8	18.0	17.9
Grazing	9-12	11.2	12.6	11.9	25.7	27.7	26.7
Hay	5-8	50.1	54.6	52.4	13.2 (2)	14.5 (2)	13.9

(1) Preliminary cut before grazing (2) Aftermath grazing.
(3) N for preliminary cut and grazing 0.15 v. 0.3 cwt in all
N for preliminary cut and hay 0.15 v. 0.3 cwt
N for preliminary cut and aftermath 0.15 v. 0.3 cwt.

Lucerne

Dry Matter: cwt per acre

		Nitrogen to 3 previous test crops Single rate	Double rate	Mean	Nitrogen to 3 previous test crops Single rate	Double rate	Mean
1st Year (2 cuts)		Highfield			Fosters		
Dung to potatoes 1950	0	44.0	42.1	43.1	29.6	33.8	31.7
	12 tons	46.9	45.0	45.9	35.5	20.4	27.9
Mean		45.4	43.5	44.5	32.5	27.1	29.8
2nd year (3 cuts)		Mean = 81.5			Mean = 93.0		
3rd year (3 cuts)		Mean = 68.7			Mean = 102.9		

https://doi.org/10.23637/ERADOC-1-178

52/Bd/1.1

GREEN MANURING EXPERIMENT

Woburn Stackyard - 1952, the 16th year

For details of treatments etc. see "Results of Field Experiments 1939-47". Since 1950 the fallow, lupin and ryegrass plots of the cabbage crop have been split into two for early and late planting.

Cultivations, etc.:

Green manures. Clover and ryegrass undersown in barley: Apr 18, 1951. Ploughed fallow, lupin and rape plots: Sept 17, 1951 and Jan 6, 1952. Sulphate of ammonia applied: Apr 3. Rape sown: Apr 17. Lupins drilled: Apr 19. Rape dusted with D.D.T: Apr 26 and May 17.

Cabbages. Dung and straw applied to fallow, clover and ryegrass plots, and ploughed in: May 13, 1952. Dung and straw applied to lupin and rape plots, ploughed in: June 23. Basal fertilizers applied: June 24. Cabbages planted and watered in (calomel treated): June 24. Sprayed with Parathion: July 30 and Sept 5. Harvested: Nov 11, 1952 - Mar 18, 1953. Variety: January King.

Barley. Ploughed: Mar 20, 1952. Chalk (46 cwt per acre) applied: Mar 26. Sulphate of ammonia applied: Apr 15. Seed drilled at 3 bushels per acre: Apr 16. Clover and ryegrass undersown: Apr 17. Harvested: Aug 15. Variety: Plumage Archer.

Standard errors per plot:

Cabbages, weight of headed cabbages: 0.383 tons per acre or 28.3% (9 d.f.)

Barley, grain: 2.24 cwt per acre or 24.3% (9 d.f.)

Summary of Results

Cabbages

	Green Manure					
	None	Lupins	Clover	Rape	Rye-grass	Mean
Weight of headed cabbages: tons per acre						
			(±0.309)			(±0.138)
No Dung	1.40	1.62	3.14	0.11	1.38	1.53
Dung	3.31	2.30	4.39	1.59	2.64	2.85
No Straw	2.56	1.93	3.71	0.92	1.98	2.22
Straw	2.15	2.00	3.82	0.78	2.04	2.16
Sulph.amm.						
2 cwt per acre	2.27	1.56	3.54	0.74	1.53	1.93
4 cwt per acre	2.44	2.36	4.00	0.96	2.48	2.45
Sulph.amm.to green manure						
Low	2.09	1.70	4.22	0.67	1.86	2.11
High	2.62	2.22	3.32	1.03	2.16	2.27
Mean (±0.219)	2.36	1.96	3.77	0.85	2.01	2.19
Total produce: tons per acre						
No Dung	4.43	4.29	6.28	2.44	4.46	4.38
Dung	6.57	5.08	7.46	4.50	5.59	5.84
No Straw	5.68	4.70	6.70	3.62	5.06	5.15
Straw	5.32	4.66	7.04	3.32	4.99	5.07
Sulph.amm.						
2 cwt per acre	5.62	4.30	6.78	3.20	4.46	4.87
4 cwt per acre	5.38	5.06	6.95	3.74	5.58	5.34
Sulph.amm.to green manure						
Low	5.14	4.38	7.24	2.93	4.79	4.89
High	5.86	4.99	6.50	4.01	5.26	5.32
Mean	5.50	4.68	6.87	3.47	5.02	5.11

https://doi.org/10.23637/ERADOC-1-178

52/Bd/1.3

Cabbages

	Green Manure					
	None	Lupins	Clover	Rape	Rye-grass	Mean
Headed cabbages as percentage of total number						
No Dung	19.0	24.3	36.0	2.7	20.0	20.4
Dung	36.8	30.6	44.0	23.8	34.0	33.8
No Straw	29.6	27.8	40.6	14.6	25.8	27.7
Straw	26.1	27.0	39.4	11.9	28.2	26.5
Sulph.amm.						
2 cwt per acre	28.4	21.2	37.4	11.0	22.6	24.1
4 cwt per acre	27.3	33.7	42.6	15.4	31.4	30.1
Sulph.amm.to green manure						
Low	23.6	26.0	45.4	11.0	27.1	26.6
High	32.1	28.8	34.7	15.4	26.9	27.6
Mean	27.9	27.4	40.0	13.2	27.0	27.1

Differential Responses

Response to	Mean	Dung		Straw		Sulph.Amm. cwt per acre		Sulph.Amm. to green manure	
		Abs.	Pres.	Abs.	Pres.	2	4	Low	High
Weight of headed cabbages: tons per acre	(±0.196)			(±0.280)					
Dung	+1.31	-	-	+1.08	+1.54	+1.51	+1.11	+0.98	+1.64
Straw	-0.06	-0.29	+0.17	-	-	+0.23	-0.35	-0.42	+0.30
Sulph.amm.	+0.52	+0.72	+0.32	+0.81	+0.23	-	-	+0.87	+0.17
Sulph.amm.to green manure	+0.16	-0.17	+0.49	-0.20	+0.52	+0.51	-0.19	-	-
Total produce: tons per acre									
Dung	+1.46	-	-	+1.37	+1.55	+1.66	+1.26	+1.26	+1.66
Straw	-0.08	-0.17	+0.01	-	-	+0.26	-0.42	-0.44	+0.28
Sulph.amm.	+0.47	+0.67	+0.27	+0.81	+0.13	-	-	+0.66	+0.28
Sulph.amm.to green manure	+0.43	+0.23	+0.63	+0.07	+0.79	+0.62	+0.24	-	-
Headed cabbages as percentage of total number									
Dung	+13.4	-	-	+11.9	+14.9	+17.0	+9.8	+10.8	+16.0
Straw	-1.2	-2.7	+0.3	-	-	+2.8	-5.2	-6.3	+3.9
Sulph.amm.	+6.0	+9.6	+2.4	+10.0	+2.0	-	-	+9.6	+2.4
Sulph.amm.to green manure	+1.0	-1.6	+3.6	-4.1	+6.1	+4.6	-2.6	-	-

https://doi.org/10.23637/ERADOC-1-178

Barley

	Green Manure				
	None	Lupins	Clover	Rape	Rye-grass	Mean
Grain: cwt per acre					
			(±1.12)			(±0.50)
No Dung to cabbages 1951	7.0	8.7	10.3	10.3	9.8	9.2
Dung to cabbages	5.5	9.8	10.2	10.6	9.9	9.2
No Straw to cabbages 1951	5.6	9.0	10.0	10.8	8.9	8.9
Straw to cabbages	6.9	9.5	10.5	10.1	10.8	9.6
Sulph.amm.to cabbages 1951						
2 cwt per acre	7.0	9.2	10.2	10.4	8.6	9.1
4 cwt per acre	5.5	9.4	10.3	10.5	11.1	9.4
Sulph.amm. to barley						
Nil	5.0	7.1	11.1	9.3	7.1	7.9
1½ cwt per acre	7.5	11.4	9.5	11.6	12.6	10.5
Mean (±0.79)	6.2	9.3	10.3	10.5	9.9	9.2
Straw: cwt per acre						
No Dung to cabbages 1951	6.9	10.9	12.2	12.6	11.7	10.9
Dung to cabbages	7.6	12.0	16.3	13.4	13.5	12.5
No Straw to cabbages 1951	7.0	10.5	12.8	14.2	12.0	11.3
Straw to cabbages	7.5	12.4	15.7	11.8	13.1	12.1
Sulph.amm.to cabbages 1951						
2 cwt per acre	7.6	11.6	13.0	12.4	11.1	11.1
4 cwt per acre	6.9	11.3	15.5	13.6	14.0	12.3
Sulph.amm.to barley						
Nil	6.6	8.8	13.1	12.0	9.1	9.9
1½ cwt per acre	7.9	14.2	15.4	14.0	16.1	13.5
Mean	7.3	11.5	14.2	13.0	12.6	11.7

https://doi.org/10.23637/ERADOC-1-178

Barley

Differential Responses

Response to	Mean	Dung to Cabbages Abs.Pres.		Straw to Cabbages Abs.Pres.		Sulph. amm. to cabbages cwt per acre 2	4	Sulph. amm. to barley cwt per acre 0	$1\frac{1}{2}$
				Grain: cwt per acre					
	(±0.71)				(±1.01)				
Dung to cabbages 1951	0.0	-	-	+0.1	-0.1	+0.6	-0.6	-1.5	+1.5
Straw to cabbages 1951	+0.7	+0.8	+0.6	-	-	-0.4	+1.8	+1.4	0.0
Sulph.amm to cabbages 1951	+0.3	+0.9	-0.3	-0.8	+1.4	-	-	+0.8	-0.2
Sulph.amm to barley	+2.6	+1.1	+4.1	+3.3	+1.9	+3.1	+2.1	-	-
				Straw: cwt per acre					
Dung to cabbages 1951	+1.7	-	-	+1.4	+2.0	+1.6	+1.8	-0.9	+4.3
Straw to cabbages 1951	+0.8	+0.5	+1.1	-	-	-1.1	+2.7	+0.8	+0.8
Sulph.amm to cabbages 1951	+1.1	+1.0	+1.2	-0.8	+3.0	-	-	+1.2	+1.0
Sulph.amm. to barley	+3.6	+1.0	+6.2	+3.6	+3.6	+3.7	+3.5	-	-

https://doi.org/10.23637/ERADOC-1-178

52/Be/1.1

LEY AND ARABLE ROTATIONS

Woburn Stackyard - 1952 the 15th year.

For details of rotations and treatments etc., see "Results of Field Experiments 1939-47".

Cultivations, etc.:

Block I. Ley - first year. Ploughed: Sept 7, 1951 and again Jan 9, 1952. Basal fertilizers applied, seeds sown: Apr 17. Topped: June 6 and Aug 19. Grazed by sheep: 2 circuits - Aug 26-Sept 3 and Sept 19-24. Seeds mixture per acre: 21 lb S23 Perennial Ryegrass, 12 lb S143 Cocksfoot, 6 lb Late flowering Montgomery Red Clover, 3 lb S100 White Clover.

Lucerne - first year. Ploughed: Sept 7, 1951 and again Jan 9, 1952. Basal fertilizers applied, seed drilled at 28 lb per acre: Apr 17. Dusted with D.D.T: Apr 29 and again May 17. Cut twice: July 23 and Oct 2. Variety: Du Puits.

Potatoes. Ploughed: Sept 7, 1951 and again Jan 9, 1952. Ridged, basal fertilizers applied: Apr 17. Potatoes planted: Apr 19. Earthed up ridges: June 16. Sprayed with copper fungicide, 5 lb per acre: Aug 8 and again Sept 2. Sprayed with sulphuric acid, 15% B.O.V: Sept 22. Lifted: Oct 6. Variety: Majestic.

Block II. Ley - second year. Nitrochalk applied: June 26. Grazed by sheep: 6 circuits - May 9-17, May 31-June 9, June 17-25, July 8-16, Aug 18-26 and Sept 11-19.

Lucerne - second year. Cut three times: June 17, July 23 and Oct 2.

Rye. Ploughed: Oct 10, 1951. Seed drilled at 3 bushels per acre: Oct 26. Nitrochalk applied: Apr 25, 1952. Harvested: July 25. Variety: King II.

Block III. Barley. Ploughed: Jan 7. Ground chalk applied: Feb 29. Basal fertilizers applied: Mar 13. Seed drilled at 3 bushels per acre: Mar 14. Sprayed with M.C.P.A: May 22. Harvested: Aug 14. Variety: Plumage Archer.

Block IV. Ley - third year. Grazed by sheep: 6 circuits - May 1-9, 22-31, June 9-17, June 25-July 3, Aug 7-14 and Sept 3-11.

Lucerne - third year. Cut three times: June 17, July 23 and Oct 2.

Hay. Seeds undersown in Rye: Apr 19, 1951. 2 cwt nitrochalk per acre applied: Apr 17, 1952. First cut: June 6. 1 cwt nitrochalk applied: June 10. Second cut: Oct 2. Seeds mixture per acre: 27 lb S24 Perennial Ryegrass, 12 lb Montgomery Red Clover, 3 lb Canadian Alsike Clover.

Sugar beet. Ploughed: Sept 7, 1951 and Jan 9, 1952. Basal fertilizers applied, seed drilled at 18 lb per acre: Apr 18. Singled: May 30. Lifted: Oct 8. Variety: Klein E.

https://doi.org/10.23637/ERADOC-1-178

Block V. Potatoes. Ploughed: Oct 12, 1951 and Feb 1, 1952. Ridged, dung and basal fertilizers applied: Apr 23. Potatoes planted: Apr 25. Earthed up ridges: June 17. Sprayed with copper fungicide, 5 lb per acre: Aug 8 resprayed Aug 11 and Sept 2. Sprayed with sulphuric acid 15% B.O.V.: Sept 22. Lifted: Oct 6. Variety: Majestic.

Standard errors per plot:

Block III. Barley.

Grain, whole plot: 1.071 cwt per acre or 4.9% (4 d.f.)
sub plot: 0.740 cwt per acre or 3.4% (4 d.f.)

Block V. Potatoes.

Total tubers, whole plot: 0.990 tons per acre or 9.8% (4 d.f.)
sub plot: 1.355 tons per acre or 13.5% (4 d.f.)

Summary of Results

Ley. First year — Block I

	Sheep days of grazing per acre
Mean	339

Lucerne. First year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st Crop	2nd Crop	Total
No Dung	4.4	15.1	19.5
Dung in 1950	10.0	25.9	35.9
Mean	7.2	20.5	27.7
Increase	5.6	10.8	16.4
Previous rotation			
Lucerne	7.7	21.7	29.4
Arable with Hay	6.7	19.3	26.0

https://doi.org/10.23637/ERADOC-1-178

Block I

Potatoes

	Total tubers tons per acre	Percentage Ware
No Dung	4.26	81.6
Dung in 1950	6.48	88.1
Mean	5.37	84.9
Increase	2.22	6.5
Previous Rotation		
Ley	6.54	86.2
Lucerne	5.78	87.0
Arable with Hay	4.74	85.8
Arable with Sugar Beet	4.43	80.5

Block II

Ley. Second year

	Sheep days of grazing per acre
Mean	1962

Lucerne. Second year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st crop	2nd crop	3rd crop	Total
No Dung	36.1	16.6	16.1	68.8
Dung in 1949	29.8	15.8	16.7	62.3
Mean	33.0	16.2	16.4	65.6
Increase	-6.3	-0.8	+0.6	-6.5
Previous Rotation				
Lucerne	36.3	14.0	13.9	64.2
Arable with Sugar Beet	29.6	18.4	18.9	66.9

Block II

Rye

	Grain: cwt per acre	Straw: cwt per acre
No Dung	29.0	31.5
Dung in 1949	30.8	34.7
Mean	29.9	36.2
Increase	1.8	-3.0
Previous Rotation		
Ley	31.6	36.5
Lucerne	32.6	34.0
Arable with Hay	28.8	31.6
Arable with Sugar Beet	26.6	30.3

Block III

Barley

	Previous Rotation				
	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean
	Grain: cwt per acre				
No Dung (±0.84)(1)	23.6	22.2	14.1	16.8	19.2
Dung in 1951	25.8	26.4	21.8	23.0	24.2
Mean (±0.76)	24.7	24.3	17.9	19.9	21.7
Increase (±0.74)	2.2	4.2	7.7	6.2	5.0 (±0.37)
	Straw: cwt per acre				
No dung	25.2	22.1	13.7	18.6	19.9
Dung in 1951	29.7	30.5	22.3	26.3	27.2
Mean	27.5	26.3	18.0	22.4	23.5
Increase	4.5	8.4	8.6	7.7	7.3

Standard error (1) for use in comparisons other than vertical

https://doi.org/10.23637/ERADOC-1-178

Block IV

Ley. Third year

	Sheep days of grazing per acre
Mean	2089

Lucerne. Third year

Yield of Lucerne Hay (85% Dry Matter) cwt per acre

	1st crop	2nd crop	3rd crop	Total
No Dung	28.2	17.2	17.5	62.9
Dung in 1948	35.4	22.5	21.5	79.4
Mean	31.8	19.8	19.5	71.2
Increase	7.2	5.3	4.0	16.5
Previous rotation				
Lucerne	34.1	23.2	20.0	77.3
Arable with Hay	29.5	16.5	19.0	65.0

Hay

Yield (85% Dry Matter) cwt per acre

	1st crop	2nd crop	Total
No Dung	51.6	4.6	56.2
Dung in 1948	58.2	8.4	66.6
Mean	54.9	6.5	61.4
Increase	6.6	3.8	10.4
Previous Rotation			
Lucerne	52.7	10.0	62.7
Arable with Hay	57.1	3.0	60.1

https://doi.org/10.23637/ERADOC-1-178

Block IV

Sugar Beet

	Roots (washed) tons per acre	Tops tons per acre	Total sugar cwt per acre	Sugar Percentage
No Dung	12.62	7.16	48.0	19.04
Dung in 1948	14.99	7.76	56.0	18.68
Mean	13.80	7.46	52.0	18.86
Increase	+2.37	+0.60	+8.0	-0.36
Previous Rotation				
Ley	13.89	7.62	52.1	18.76
Arable with Sugar Beet	13.72	7.31	51.8	18.96

Block V

Potatoes

Previous Rotation

	Ley	Lucerne	Arable with hay	Arable with sugar beet	Mean	
	Total tubers: tons per acre					
No Dung (±0.974)(1)	10.46	7.42	7.19	6.54	7.90	
Dung in 1952	15.05	11.45	11.20	11.28	12.24	
Mean (±0.700)	12.75	9.44	9.19	8.91	10.07	
Increase (±1.36)	4.59	4.03	4.01	4.74	4.34	(±0.678)
	Percentage Ware					
No Dung	94.1	89.2	92.4	89.4	91.3	
Dung in 1952	94.0	94.2	92.5	94.2	93.7	
Mean	94.0	91.7	92.4	91.8	92.5	
Increase	-0.1	+5.0	+0.1	+4.8	+2.4	

Standard error (1) for use in comparisons other than vertical

52/Bf/1.1

WOBURN MARKET GARDEN EXPERIMENT

Organic manures and nitrochalk - Lansome 1952 the 11th year.

The present cropping comprises two series, each carrying in turn the crops of a two course rotation: 1st year - Globe beet followed by Spring cabbages; 2nd year - Leeks.

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

Area of each plot: 0.0125 acre.

Treatments applied to each crop:
Organic manures: Dung; sewage sludge compost; sewage sludge (West Middlesex); vegetable compost, each at 10 and 20 tons per acre.
Nitrochalk; None; 0.3 cwt N per acre on plots receiving organic manure. None; 0.3, 0.6, 0.9 cwt N per acre on plots not receiving organic manure. The last two rates are applied in two equal dressings.

Basal manuring per acre to each crop: 0.3 cwt P_2O_5; 0.3 cwt K_2O, applied as granular fertilizer (13% P_2O_5; 13% K_2O).

Cultivations, etc.:
Globe beet. Organic manures applied and ploughed in: Apr 1. Nitrochalk applied (first dressing to 0.6 and 0.9 N plots): Apr 23. Basal manure applied: Apr 25. Seed drilled at 13 lb per acre: Apr 26. Dusted against flea beetle: May 1-17. Singled: June 12. Second application of nitrochalk to 0.6 and 0.9 N plots: June 13. Lifted: July 11-Sept 24. Variety: Detroit.

Spring cabbages 1952-53. Organic manures applied and ploughed in: Sept 25, 1952. Basal manures applied: Sept 26. Cabbages planted (calomel treated) and watered in, 2½ cwt of 5% D.D.T. dust broadcast before planting: Sept 29. Owing to damage by birds cabbages had to be ploughed in: Mar 12, 1953. Variety: Durham Early.

Leeks 1952-53. Organic manures applied and ploughed in: July 8, 1952. Basal manures and nitrochalk applied (first dressing to 0.6 and 0.9 N plots): July 30. Leeks planted and watered in: Aug 5-7. Second dressing of nitrochalk to 0.6 and 0.9 N plots: Sept 12. Harvested: Feb 6-Apr 16, 1953. Variety: Musselburgh.

Standard errors per plot:
Globe beet, saleable bulbs: 1.29 tons per acre or 17.1% (17 d.f.)
Leeks, saleable produce: 0.470 tons per acre or 12.6% (17 d.f.)

https://doi.org/10.23637/ERADOC-1-178

Summary of Results

Globe Beet

Organic Manures	Level of manuring (tons per acre)	Nitrochalk, cwt N per acre: None	0.3	0.6	0.9	Mean
Saleable bulbs: tons per acre				(±0.911)		(±0.644)
None		1.59	4.88	7.63	4.24	3.24*
Dung	10	4.98	9.58			7.28
	20	9.74	9.60			9.67
Sludge compost	10	6.01	6.69			6.35
	20	7.06	9.56			8.32
Sludge	10	8.78	9.88			9.33
	20	8.37	8.18			8.27
Vegetable compost	10	7.30	8.60			7.95
	20	6.84	10.81			8.83
Mean (±0.322)		7.39†	9.11†			7.52
Total produce: tons per acre						
None		5.68	9.84	12.77	7.32	7.76*
Dung	10	7.73	14.06			10.89
	20	14.91	15.04			14.97
Sludge compost	10	11.11	9.92			10.52
	20	10.82	14.88			12.85
Sludge	10	14.00	16.88			15.44
	20	12.62	11.88			12.24
Vegetable compost	10	11.82	12.64			12.23
	20	9.97	16.03			13.00
Mean		11.62†	13.91†			11.99
Plant number: thousands per acre						
None		95.4	98.7	110.5	51.4	97.1*
Dung	10	60.1	93.0			76.5
	20	102.3	86.9			94.6
Sludge compost	10	113.4	61.2			87.3
	20	76.4	97.3			86.8
Sludge	10	100.2	130.2			115.2
	20	87.6	60.5			74.0
Vegetable compost	10	86.2	93.3			90.8
	20	64.5	102.6			83.5
Mean		86.6†	90.6†			88.7

* Mean over None and 0.3 cwt N per acre only.
† Excluding 'No organics'.

https://doi.org/10.23637/ERADOC-1-178

Leeks

Organic Manures	Level of manuring (tons per acre)	Nitrochalk, cwt N per acre: None	0.3	0.6	0.9	Mean
Saleable produce: tons per acre			(±0.332)			(±0.235)
None		1.94	3.09	3.52	2.93	2.52*
Dung	10	3.98	3.83			3.90
	20	4.44	5.03			4.73
Sludge compost	10	3.48	4.05			3.77
	20	3.71	4.01			3.86
Sludge	10	3.09	3.44			3.27
	20	3.24	3.30			3.27
Vegetable compost	10	4.10	4.20			4.15
	20	4.54	4.53			4.53
Mean (±0.117)		3.82†	4.05†			3.72
Percentage saleable (by number)						
None		87.1	92.9	93.5	92.2	90.0*
Dung	10	95.6	94.9			95.2
	20	97.1	97.6			97.4
Sludge compost	10	94.3	95.5			94.9
	20	95.7	95.6			95.7
Sludge	10	94.5	94.9			94.7
	20	93.1	94.7			93.9
Vegetable compost	10	98.1	95.7			96.9
	20	96.2	97.2			96.7
Mean		95.6†	95.8†			94.8

* Mean over None and 0.3 cwt N per acre only.
† Excluding 'No organics'.

https://doi.org/10.23637/ERADOC-1-178

52/Bg/1.1

IRRIGATION EXPERIMENT

The 2nd year

The effects of irrigation and nitrogen - Woburn Butt Close 1952.

The cropping comprises four series; three of these in turn carry the crops of a 3-course rotation:-

1st year: Early potatoes followed by winter cabbages
2nd year: Sugar beet
3rd year: Barley

The fourth series remains in long term grass for cutting.

System of replication: 3 randomized blocks of 4 plots each, plots being split into two for the application of nitrogen.

Area of each sub plot: Cut grass - 0.0264, remainder - 0.0278 acre.
Area harvested: Cut grass - 0.0264, early potatoes - 0.0155, winter cabbages - 0.0175, sugar beet - 0.0176, barley - 0.0168 acre.

Treatments: All combinations of:-
Whole plots. Irrigation:-

	Grass	Arable crops
0	None	None
C	Full irrigation	Full irrigation to maintain deficit at 1".
B	2/3 of C	None till mid-season, then as C.
A	1/3 of C	As C till mid-season, then none

The actual amounts applied are given below.

Sub plots. Nitrogen: 2 levels applied to crops as below.

Rainfall and Irrigation: inches

Week ending	Rain-fall	Irrigation: Early Potatoes A	B	C	Sugar beet A	B	C	Barley A	B	C	Cut Grass A	B	C
May 19	.08												
26	.40												
June 2	.30												.16
9	.19	1.00		1.00	.83		.83	1.09		1.09	.51	.85	.97
16	.62	.50		.50	.67		.68	.50		.50			.50
23	.29												
30	.00		.50	.50					.50	.50		.53	.53
July 7	.12		.75	.75	.50		.50						
14	.21				1.15		1.15		.81	.81	.53	.70	.80
21	.02					.52	.52				.56	.56	.52
28	.00					1.21	1.21				.25	.77	1.41
Aug 4	1.03												
11	1.51												
18	.27												
25	.38												
Sept 1	.00												
8	.90					.70	.70						.20
15	.50												
22	.25												
29	.53												
Total	7.60	1.50	1.25	2.75	3.15	2.43	5.59	1.59	1.31	2.90	1.85	3.41	5.09

Levels of nitrogen (in addition to N in basal dressing):

cwt per acre)

Early Potatoes:	None;	0.5	Applied as sulphate of ammonia
Winter Cabbages (after potatoes):	0.5;	1.0	Applied as nitrochalk
Sugar beet:	None;	0.4	Applied as nitrochalk
Barley:	None;	0.2	Applied as nitrochalk
Cut grass:	0.15;	0.30	Applied as nitrochalk after each cut

Basal manurings: cwt per acre

	As compound fertilizer N	P_2O_5	K_2O	Salt
Early potatoes	0.5	0.5	0.75	None
Winter cabbages (after potatoes)		None		None
Sugar beet	0.4	0.4	0.6	None
Barley	0.2	0.2	0.3	5.0
Cut grass (yearly)	None	0.6	0.6	None

In addition 18 cwt carbonate of lime per acre was applied after early potatoes.

https://doi.org/10.23637/ERADOC-1-178

Cultivations, etc.:

Early potatoes. Ploughed: Sept 20 and again Dec 17, 1951. Potatoes planted by machine: Apr 10, 1952. Ridged: Apr 12. Fertilizers applied: Apr 18. Earthed up ridges: Apr 29. Lifted: July 10. Variety: Ulster Chieftain.

Winter cabbages. 19 cwt chalk per acre applied: July 11, 1952. Irrigated all plots ready for planting, planted cabbages and watered in: July 21. Sprayed with Parathion: Aug 12 and again Sept 8. Variety: January King. The crop was a failure, mainly owing to bird damage.

Sugar beet. Fertilizers applied, seed drilled at 18 lb per acre: Apr 18. Singled: May 26. Lifted: Nov 20. Variety: Klein E.

Barley. Fertilizers applied: Mar 12. Seed drilled at 3 bushels per acre: Mar 14. Harvested: Aug 12. Variety: Plumage Archer.

Cut grass. Basal fertilizers applied: Mar 21. Cut: Apr 29, May 19, June 16, July 9 and Aug 11. Nitrochalk applied after each cut except the last.

Standard errors per plot:

Early potatoes.	Total tubers,	whole plot	0.506 tons per acre or	6.3% (6 d.f.)
		sub plot	0.446 tons per acre or	5.6% (8 d.f.)
Sugar beet.	Total sugar,	whole plot	4.85 cwt per acre or	3.4% (6 d.f.)
		sub plot	1.88 cwt per acre or	3.3% (8 d.f.)
	Tops,	whole plot	0.690 tons per acre or	6.5% (6 d.f.)
		sub plot	0.940 tons per acre or	8.9% (8 d.f.)
Barley.	Grain,	whole plot	2.27 cwt per acre or	9.8% (6 d.f.)
		sub plot	1.95 cwt per acre or	8.4% (8 d.f.)
Cut grass (total of 5 cuts)	Hay (85% D.M.)	whole plot	5.59 cwt per acre or	6.6% (6 d.f.)
		sub plot	6.21 cwt per acre or	7.3% (8 d.f.)

Summary of Results

cwt N per acre	Irrigation 0	A	B	C	Mean
Early Potatoes, total tubers: tons per acre					
			(±0.344)*		
0	6.05	8.08	6.72	9.74	7.65
0.5	6.20	8.89	7.43	10.88	8.35
Mean (±0.292)	6.12	8.49	7.08	10.31	8.00
Difference (±0.364)	0.15	0.31	0.71	1.14	0.70 (±0.182)

*for use in comparisons other than vertical.

cwt N per acre	Irrigation 0	A	B	C	Mean
Sugar beet, roots (washed): tons per acre					
0	12.90	16.11	16.36	15.85	15.43
0.4	15.06	15.60	17.37	16.52	16.14
Mean	13.98	15.86	17.11	16.18	15.78
Difference	+2.16	-0.51	+0.51	+0.67	+0.71
Sugar beet, sugar percentage					
0	18.22	18.39	18.27	18.20	18.27
0.4	18.41	17.97	18.15	18.04	18.14
Mean	18.31	18.18	18.21	18.12	18.21
Difference	+0.19	-0.42	-0.12	-0.16	-0.13
Sugar beet, total sugar: cwt per acre (±2.90)*					
0	47.1	59.3	61.6	57.7	56.4
0.4	55.5	56.2	63.1	59.6	58.6
Mean (±2.80)	51.3	57.7	62.3	58.7	57.5
Difference (±1.53)	+8.4	-3.1	+1.5	+1.9	+2.2 (±0.77)
Sugar beet, tops: tons per acre (±0.553)*					
0	8.14	9.80	10.65	10.11	9.67
0.4	10.32	11.29	12.71	11.58	11.48
Mean (±0.398)	9.23	10.54	11.68	10.85	10.58
Difference (±0.768)	+2.18	+1.49	+2.06	+1.47	1.81 (±0.384)
Sugar beet, noxious nitrogen: mg. per 100 g.					
0	25.0	26.7	26.7	26.7	26.2
0.4	25.0	25.0	26.7	25.0	25.4
Mean	25.0	25.8	26.7	25.8	25.8
Difference	0.0	-1.7	0.0	-1.7	-0.8

*for use in comparisons other than vertical.

cwt N per acre	Irrigation 0	A	B	C	Mean
Barley, grain: cwt per acre					
			(±1.53)*		
0	21.7	18.8	21.7	22.7	21.2
0.2	23.1	23.3	26.3	27.2	25.0
Mean (±1.31)	22.4	21.1	24.0	25.0	23.1
Difference (±1.59)	1.4	4.5	4.6	4.5	3.8 (±0.80)
Barley, straw: cwt per acre					
0	25.2	23.3	24.6	25.6	24.7
0.2	27.9	27.2	32.8	34.3	30.6
Mean	26.5	25.3	28.7	30.0	27.6
Difference	2.7	3.9	3.2	8.7	5.9
Cut grass, hay at 35% D.M. 7 cuts: cwt per acre					
after each cut			(±4.10)*		
0.15	63.1	76.1	93.3	97.8	82.6
0.30	66.2	83.0	95.0	103.5	86.9
Mean (±3.23)	64.6	79.6	94.2	100.7	84.8
Difference (±5.07)	3.1	6.9	1.7	5.7	4.3 (±2.54)

*for use in comparisons other than vertical.

Winter Cabbages. Crop failed.