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Numerical Results of the Field Experiments 1969

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69/R/RN/1&2 - Ley and Arable Rotations - Old Grass, Leys, Oats, Wheat, Potatoes & Barley

Rothamsted Research

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LEY AND ARABLE ROTATIONS

(69/R/RN/1 and 69/R/RN/2)

Highfield and Fosters Field 1969, the 21st year.

For details of treatments, rotations, etc. see 'Details' 1967 and 'Results' 68/B/1.

Revised NPK dressings to wheat (2nd, 4th and 5th test crops):

Basal dressings: 0.4 cwt P205, 0.4 cwt K20 broadcast by drill before ploughing and 0.5 cwt P205, 0.5 cwt K20 combine drilled. Both dressings as (0:20:20).

Nitrogen: 2nd test crop: 0.0 (N0), 0.4 (N1), 0.8 (N2), 1.2 (N3) cwt N as 'Nitro-Chalk' to 1/8th plots in spring.

4th and 5th test crops: 0.6 (N1), 1.0 (N2), 1.4 (N3), 1.8 (N4) cwt N as 'Nitro-Chalk' to 1/4 plots in spring.

All-grass leys, reseeded (RN) and permanent (GN) grass: The NK dressings for each cut are now applied as (25:0:16) plus muriate of potash, since (16:0:16) is unobtainable. The amounts of N and K applied remain the same.

3rd year lucerne: This crop was poor and weedy and was destroyed after the second cut. The plots were then fallowed.

Corrective K dressings, as muriate of potash, to 1st test crop potatoes were ploughed in in autumn 1968 as follows (in cwt K20):-

Rotation	Highfield	Fosters
AH	7.4	4.7
LU	4.3	4.6
LC	0.2	None
LN	5.4	4.9
R (AH since 1963)	7.0	6.1
GC	Not corrected	
GN	3.4	

Varieties: Potatoes, 1st test crop: King Edward.

Barley, 3rd test crop: Maris Badger.

Winter wheat, all wheat test crops: Joss Cambier.

Oats, 3rd treatment crop: Manod.

NOTE: Rat-damage on Highfield made it necessary to resow wheat as follows: all plots of the 4th test crop, one block of the 5th test crop and plots 61 and 62 (following all-grass ley) of the 2nd test crop. (Yields from plots 61 and 62 were calculated using a 'missing plot' technique).

HIGHFIELD

3rd year Treatment Crops:

All-grass ley: Basal PK compound applied: 13 Nov, 1968. NK compound and muriate of potash applied: 5 Mar, 1969. Cut three times: 2 June, 16 July, 19 Sept. NK compound and muriate of potash applied after first two cuts.

Clover-grass ley: Basal PK compound applied: 13 Nov, 1968. Muriate of potash applied: 5 Mar, 1969. Cut three times: 2 June, 16 July, 19 Sept. Muriate of potash applied after first two cuts.

Lucerne: Basal PK compound applied: 13 Nov, 1968. Sprayed with paraquat at 2 lb ion in 32 gals: 13 Dec. Cut once for yield: 6 June, 1969. Cut: 8 July. Sprayed with paraquat at 0.75 lb ion in 50 gals. Rotary cultivated: 15 July, 9 Sept.

Oats: Ploughed: 6 Feb, 1969. 'Nitro-Chalk' applied, seed combine drilled at 160 lb: 26 Mar. Sprayed with ioxynil at 7.5 oz and mecoprop at 22.5 oz in 20 gals: 20 May. Combine harvested: 19 Aug.

1st Test Crop. Potatoes:-

Corrective K applied: 29 Oct, 1968. Ploughed: 19 Nov. All fertilisers applied: 22 - 28 Apr, 1969. FYM applied, all plots rotary cultivated, potatoes machine planted: 30 Apr. Sprayed with paraquat at 0.375 lb ion plus linuron at 0.75 lb in 37 gals: 20 May. Grubbed: 18 June. Earthed up: 26 June. Sprayed with mancozeb three times at 1.2 lb in 37 gals, the second time including demeton-s-methyl at 3.5 oz: 15 July, 4 Aug, 21 Aug. Sprayed with undiluted BOV at 15 gals: 26 Sept. Haulm destroyed mechanically: 2 Oct. Lifted: 9 Oct.

2nd Test Crop. Wheat:-

Basal PK compound applied, deep-tine cultivated: 14 Oct, 1968. Seed combine drilled at 170 lb: 15 Oct. Plots 61 and 62 (following all-grass ley) resown at

170 lb: 14 Nov. 'Nitro-Chalk' applied: 18 Apr, 1969. Sprayed with mecoprop at 42 oz and 2,4-D at 10.5 oz in 20 gals: 1 May. Combine harvested: 28 Aug.

3rd Test Crop. Barley:-

Ground chalk applied: 4 Nov, 1968. Ploughed: 22 Nov. Seed combine drilled at 140 lb: 10 Mar, 1969. 'Nitro-Chalk' applied: 1 Apr. Sprayed with mecoprop at 36 oz and 2,4-D at 9 oz in 20 gals: 13 May. Combine harvested: 21 Aug.

4th Test Crop. Wheat:-

Basal PK compound applied: 6 Sept, 1968. Ploughed: 14 Sept. Seed combine drilled at 170 lb: 14 Oct. All plots resown at 170 lb: 13 Nov. 'Nitro-Chalk' applied: 18 Apr, 1969. Sprayed with mecoprop at 42 oz and 2,4-D at 10.5 oz in 20 gals: 1 May. Combine harvested: 28 Aug.

5th Test Crop. Wheat:-

Basal PK compound applied: 6 Sept, 1968. Ploughed: 19 Sept. Seed combine drilled at 170 lb: 14 Oct. Plots 049 - 060 (the whole of block 5) resown at 170 lb: 13 Nov. 'Nitro-Chalk' applied: 18 Apr, 1969. Sprayed with mecoprop at 42 oz and 2,4-D at 10.5 oz in 20 gals: 1 May. Combine harvested: 28 Aug.

Permanent grasses:-

The 21st experimental year permanent (old) grass, blocks 1, 2 and 4, the 21st year reseeded grass, blocks 1 and 4. Ground chalk applied to blocks 1 and 4: 4 Nov, 1968. Basal PK compound applied: 13 Nov. NK compound and muriate of potash applied to 'all grass' half plots, muriate of potash to 'clover grass' half plots: 5 Mar, 1969. Cut three times: 2 June, 16 July, 19 Sept. NK compound and muriate of potash applied to 'all grass' half plots and muriate of potash to 'clover grass' half plots after each cut except the last.

FOSTERS

3rd year Treatment Crops:-

All-grass ley: Basal PK compound applied: 13 Nov, 1968. NK compound and muriate of potash applied: 5 Mar, 1969. Cut three times: 2 June, 16 July, 19 Sept. NK compound and muriate of potash applied after first two cuts.

Clover-grass ley: Basal PK compound applied: 13 Nov, 1968.

Muriate of potash applied: 5 Mar, 1969. Cut three times: 2 June, 16 July, 19 Sept. Muriate of potash applied after first two cuts.

Lucerne: Basal PK compound applied: 13 Nov, 1968. Sprayed with paraquat at 2 lb ion in 32 gals: 13 Dec. Cut twice for yield: 6 June, 8 July. Sprayed with paraquat at 0.75 lb ion in 50 gals: 9 July. Rotary cultivated: 15 July, 9 Sept.

Oats: Ploughed: 30 Jan, 1969. 'Nitro-Chalk' applied, seed combine drilled at 160 lb: 26 Mar, 1969. Sprayed with ioxynil at 7.5 oz and mecoprop at 22.5 oz in 20 gals: 20 May. Combine harvested: 19 Aug.

1st Test Crop. Potatoes:-

Corrective K applied: 29 Oct, 1968. Ploughed: 19 Nov. All fertilisers applied: 21 - 28 Apr, 1969. FYM applied, all plots rotary cultivated, potatoes machine planted: 30 Apr. Sprayed with paraquat at 0.375 lb ion plus linuron at 0.75 lb in 37 gals: 20 May. Grubbed: 18 June. Earthed up: 26 June. Sprayed with mancozeb three times at 1.2 lb in 37 gals, the second time including demeton-s-methyl at 3.5 oz: 15 July, 4 Aug, 21 Aug. Sprayed with undiluted BOV at 15 gals: 26 Sept. Haulm destroyed mechanically: 2 Oct. Lifted: 9 Oct.

2nd Test Crop. Wheat:-

Basal PK compound applied, plots deep-tine cultivated: 14 Oct, 1968. Seed combine drilled at 170 lb: 15 Oct. 'Nitro-Chalk' applied: 17 Apr, 1969. Sprayed with mecoprop at 42 oz and 2,4-D at 10.5 oz in 20 gals: 3 May. Combine harvested: 25 Aug.

3rd Test Crop. Barley:-

Ploughed: 22 Nov, 1968. Seed combine drilled at 140 lb: 10 Mar, 1969. 'Nitro-Chalk' applied: 1 Apr. Sprayed with mecoprop at 36 oz and 2,4-D at 9 oz in 20 gals: 13 May. Combine harvested: 21 Aug.

4th Test Crop. Wheat:-

Basal PK compound applied: 6 Sept, 1968. Ploughed: 13 Sept. Seed combine drilled at 170 lb: 14 Oct. 'Nitro-Chalk' applied: 17 Apr, 1969. Sprayed with mecoprop at 42 oz and 2,4-D at 10.5 oz in 20 gals: 3 May. Combine harvested: 25 Aug.

5th Test Crop. Wheat:-

Basal PK compound applied: 6 Sept, 1968. Ploughed: 19 Sept.
Seed combine drilled at 170 lb: 14 Oct. 'Nitro-Chalk'
applied: 17 Apr, 1969. Sprayed with mecoprop at 42 oz
and 2,4-D at 10.5 oz in 20 gals: 3 May. Combine harvested:
25 Aug.

Permanent grasses:-

The 21st year reseeded grass, blocks 1 and 3. Basal PK compound
applied: 13 Nov, 1968. NK compound and muriate of potash
applied to 'all grass' half plots, and muriate of potash to
'clover grass' half plots: 5 Mar, 1969. Cut three times:
2 June, 16 July, 19 Sept. NK compound and muriate of potash
applied to 'all grass' half plots and muriate of potash to
'clover grass' half plots after each cut except the last.

POTATOES 1ST TEST CROP

TOTAL TUBERS: TONS

HIGHFIELD

	1966 - 68					1950 - 68			
	IU	LC	LN	AH	R*	Mean	GC	GN	Mean
Mean	19.23	19.25	17.57	16.23	19.21	18.30	17.24	18.37	17.80
F	18.98	18.81	17.41	15.26	18.94	17.88			
D	19.48	19.69	17.73	17.20	19.48	18.71			
NO	17.54	16.90	14.87	12.05	16.93	15.66	12.45	15.57	14.01
N1	19.46	19.25	17.25	16.57	18.53	18.21	17.45	18.30	17.88
N2	19.78	21.24	18.99	17.18	20.92	19.62	18.23	18.72	18.47
N3	20.14	19.60	19.18	19.12	20.46	19.70	20.82	20.87	20.84
PO	19.24	19.22	17.44	15.86	19.25	18.20	17.26	18.72	17.99
P1	19.22	19.28	17.71	16.60	19.18	18.40	17.22	18.01	17.61
KO	19.25	19.54	17.43	16.19	19.12	18.31	17.44	17.90	17.67
K1	19.21	18.96	17.71	16.27	19.30	18.29	17.03	18.83	17.93

* R 1952 - 61 then AH

POTATOES 1ST TEST CROP

% WARE

HIGHFIELD

	1966 - 68					1950 - 68			
	LU	LC	LN	AH	R*	Mean	GC	GN	Mean
Mean	94.1	95.5	94.5	93.4	93.6	94.2	94.6	94.6	94.6
F	94.2	95.7	94.5	93.1	93.6	94.2			
D	94.0	95.3	94.4	93.8	93.6	94.2			
NO	93.9	95.2	93.8	91.2	93.1	93.4	94.5	94.1	94.3
N1	94.8	95.7	94.4	93.6	93.6	94.4	94.3	94.5	94.4
N2	93.6	96.4	95.0	94.1	93.4	94.5	95.0	95.9	95.5
N3	94.0	94.9	94.7	94.8	94.1	94.5	94.5	93.9	94.2
PO	94.2	95.6	94.8	93.4	93.9	94.4	94.8	94.7	94.7
P1	93.9	95.5	94.2	93.5	93.2	94.1	94.4	94.5	94.4
KO	93.9	95.5	94.9	93.7	93.9	94.4	95.2	94.7	94.9
K1	94.2	95.5	94.1	93.1	93.2	94.0	93.9	94.5	94.2

* R 1952 - 61 then AH

POTATOES 1ST TEST CROP

TOTAL TUBERS: TONS

FOSTERS

1966 - 68

	LU	LC	LN	AH	R*	Mean
Mean	16.56	16.39	16.16	14.46	16.37	15.99
F	16.16	15.70	15.75	13.89	16.31	15.56
D	16.96	17.07	16.58	15.03	16.43	16.41
NO	14.20	14.45	13.83	10.37	13.40	13.25
N1	16.89	16.39	16.04	14.31	16.25	15.98
N2	17.35	17.75	17.25	16.21	17.28	17.17
N3	17.80	16.95	17.53	16.96	18.55	17.56
PO	16.41	16.07	15.74	14.42	16.16	15.76
P1	16.71	16.70	16.59	14.50	16.58	16.22
KO	16.73	16.30	16.32	14.32	16.31	15.99
K1	16.39	16.48	16.00	14.61	16.43	15.98

* R 1952 - 61 then AH

POTATOES 1ST TEST CROP

% WARE

FOSTERS

1966 - 68

	IJ	LC	LN	AH	R*	Mean
Mean	92.8	93.0	93.1	92.8	93.3	93.0
F	92.9	92.6	93.5	92.5	93.2	93.0
D	92.6	93.4	92.7	93.0	93.5	93.0
NO	92.8	93.5	93.6	92.0	92.5	92.9
N1	93.0	92.9	93.3	91.9	93.9	93.0
N2	92.6	93.1	92.7	93.4	94.0	93.1
N3	92.6	92.7	92.8	93.7	93.0	93.0
PO	93.1	92.7	93.1	92.4	93.3	92.9
P1	92.4	93.4	93.2	93.2	93.4	93.1
KO	92.9	93.4	93.2	92.3	93.4	93.0
K1	92.6	92.7	93.0	93.2	93.2	93.0

* R 1952 - 61 then AH

SUMMARY OF RESULTS
 WHEAT 2ND TEST CROP
 GRAIN: CWT
 HIGHFIELD

		1965 - 67					1950 - 67				
	Mean	IU	LC	LN	AH	Mean	IC	RN	GC	GN	Mean
Mean	58.7	58.8	59.4	56.6	58.4	64.7	64.2	62.5	62.2	63.4	
1969											
N0	47.8	51.3	47.8	42.2	47.3	56.5	56.7	52.7	57.5	55.9	
N1	60.5	57.6	58.4	54.5	57.8	68.2	67.7	65.3	63.3	66.1	
N2	64.5	63.1	65.3	63.1	64.0	68.0	67.4	67.5	62.3	66.3	
N3	62.0	63.3	65.9	66.5	64.4	65.9	65.0	64.5	65.6	65.3	
1968											
F	59.0	58.2	57.3	55.0	57.4						
D	58.4	59.4	61.4	58.2	59.4						
1968											
N0	55.1	55.3	54.6	52.8	54.5	67.4	57.0	54.5	61.8	60.2	
N1	55.5	60.5	58.8	56.1	57.7	63.1	66.8	67.6	59.4	64.2	
N2	60.7	58.8	61.4	57.8	59.7	59.4	68.4	65.2	63.8	64.2	
N3	63.5	60.7	62.7	59.7	61.7	68.8	64.7	62.7	63.8	65.0	

Mean D.M. % (All plots): 80.8

WHEAT 2ND TEST CROP

GRAIN: CWT

FOSTERS

	1965 - 67				1950 - 67			Mean
	LU	LC	LN	AH	Mean	RC	RN	
Mean	67.6	63.7	63.3	60.3	63.7	64.3	68.9	66.6
1969								
NO	58.0	53.6	51.5	43.1	51.6	58.1	60.3	59.2
N1	70.9	66.6	62.5	57.7	64.4	63.6	72.4	68.0
N2	71.3	67.5	70.5	68.1	69.4	67.7	74.1	70.9
N3	70.0	66.8	68.6	72.4	69.5	67.7	68.7	68.2
1968								
F	66.1	63.5	62.4	59.3	62.8			
D	69.0	63.8	64.2	61.4	64.6			
1968								
NO	67.2	62.4	63.0	60.3	63.2	62.1	61.8	62.0
N1	67.1	64.1	60.3	58.3	62.4	61.3	73.4	67.3
N2	67.4	63.3	64.9	61.8	64.3	64.5	73.1	68.8
N3	68.5	64.9	65.0	61.0	64.8	69.3	67.2	68.3

Mean D.M. % (All plots): 81.8

BARLEY 3RD TEST CROP

GRAIN: CWT

1964 - 1966

	LU	LC	LN	AH	Mean
HIGHFIELD					
Mean	46.9	44.5	42.5	39.9	43.5
1969					
NO	44.5	40.9	39.7	34.9	40.0
N1	46.5	46.0	42.2	36.5	42.8
N2	48.5	43.9	44.9	43.1	45.1
N3	48.2	47.3	43.3	45.0	46.0
1968					
F	45.5	42.7	40.8	38.4	41.8
D	48.4	46.4	44.3	41.3	45.1

Excluding AH

1969

1968	NO	N1	N2	N3	Mean
F	39.7	42.0	43.9	46.3	43.0
D	43.8	47.8	47.6	46.3	46.4

Mean D.M. %: 79.6

BARLEY 3RD TEST CROP

GRAIN: CWT

1964 - 1966

	LU	LC	LN	AH	Mean
FOSTERS					
Mean	47.6	45.9	45.2	45.5	46.1
1969					
NO	41.6	40.7	37.4	36.0	38.9
N1	47.9	45.3	45.4	-	-
N2	50.0	48.6	49.4	48.8	49.2
N3	51.0	49.1	48.5	49.2	49.4
N4	-	-	-	48.0	-
1968					
F	47.0	44.5	45.0	46.1	45.6
D	48.3	47.4	45.4	44.9	46.5

Excluding AH
1969

1968	NO	N1	N2	N3	Mean
F	37.7	45.2	48.8	50.2	45.5
D	42.2	47.3	49.9	48.9	47.1

Mean D.M. %: 79.3

WHEAT 4TH TEST CROP

GRAIN: CWT

HIGHFIELD

1951 - 68

1963 - 65

	IU	IC	IN	AH	Mean	FC	RN	GC	GN	Mean
N1	22.0	44.5	38.5	37.3	35.5	51.0	41.6	45.1	49.7	46.8
N2	36.0	47.8	39.8	39.7	40.8	35.6	51.0	46.8	41.2	43.7
N3	33.0	44.7	41.9	38.9	39.6	44.8	49.1	29.8	46.7	42.6
N4	34.3	43.7	40.0	40.0	39.5	42.4	49.4	47.0	33.3	43.0
Mean	31.3	45.2	40.0	39.0	38.9	43.4	47.8	42.2	42.7	44.0

Mean D.M. %: 82.1

WHEAT 4TH TEST CROP

GRAIN: CWT

FOSTERS

	1963 - 65					1951 - 68		
	LU	LC	LN	AH	Mean	RC	RN	Mean
N1	57.7	56.8	58.2	55.4	57.0	53.5	56.9	55.2
N2	61.0	57.7	64.2	63.8	61.7	54.5	54.0	54.2
N3	60.9	59.5	64.4	63.2	62.0	53.2	58.3	55.7
N4	59.2	59.0	63.0	62.8	61.0	56.6	50.3	53.5
Mean	59.7	58.2	62.4	61.3	60.4	54.5	54.9	54.7

Mean D.M. %: 83.2

WHEAT 5TH TEST CROP

GRAIN: CWT

HIGHFIELD

	1962-64					1950-64					1950-67		
	IU	LC	LW	AH	R	Mean	GC	GN	Mean	GC	GN	Mean	
Mean	41.5	45.6	42.8	46.5	51.3	45.5	49.2	53.0	51.1	49.2	53.0	51.1	
N1	41.9	46.3	41.9	43.5	51.7	45.1	56.7	54.6	55.7	56.7	54.6	55.7	
N2	41.2	45.5	43.7	48.2	51.1	45.9	49.1	56.2	52.7	49.1	56.2	52.7	
N3	42.7	47.1	40.8	48.5	52.3	46.3	46.8	49.0	47.9	46.8	49.0	47.9	
N4	40.1	43.5	44.6	45.7	50.2	44.8	44.0	52.2	48.1	44.0	52.2	48.1	
F	40.7	45.6	44.2	45.4	50.9	45.4							
D	42.2	45.7	41.3	47.6	51.8	45.7							

Mean D.M. % (all plots): 81.9

WHEAT 5TH TEST CROP

GRAIN: CWT

FOSTERS

1962 - 64

1950 - 64

	IU	LC	LN	AH	R	Mean
Mean	64.7	64.1	64.5	62.7	61.4	63.5
N1	64.9	64.2	61.2	59.3	59.7	61.9
N2	64.1	67.1	68.2	62.4	63.0	65.0
N3	66.0	63.1	64.8	64.2	62.3	64.1
N4	63.9	61.7	63.7	65.0	60.4	63.0
F	64.3	63.8	64.7	61.1	61.8	63.2
D	65.1	64.3	64.3	64.3	60.9	63.8

Mean D.M. %: 83.1

RESEEDED GRASS, DRY MATTER: CWT

	HIGHFIELD			FOSTERS		
	Blocks	RC	RN	Blocks	RC	RN
21st Exptl year	1 & 4	39.9	71.2	1 & 3	38.7	65.6

PERMANENT GRASS, DRY MATTER: CWT

	GC	GN

HIGHFIELD

21st Exptl year

Blocks 1 and 4	30.2	68.3
Block 2	31.4	70.5

(C) Clover-grass management

(N) All-grass management

Errata to 'Results' 1967 page 67/B/1.15

Left-hand columns

For 17th exptl year read 19th exptl year Blocks 1 & 4

18th exptl year read 17th exptl year Blocks 9 & 12

19th exptl year read 18th exptl year Blocks 6 & 7

LEY AND ARABLE ROTATIONS

(69/W/RN/3)

Woburn Stackyard, 1969 - 32nd year.

For history, treatments, etc., see 'Details' 1967 and 'Results' 68/E/2.

Corrective K dressings (in cwt K₂O) as muriate of potash applied to first test-crop barley.

	No FYM	FYM
Continuous rotations	half plots	half plots
Ley	1.5	0
Sainfoin	3.5	2.5
Arable with hay	4	3.5
Arable	3	3
Alternating rotations (last two rotations, in order).		
Arable/ley	2	2
Arable with hay/sainfoin	3	2
Lucerne/Arable with hay	4	4
Ley/Arable	3	3

Treatments to potatoes:

1. Fumigant on quarter plots: None (O), 400 lb (F) Chloropicrin.
2. Nitrogen on twelfth plots: 1.0 (N₂), 1.5 (N₃), 2.0 (N₄) cwt N as 'Nitro-Chalk'.
3. Fumigant on twenty fourth plots: None (O) 10 lb (T) Temik.

Treatments to rye:

Residues of fumigant applied to potatoes in 1968 on quarter plots: None (O), 400 lb (F) chloropicrin.

Management of ley:

The 1st and 2nd years leys are no longer grazed but are cut and carted off. The 3rd year ley is still grazed.

Cultivations, etc.:

Treatment crops.

Ley 1st year: Ploughed: 15 Oct, 1968. Mg applied: 25 Mar, 1969.
NPK applied: 14 Apr. Seed sown at 40 lb: 16 Apr. NK applied: 1 Aug. Cut twice: 1 Aug, 4 Sept.

QATS
GRAIN: CWT
HIGHFIELD

AH	R	Mean
36.8	43.1	40.0

Mean D.M. %: 81.4

FOSTERS

45.7	48.0	46.9
------	------	------

Mean D.M. %: 81.7