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## Yields of the Field Experiments 1988

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### 88/R/BK/1 Broadbalk - W. Wheat, Potatoes

#### Rothamsted Research

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88/R/BK/1

**BROADBALK**

**Object:** To study the effects of organic and inorganic manures on continuous w. wheat. From 1968 two three-year rotations were included: potatoes, beans, w. wheat and fallow, w. wheat, w. wheat. In 1979 the first rotation was changed to fallow, potatoes, w. wheat. In 1980 the second rotation reverted to continuous w. wheat. Since 1985 part of the second rotation has been added to the first to extend the rotation to fallow, potatoes, w. wheat, w. wheat, w. wheat.

The 145th year, w. wheat, fallow, potatoes.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-87/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00311
	1	0.00572
	3,4,5 and 6	0.00473
	9	0.00497
Potatoes:	2	0.00348

**Treatments:**

Whole plots

PLOT	Fertilizers and organic manures:-			
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K (Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17N1+3FH	17	N2 (A)	N2 1/2 (P K (Na) Mg)	N1+3 1/2 (PK Mg) +
18N0+3FH	18	P K Na Mg (A)	N2 1/2 (P K (Na) Mg)	N0+3 1/2 (PK Mg) +
19C	19	C	C	C
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

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+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Potatoes receive N3 1/2 (PK Mg) on both Plots 17 and 18.

N1,N2,N3,N4,N5,N6: 48, 96, 144, 192, 240, 288 kg N (as sulphate of ammonia until 1967, except N\* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1968 to 1985, as 'Nitram' since 1986.)

N0+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring

P: 35 kg P as single superphosphate until 1987, triple superphosphate since and in 1974

K: 90 kg K as sulphate of potash

Na: 55 kg Na as sulphate of soda

(Na): 16 kg Na as sulphate of soda until 1973

Mg: 30 kg Mg annually to Plot 14, 35 kg Mg every third year to other plots since 1974. All as kieserite since 1974, previously as sulphate of magnesia annually

D: Farmyard manure at 35 tonnes

C: Castor meal to supply 96 kg N

F: P K (Na) Mg      H: Half rate

Strips of sub plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing on strips of sub plots. From 1968, ten sub plots were started with the following cropping:-

SECTION	Section	68	69	76	77	78	79	80	81	82	83	84	85	86	87	88
0/W37B	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1/W22B	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
POTATOES	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F	P
3/W1B	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W
3/W1S	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W
4/W3B	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W
5/W2B	5	W	F	W	W	F	W	W	W	W	W	W	W	F	P	W
6/W11B	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
6/W11S	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
-	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F
-	8+	W	W	W	W	W	W	W	F	W	W	W	W	W	W	F
9/W30B	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
9/W30S	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

W = w. wheat, P = potatoes, BE = s. beans, F = fallow

\* Straw incorporated since 1987. \*\* No sprays except weedkillers since 1985. + No weedkillers.

B = Brimstone, S = Squareheads Master

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**NOTES:** (1) For a fuller record of treatments see 'Details' etc.  
(2) Since autumn 1975, chalk is applied at 2.9 t each autumn to sets of Sections on a three-year cycle.  
Year 1: Sections 1,2,3. Year 2: Sections 6,7,8 and 9.  
Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.

**Standard applications:**

W. wheat: Weedkillers: Fluroxypyr at 0.20 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg in 200 l. Diclofop-methyl at 1.1 kg with fluroxypyr at 0.15 kg in 260 l. Fungicides (not applied to section 6): Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 260 l applied with the growth regulator. Propiconazole at 0.12 kg and tridemorph at 0.25 kg with the pirimicarb in 200 l. Carbendazim at 0.25 kg and maneb at 1.6 kg with propiconazole at 0.12 kg in 200 l. Insecticide (not applied to section 6): Pirimicarb at 0.14 kg. Growth regulator (not applied to section 6): Chlormequat chloride at 1.3 kg.  
Potatoes: Weedkiller: Linuron at 1.6 kg in 260 l. Fungicides: Mancozeb at 1.4 kg on five occasions, on the first two with the pirimicarb. Manganese zinc ethylene bisdithiocarbamate at 1.4 kg in 200 l. Fentin hydroxide at 0.27 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg.

**Seed:** W. wheat: Brimstone (sections 3, 4, 5, 6 and 9 only, dressed fonofos) and Squareheads Master, both sown at 180 kg.  
Potatoes: Pentland Crown.

**Cultivations, etc.:-**

All Sections:

Triple superphosphate, sulphate of potash, sulphate of soda, kieserite, castor meal and FYM applied: 28 Sept, 1987. Ploughed: 30 Sept.

Cropped Sections:

W. wheat: Straw chopped (section 0): 9 Sept, 1987. Autumn N treatment applied: 28 Sept. Rotary harrowed, Brimstone seed sown: 5 Nov. Rotary harrowed, Squareheads Master seed sown: 6 Nov. Spring N treatments applied: 8 Apr, 1988. Fluroxypyr, clopyralid and bromoxynil applied: 26 Apr. Growth regulator with prochloraz and carbendazim applied (except to section 6), diclofop-methyl with fluroxypyr applied: 6 May. Propiconazole with tridemorph and pirimicarb applied (except to section 6): 6 June. Carbendazim, maneb and propiconazole applied (except to section 6): 23 June. Combine harvested Brimstone (except section 9): 5 Sept. Combine harvested Brimstone (section 9) and Squareheads Master: 6 Sept.  
Potatoes: N treatments applied: 7 Apr, 1988. Heavy spring-tine cultivated, rotary harrowed, potatoes planted: 8 Apr. Rotary ridged: 25 Apr. Weedkiller applied: 5 May. Mancozeb with pirimicarb applied: 15 June, 30 June. Manganese zinc ethylene bisdithiocarbamate applied: 8 July. Mancozeb applied: 18 July, 1 Aug, 15 Aug. Fentin hydroxide applied: 30 Aug. Haulm mechanically destroyed: 5 Sept. Lifted: 15 Sept.  
Fallow: Heavy spring-tine cultivated: 29 Apr, 1988. Cultivated with rotary grubber: 13 May, 13 June. Ploughed: 15 July. Disced and rolled: 29 July. Ploughed: 1 Aug.

88/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SECTION PLOT	3/W1B	3/W1S	5/WB2	4/W3B	6/W11B	6/W11S	1/W22B	9W30B	9W30S	0/W37B
01DN4PK	9.25	*	8.16	7.59	6.52	*	*	*	*	*
21DN2	9.52	*	7.90	7.41	7.07	*	8.01	7.51	*	6.84
22D	6.49	*	3.91	3.43	2.46	*	4.10	5.19	*	3.61
030	2.87	1.98	0.85	0.87	0.73	0.73	0.68	0.35	0.80	0.73
05F	2.90	2.27	0.92	0.99	0.99	0.56	0.86	0.28	0.65	0.46
06N1F	5.58	4.62	3.42	4.33	3.51	1.97	2.88	3.35	2.71	4.48
07N2F	7.95	5.84	6.02	6.41	4.79	2.68	4.10	4.26	3.91	5.32
08N3F	8.49	5.26	5.29	6.67	5.19	3.06	5.60	5.92	4.43	5.77
09N4F	8.46	6.06	6.29	7.08	4.86	3.06	6.53	5.30	4.28	5.98
10N2	7.36	4.88	3.56	4.92	2.78	2.23	2.46	1.63	1.55	1.77
11N2P	6.27	5.10	4.29	5.05	3.09	2.14	2.62	1.29	0.74	1.57
12N2PNA	6.83	5.45	3.81	4.70	3.70	2.67	3.55	1.36	1.76	3.65
13N2PK	7.30	5.65	3.82	5.07	3.74	2.93	4.87	4.76	3.12	5.03
14N2PKMG	7.96	5.84	5.26	5.46	4.97	2.97	5.90	3.85	3.07	5.33
15N5F	8.23	5.75	7.13	6.73	4.29	3.38	6.60	5.58	4.29	6.41
16N6F	7.98	4.98	7.10	6.66	5.00	3.11	6.71	6.90	4.35	3.65
17N1+3FN	8.94	6.44	6.80	6.92	5.75	3.25	7.03	6.66	4.36	6.58
18N0+3FN	8.86	5.72	7.12	6.72	5.70	3.23	6.63	6.08	4.08	6.50
19C	5.21	4.11	1.30	2.93	0.69	1.39	2.18	0.55	1.49	1.74
20NKMG	*	*	*	*	*	*	1.32	*	*	1.59

GRAIN MEAN DM% 82.3

STRAW TONNES/HECTARE

\*\*\*\*\* Tables of means \*\*\*\*\*

SECTION PLOT	3/W1B	3/W1S	1/W22B
01DN4PK	7.88	*	*
21DN2	7.96	*	5.84
22D	3.06	*	3.56
030	0.95	1.49	0.40
05F	0.93	1.87	0.48
06N1F	2.86	5.02	2.73
07N2F	5.26	7.93	3.43
08N3F	6.17	9.10	3.48
09N4F	6.55	7.53	5.05
10N2	3.31	5.50	1.85
11N2P	3.26	4.85	2.13
12N2PNA	4.00	5.50	1.68
13N2PK	4.88	7.90	3.09
14N2PKMG	4.84	7.25	3.20
15N5F	6.44	9.23	4.67
16N6F	6.88	9.20	5.06
17N1+3FN	6.54	8.34	4.11
18N0+3FN	6.45	8.92	4.11
19C	2.20	3.95	2.24
20NKMG	*	*	1.09

STRAW MEAN DM% 84.7

88/R/BK/1 POTATOES

\*\*\*\*\* Tables of means \*\*\*\*\*

PLOT	TOTAL TUBERS	% WARE
	TONNES/ HECTARE	3.81 CM (1.5 INCH) RIDDLE
01DN4PK	52.0	92.0
21DN2	48.6	90.0
22D	37.0	90.3
030	11.4	80.5
05F	17.8	86.1
06N1F	33.6	84.2
07N2F	40.4	87.9
08N3F	54.9	95.9
09N4F	49.2	93.9
10N2	8.4	66.3
11N2P	8.5	45.6
12N2PNA	12.3	62.4
13N2PK	27.0	79.8
14N2PKMG	43.5	89.2
15N5F	51.1	96.4
16N6F	51.6	96.1
17N1+3FH	27.1	92.7
18N1+3FH	36.7	94.5
19C	16.8	87.7