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Yields of the Field Experiments 1997

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Experiments - Classics

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97/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, in 1996 the fallow was replaced by w.oats and potatoes replaced by maize in 1997.

The 154th year, w. wheat, w.oats and forage maize.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1978, Part 2, Station Report for 1982, Part 2, pp. 5-44 and 74-96/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00351
	1	0.00645
	4,5,6 and 7	0.00533
	8 and 9	0.00561
Oats:	2	0.00533
Maize:	3	0.00162

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
17N0+3FH	17	N2 (A)	N2 1/2 (P K (Na) Mg)	N0+3 1/2 (PK Mg)+
18N1+3FH	18	P K Na Mg (A)	N2 1/2 (P K (Na) Mg)	N1+3 1/2 (PK Mg)+
19(C)	19	C	C	(C) (since 1989)
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg
(A) Alternating				

97/R/BK/1

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

W. oats; Nitrogen and dung were not applied.

N1,N2,N3,N4,N5,N6: 48, 97, 144, 192, 240, 288 kg N as sulphate of ammonia until 1977, except N* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1978 to 1985, as 34.5% N 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 triple superphosphate in 1974 and since 1988, single superphosphate in other years

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 t

(C): Castor meal to supply 97 kg N until 1988, none since

F: P K (Na) Mg H: Half rate

Strips of sub-plots: Until 1977 wheat alone was grown on the experiment, with some bare fallowing. From 1978, ten strips of sub-plots (sections) were started with the following cropping:-

SECTION	1/W31	9/W39	0/W46	8/W3	6/W20	5/W1	3/M	7/W3	4/W2	2/O
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W
1970	W	W	W	W	W	W	F	W	BE	P
1971	W	W	W	W	F	W	W	P	W	BE
1972	W	W	W	W	W	F	W	BE	P	W
1973	W	W	W	W	W	W	F	W	BE	P
1974	W	W	W	W	F	W	W	P	W	BE
1975	W	W	W	W	W	F	W	BE	P	W
1976	W	W	W	W	W	W	F	W	BE	P
1977	W	W	W	W	F	W	W	P	W	BE
1978	W	W	W	W	W	F	W	BE	P	W
1979	W	W	W	W	W	W	F	W	P	F
1980	W	W	W	W	W	W	W	F	W	P
1981	W	W	W	F	W	W	W	P	F	W
1982	W	W	W	W	W	W	W	W	P	F
1983	W	W	W	W	W	W	W	F	W	P
1984	W	W	W	W	W	W	W	P	F	W
1985	W	W	W	W	W	F	W	W	P	W
1986	W	W	W	W	W	P	F	W	W	W
1987	W	W	W	W	W	W	P	W	W	F
1988	W	W	W	F	W	W	W	F	W	P

97/R/BK/1

SECTION	1/W31	9/W39	0/W46	8/W3	6/W20	5/W1	3/M	7/W3	4/W2	2/O
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W
1995	W	W	W	W	W	F	W	W	P	W
1996	W	W	W	W	W	P	O	W	W	W
1997	W	W	W	W	W	W	M	W	W	O

W = w. wheat, O = w. oats, P = potatoes, BE = s. beans, F = fallow,
M = forage maize

* Straw incorporated since autumn 1986. ** No sprays except weedkillers since 1985. + No weedkillers.

- NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) From autumn 1975 to autumn 1986, chalk was applied at 2.9 t each autumn to all plots in sets of Sections on a three-year cycle. Year 1: Sections 1,2,3. Year 2: Sections 6,7,8,9. Year 3: Sections 0,4,5. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1,3. Year 2: Sections 2,8. Year 3: Sections 7,9. Year 4: Sections 4,6. Year 5: Sections 0,5. None applied since autumn 1991.

Experimental diary:

All sections:

- 25-Sep-96 : T : PK Na and Mg applied.
- 28-Sep-96 : B : Ploughed and furrow pressed.
- 14-Oct-96 : B : Rotary harrowed.

Cropped sections:

W. wheat:

- 20-Aug-96 : T : Straw chopped (section 0 only), straw baled (sections 1, 2, 3, 4, 6, 7, 8 and 9).
- 26-Sep-96 : T : Autumn N treatment applied.
- 27-Sep-96 : T : Farmyard manure applied.
- 15-Oct-96 : T : Rotary harrowed, Hereward, dressed Beret Gold and Fonophos Seed Treatment at 380 seeds per m².
- 02-Apr-97 : T : Topik at 125 ml with Sprayprover at 1.0 l in 200 l (except section 8).
- 10-Apr-97 : T : MSS Optica at 2.5 l in 300 l (except section 8).
- : T : Barclay Holdup at 2.3 l in 300 l (except section 6).
- 11-Apr-97 : T : Spring N treatments applied.
- 01-May-97 : T : Barclay Eyetak at 0.9 l in 200 l (except section 6).
- 29-May-97 : T : Starane 2 at 0.5 l in 300 l (except section 8).
- 30-May-97 : T : Folicur at 0.5 l with Pointer at 0.5 l in 300 l (except section 6).
- 09-Jul-97 : T : Hand rogued wild oats.
- 01-Sep-97 : T : Combine harvested.

97/R/BK/1

Experimental diary:

W. oats:

20-Aug-96 : T : Wheat straw baled.
 16-Oct-96 : T : Rotary harrowed, Image, dressed Anchor, drilled at 350 seeds per m².
 17-Oct-96 : T : Tribunil at 2.25 kg in 200 l.
 22-May-97 : T : Radar at 0.5 l with Stefes CCC 700 at 2.3 l in 300 l.
 20-Aug-97 : T : Combine harvested.

Forage Maize:

20-Aug-96 : T : Oat straw baled.
 27-Sep-96 : T : Farmyard manure applied.
 16-Apr-97 : T : Scythe LC at 3.0 l with Vassgro Non-ionic at 200 ml in 200 l.
 23-Apr-97 : T : Spring N treatments applied, heavy spring-tine cultivated, rotary harrowed, Hudson, dressed Mesurol, drilled at 11 seeds per m².
 09-Jun-97 : T : Barclay Mutiny at 1.5 l in 300 l.
 17-Sep-97 : T : Hand harvested.

NOTE: Samples of wheat grain and straw from sections 1, 5, 6 and 9, samples of oat grain and straw and whole crop maize were taken for chemical analysis. Unground grain and straw and maize samples from selected treatments were archived.

W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	5/W1	4/W2	7/W3	8/W3	6/W20	1/W31	9/W39	0/W46
01DN4PK	9.18	9.56	9.27	*	8.21	*	*	*
21DN2	9.57	8.38	8.04	5.67	7.44	7.88	7.82	6.70
22D	9.44	5.65	5.14	4.18	5.73	5.61	4.47	4.30
030	4.52	0.71	0.63	1.31	0.91	1.03	0.77	1.06
05F	2.59	0.67	0.68	2.17	0.99	1.01	0.91	0.96
06N1F	6.17	3.05	2.65	2.47	3.07	2.95	3.11	2.77
07N2F	8.62	5.76	4.95	3.77	5.11	5.63	5.17	5.17
08N3F	9.56	6.89	6.76	5.00	6.74	6.96	6.59	6.58
09N4F	9.61	7.89	7.72	6.02	6.91	7.12	7.37	7.61
10N2	7.82	4.19	2.56	2.09	2.25	2.59	2.54	2.68
11N2P	7.43	5.20	5.22	1.53	2.54	3.07	2.66	4.41
12N2PNA	7.77	5.49	5.20	3.32	4.33	3.71	3.61	5.06
13N2PK	8.46	5.59	5.30	3.96	5.07	5.29	5.62	5.34
14N2PKMG	7.99	5.39	5.25	4.19	5.39	5.31	5.81	5.34
15N5F	9.40	8.87	8.98	3.79	8.30	8.47	7.83	8.12
16N6F	9.23	8.91	8.97	3.97	8.03	8.46	8.83	8.28
17N0+3FH	9.12	8.06	7.65	4.64	7.77	7.70	7.31	7.67
18N1+3FH	9.41	8.06	7.76	5.13	8.02	7.61	7.33	7.68
19(C)	4.68	0.99	0.58	2.09	1.12	1.93	1.29	1.67
20N2KMG	*	*	*	*	*	1.87	*	2.10

GRAIN MEAN DM% 83.2

97/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION PLOT	5/W1	6/W20	1/W31	9/W39
01DN4PK	3.88	*	*	*
21DN2	4.40	3.95	4.84	3.07
22D	5.33	3.47	3.53	2.67
030	2.07	0.60	0.49	0.14
05F	1.54	0.57	0.69	0.37
06N1F	3.17	1.36	1.33	1.31
07N2F	3.81	1.89	2.26	1.73
08N3F	4.08	2.23	2.86	1.87
09N4F	3.78	2.29	2.72	2.28
10N2	2.91	*	1.16	*
11N2P	2.42	*	1.00	*
12N2PNA	2.91	*	1.00	*
13N2PK	3.13	*	1.87	*
14N2PKMG	3.30	*	1.63	*
15N5F	4.37	2.89	3.22	2.44
16N6F	4.19	2.85	3.80	3.16
17N0+3FH	4.29	*	3.09	*
18N1+3FH	4.21	*	2.82	*
19 (C)	2.32	*	0.82	*
20N2KMG	*	*	1.08	*

STRAW MEAN DM% 87.3

97/R/BK/1 W. OATS

GRAIN TONNES/HECTARE

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

PLOT	GRAIN	STRAW
01DN4PK	7.53	6.18
21DN2	7.14	4.76
22D	7.24	5.12
030	1.32	0.43
05F	1.80	0.74
06N1F	1.81	0.65
07N2F	2.23	0.94
08N3F	2.73	1.19
09N4F	2.79	1.37
10N2	2.24	1.04
11N2P	2.44	0.98
12N2PNA	2.34	0.84
13N2PK	1.97	0.93
14N2PKMG	1.86	0.71
15N5F	5.14	2.94
16N6F	6.71	3.62
17N0+3FH	3.70	2.19
18N1+3FH	2.18	0.89
19 (C)	1.85	0.84

GRAIN MEAN DM% 86.8

STRAW MEAN DM% 77.5

NOTE: Dung and nitrogen treatments are residual from previous wheat.

97/R/BK/1 MAIZE

WHOLE CROP (100% DM) TONNES/HECTARE

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

PLOT	WHOLE CROP
01DN4PK	16.36
21DN2	17.45
22D	17.53
030	3.64
05F	4.79
06N1F	11.85
07N2F	14.86
08N3F	18.62
09N4F	18.50
10N2	5.77
11N2P	6.46
12N2PNA	8.73
13N2PK	15.52
14N2PKMG	14.97
15N5F	15.85
16N6F	18.72
17N0+3FH	15.81
18N1+3FH	16.35
19(C)	5.44

CROP MEAN DM% 36.1

97/R/HB/2

HOOS BARLEY

Object: To study the effects of organic and inorganic manures on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised. The rotation was discontinued in 1979 and continued in s. barley.

The 146th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-96/R/HB/2.

Treatments: All combinations of:-

Whole plots

1. **MANURE** Plot Fertilizers and organic manures:

		Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980
---	11	None	-	-
-P-	21	None	P	-
--K	31	None	K(Na)Mg	-
-PK	41	None	PK(Na)Mg	-
A--	12	A	-	-
AP-	22	A	P	-
A-K	32	A	K(Na)Mg	-
APK	42	A	PK(Na)Mg	-
N----	131	N	-	-
NP---	231	N	P	-
N-K--	331	N	K(Na)Mg	-
NPK--	431	N	PK(Na)Mg	-
N--S-	134	N	Si	Si omitted
NP-S-	234	N	P Si	"
N-KS-	334	N	K(Na)MgSi	"
NPKS-	434	N	PK(Na)MgSi	"
N---S	132	N	-	Si added
NP--S	232	N	P	"
N-K-S	332	N	K(Na)Mg	"
NPK-S	432	N	PK(Na)Mg	"
N--SS	133	N	Si	-
NP-SS	233	N	P Si	-
N-KSS	333	N	K(Na)MgSi	-
NPKSS	433	N	PK(Na)MgSi	-
C(--)	14	C	-	PKMg omitted
C(P-)	24	C	P	"
C(-K)	34	C	K(Na)Mg	"
C(PK)	44	C	PK(Na)Mg	"
D	72	None	D	-
(D)	71	None	(D)	-
(A)	62	None	(Ashes)	-
-	61	None	-	-

97/R/HB/2

Form of N: A, sulphate of ammonia: N, nitrate of soda - each to supply 48 kg N: C, castor meal to supply 97 kg N
 P: 35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years
 K: 90 kg K as sulphate of potash
 (Na): 16 kg Na as sulphate of soda until 1973
 Mg: 35 kg Mg, as kieserite every third year since 1974 (sulphate of magnesia annually until 1973)
 Si: Silicate of soda at 450 kg
 D: Farmyard manure at 35 t. (D): until 1871 only
 (Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

Sub-plots

2. N Nitrogen fertilizer (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):

0
 48
 96
 144

Plus extra plots testing all combinations of:-

Whole plots

1 MANURE Fertilizers other than magnesium:

55AN2PK	Plot 55	AN2PK
56--PK	Plot 56	--PK
57NN2--	Plot 57	NN2
58NN2--	Plot 58	NN2

N2: 96 kg N as 'Nitro-Chalk' since 1968. Other symbols as above.

Sub-plots

2. MAGNESIUM Magnesium fertilizer (kg Mg) as kieserite every third year since 1974:

0
 35

NOTE: For a fuller record see 'Details' etc.

97/R/HB/2

Experimental diary:

02-Sep-96 : B : Straw baled.
26-Nov-96 : T : P applied.
04-Dec-96 : T : K applied.
05-Dec-96 : T : Si applied.
17-Dec-96 : T : Farmyard manure applied.
19-Dec-96 : B : Ploughed.
10-Mar-97 : B : Spring-tine cultivated.
11-Mar-97 : B : Rotary harrowed, Cooper, dressed Baytan Flowable, drilled
at 350 seeds per m².
12-Mar-97 : B : Rolled.
24-Apr-97 : T : N applied.
22-May-97 : B : MSS Optica at 2.0 l with Vindex at 1.0 l in 300 l.
01-Jul-97 : B : Hand rogued wild oats.
22-Jul-97 : B : Hand rogued wild oats.
22-Aug-97 : B : Combine harvested.

NOTE: Samples of grain and straw were taken from selected plots for chemical analysis. Some unground samples were archived.

97/R/HB/2 MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	1.89	1.73	1.93	2.18	1.93
-P-	1.89	2.74	2.03	2.01	2.17
--K	2.19	3.07	3.48	3.22	2.99
-PK	2.10	3.84	4.96	5.02	3.98
A--	1.71	2.08	2.18	1.88	1.96
AP-	1.43	0.97	0.70	1.49	1.15
A-K	1.82	2.54	2.67	2.44	2.37
APK	2.24	3.77	4.94	4.95	3.98
N----	1.90	2.33	2.71	2.51	2.36
NP----	2.33	1.99	2.24	2.38	2.24
N-K--	2.08	2.59	3.41	3.17	2.81
NPK--	2.36	4.33	5.49	5.03	4.30
N--S-	2.22	3.05	3.72	4.27	3.31
NP-S-	2.60	3.56	3.50	2.54	3.05
N-KS-	2.22	4.07	4.26	3.82	3.59
NPKS-	2.54	4.31	5.51	5.34	4.43
N---S	2.44	3.58	3.71	3.59	3.33
NP--S	2.15	3.31	3.79	3.54	3.20
N-K-S	2.67	4.07	3.75	4.33	3.70
NPK-S	2.39	4.31	5.52	5.62	4.46
N--SS	2.22	3.50	3.71	3.63	3.26
NP-SS	2.60	3.10	3.37	3.37	3.11
N-KSS	2.61	3.94	4.33	4.41	3.82
NPKSS	2.40	4.37	5.15	5.35	4.32
C(--)	2.36	3.59	4.05	3.67	3.42
C(P-)	2.33	3.59	3.64	2.91	3.12
C(-K)	2.12	3.78	4.53	4.36	3.70
C(PK)	2.23	4.16	4.81	4.88	4.02
D	6.73	6.61	6.83	6.51	6.67
(D)	2.32	3.74	3.80	5.42	3.82
(A)	2.23	3.02	3.84	3.07	3.04
-	1.95	2.48	2.83	2.50	2.44
Mean	2.35	3.38	3.79	3.73	3.31

GRAIN MEAN DM% 85.8

97/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.62	0.71	0.89	1.33	0.89
-P-	0.55	1.13	0.88	0.89	0.86
--K	0.69	1.71	1.64	1.57	1.40
-PK	0.58	1.63	2.13	2.46	1.70
A--	0.58	0.89	0.73	0.51	0.68
AP-	0.44	0.39	0.34	0.62	0.45
A-K	0.70	1.29	1.21	1.51	1.18
APK	0.58	1.62	1.94	2.24	1.60
D	3.25	3.58	4.34	3.90	3.77
(D)	0.79	1.63	1.70	2.69	1.70
(A)	0.69	1.14	1.46	1.04	1.08
-	0.67	1.19	1.33	1.50	1.17
Mean	0.84	1.41	1.55	1.69	1.37

STRAW MEAN DM% 88.2

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	4.52	1.19	3.46	2.67	2.96
35	4.74	1.31	3.16	2.70	2.98
Mean	4.63	1.25	3.31	2.68	2.97

GRAIN MEAN DM% 87.5

97/R/WF/3

WHEAT AND FALLOW

Object: To study the effects of fallowing on unmanured w. wheat - Hoosfield.

The 142nd year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-96/R/WF/3.

Whole plot dimensions: 9.0 x 211.

Treatments:

Each year there are two plots, one is sown to w. wheat, one is fallow; they alternate in successive years.

Experimental diary:

Wheat plot:

05-Oct-96 : T : Ploughed.

16-Oct-96 : T : Heavy spring-tine cultivated, spring-tine cultivated, Hereward, dressed Beret Gold and Fonofos Seed Treatment, drilled at 380 seeds per m².

17-Mar-97 : T : Topik at 1.25 l with Sprayprover at 1.0 l in 200 l.

10-Jun-97 : T : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.

14-Aug-97 : T : Combine harvested.

Fallow plot:

05-Oct-96 : T : Ploughed.

15-Apr-97 : T : Heavy spring-tine cultivated.

08-Jul-97 : T : Thistle barred.

14-Aug-97 : T : Thistle barred.

NOTE: A sample of unground grain and straw was archived.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	2.01	1.16

MEAN DM%	85.7	92.4
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PLOT AREA HARVESTED	0.023232
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97/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1876-1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley up to 1991, w. wheat since - Hoosfield.

The 142nd year, w. wheat.

For previous years see 'Details' 1977, 1973 and 74-96/R/EX/4.

Treatments: All combinations of:-

Whole plots (P test)

- | | |
|------------|--|
| 1. OLD RES | Residues of manures applied annually 1876-1901: |
| O | None |
| D | Farmyard manure at 35 t |
| N | 97 kg N as ammonium salts |
| P | 34 kg P as superphosphate |
| NPKNAMG | N and P as above plus 137 kg K as sulphate of potash,
16 kg Na as sulphate of soda, 11 kg Mg as sulphate of
magnesia |
| 2. P RES | Residues of phosphate (kg P) applied annually from
1986, as single superphosphate in 1986 and 1987,
triple superphosphate from 1988 until 1992, none
since: |
| O | None |
| P1 | 44 |
| P2 | 87 |
| P3 | 131 |

plus

Whole plots (K test, previously N test until 1991)

- | | |
|---------|--|
| OLD RES | Residues of manures applied annually 1876-1901: |
| O | None |
| D | Farmyard manure at 35 t |
| N* | 97 kg N as nitrate of soda |
| PK | 34 kg P as superphosphate, 137 kg K as sulphate of
potash |
| N*PK | N, P and K as above |

Experimental diary:

K test:

26-Sep-96 : T : Muriate of potash at 167 kg.

P test:

26-Sep-96 : T : Triple superphosphate at 319 kg.

97/R/EX/4

Experimental diary:

All plots:

05-Oct-96 : B : Ploughed.
 08-Oct-96 : B : Spring-tine cultivated, rotary harrowed, Hereward,
 dressed Beret Gold, drilled at 380 seeds per m².
 17-Mar-97 : B : Topik at 1.25 l with Sprayprover at 1.0 l in 200 l.
 07-Apr-97 : B : 34.5% N at 556 kg.
 16-Apr-97 : B : Dow Shield at 0.35 l with Deloxil at 1.5 l in 200 l.
 30-May-97 : B : Folicur at 0.5 l with Pointer at 0.5 l in 300 l.
 14-Aug-97 : B : Combine harvested.

NOTE: Samples of grain and straw were taken for chemical analysis.

P TEST

GRAIN TONNES/HECTARE

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

P RES	O	P1	P2	P3	Mean
OLD RES					
O	1.28	5.01	6.86	7.25	5.10
D	4.78	6.61	7.60	7.47	6.61
N	1.68	5.71	7.40	7.46	5.56
P	4.58	6.69	7.71	7.44	6.61
NPKNAMG	4.09	6.56	7.33	7.70	6.42
Mean	3.28	6.12	7.38	7.46	6.06

GRAIN MEAN DM% 86.9

STRAW TONNES/HECTARE

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

P RES	O	P1	P2	P3	Mean
OLD RES					
O	0.31	2.02	2.82	2.81	1.99
D	1.61	2.66	3.01	2.58	2.46
N	0.66	2.07	2.99	2.90	2.16
P	1.50	2.41	2.96	2.78	2.41
NPKNAMG	1.46	2.49	3.09	2.89	2.48
Mean	1.11	2.33	2.97	2.79	2.30

STRAW MEAN DM% 89.9

PLOT AREA HARVESTED 0.00614

97/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES

O	6.55
D	7.18
N*	7.27
PK	7.84
N*PK	7.47

Mean	7.26
------	------

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

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

OLD RES

O	2.59
D	2.84
N*	2.89
PK	3.00
N*PK	2.73

Mean	2.81
------	------

STRAW MEAN DM% 89.3

PLOT AREA HARVESTED 0.00614

97/R/PG/5

PARK GRASS

Object: To study the effects of organic and inorganic manures and lime on old grass for hay.

The 142nd year, hay.

For previous years see 'Details' 1977 and 1973 and 74-96/R/PG/5.

Treatments: Combinations of:-

Whole plots

1. MANURE

Fertilizers and organic manures:

N1	Plot 1	N1
K	Plot 2/1	K since 1996 (as 2/2 before)
O(D)	Plot 2/2	None (D until 1863)
O	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1MN	Plot 6	N1 P K Na Mg
MN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
MN(N2)	Plot 9/1	P K Na Mg (N2 until 1989)
N2MN	Plot 9/2	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MN	Plot 11/1	N3 P K Na Mg
N3MNSI	Plot 11/2	N3 P K Na Mg Si
O	Plot 12	None
(D/F)	Plot 13/1	None (D/F until 1994)
D/F	Plot 13/2	D/F
MN(N2*)	Plot 14/1	P K Na Mg (N2* until 1989)
N2*MN	Plot 14/2	N2* P K Na Mg
MN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MN	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNAMG	Plot 18	N2 K Na Mg
D	Plot 19	D
D/N*PK	Plot 20	D/N*P K

N1, N2, N3:	48, 96, 144 kg N as sulphate of ammonia
N1*, N2*:	48, 96 kg N as nitrate of soda (30 kg N to plot 20, only in years with no farmyard manure)
P:	35 kg P (15 kg P to plot 20, only in years with no farmyard manure) as triple superphosphate in 1974 and since 1987, single superphosphate in other years
K:	225 kg K (45 kg K to plot 20, only in years with no farmyard manure) as sulphate of potash
Na:	15 kg Na as sulphate of soda
Mg:	10 kg Mg as sulphate of magnesia
Si:	Silicate of soda at 450 kg
D:	Farmyard manure at 35 t every fourth year
F:	Fishmeal every fourth year to supply 63 kg N
MN:	P K Na Mg as above

97/R/PG/5

Sub-plots

2. LIME Liming plots 1-17:

- | | |
|---|--|
| A | a Ground chalk applied as necessary to achieve pH7 |
| B | b Ground chalk applied as necessary to achieve pH6 |
| C | c Ground chalk applied as necessary to achieve pH5 |
| D | d None |

NOTE: Lime was applied regularly at the same rate, to all 'a' and 'b' sub-plots of plots 1 to 17 (except 12) from 1924. Differential liming started in 1975 on certain 'b' and 'c' sub-plots (except on plot 12) and in 1976 on certain 'a' sub-plots (including plot 12) and 12b. Lime last applied in 1997.

Liming plots 18-20:

Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1974. Since 1975 plot 18-1 has been split into two for treatments 'c' and 'd' above and plot 18-3 split into two for treatments 'a' and 'b'. Plots 19 and 20 received no further chalk after 1978; plot 18/2 no further chalk after 1972.

Chalk applied 1997 (tonnes Ca CO₃):

Plot	a	b	c
1	3.0	1.5	1.5
2/1	3.0	0.8	0.3
2/2	3.0	0.8	0.3
3	3.0	0.8	-
4/1	3.0	0.8	0.3
4/2	5.1	3.6	2.1
6	3.0	1.5	-
7	3.0	0.8	0.3
8	3.0	0.8	0.3
9/1	6.0	1.5	1.5
9/2	10.2	3.6	2.1
10	10.2	7.2	4.2
11/1	12.0	4.5	6.0
11/2	12.0	4.5	3.0
12	3.0	-	-
13/1	3.0	-	-
13/2	3.0	-	-
14/1	3.0	-	-
14/2	2.2	-	-
15	3.0	0.8	0.3
16	2.2	-	-
17	2.2	-	-
18	5.1	3.6	2.1

None applied to plots 18/2, 19 and 20. This was the second application in a triennial scheme of soil pH analyses and chalk applications.

97/R/PG/5

Experimental diary:

26-Nov-96 : T : (Not plot 20) P applied.
10-Dec-96 : T : (Not plot 20) K, Na, Mg and Si applied.
11-Dec-96 : T : Plot 20: P and K applied.
07-Jan-97 : T : Chalk application started.
29-Jan-97 : T : Farmyard manure applied.
31-Jan-97 : T : Chalk application finished.
09-Apr-97 : T : Sulphate of ammonia applied.
10-Apr-97 : T : Nitrate of soda applied.
07-Jul-97 : B : Cut.
09-Jul-97 : B : Hay turned twice.
10-Jul-97 : B : Hay rowed up and baled.
10-Nov-97 : B : Cut and herbage removed.

NOTE: Samples of herbage from selected plots were taken for chemical analysis. Unground herbage samples from all plots from both cuts were archived.

97/R/PG/5

1ST CUT (8/7/97) DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	2.68	2.98	2.12	0.87	2.16
K	2/1	1.68	2.37	1.46	1.75	1.82
O(D)	2/2	1.94	2.51	1.51	1.84	1.95
O	3	1.84	1.89	1.75	2.13	1.90
P	4/1	2.08	2.65	2.51	2.94	2.55
N2P	4/2	2.29	2.37	3.06	1.90	2.40
N1MN	6	3.10	3.11			3.11
MN	7	3.17	2.63	3.16	2.08	2.76
PNAMG	8	2.06	2.59	2.57	2.46	2.42
MN(N2)	9/1	2.65	2.79	1.38	0.95	1.94
N2MN	9/2	3.21	3.54	2.80	3.03	3.15
N2PNAMG	10	2.55	2.50	2.82	2.03	2.47
N3MN	11/1	3.52	3.59	2.59	3.70	3.35
N3MNSI	11/2	4.12	3.27	2.81	3.94	3.54
O	12	1.64	1.60	1.40	1.44	1.52
(D/F)	13/1	2.22	2.43	2.87	2.76	2.57
D/F	13/2	3.05	4.57	4.79	4.61	4.26
MN(N2*)	14/1	2.71	2.92	2.65	2.43	2.68
N2*MN	14/2	3.42	2.99	3.19	3.67	3.32
MN(N2*)	15	2.74	2.79	2.22	2.39	2.54
N1*MN	16	3.48	3.26	3.61	3.40	3.43
N1*	17	2.79	3.17	3.06	3.30	3.08
N2KNAMG	18/1			3.40	0.98	2.19
N2KNAMG	18/2					3.94
N2KNAMG	18/3	2.89	3.74			3.31
D	19/1					5.47
D	19/2					4.80
D	19/3					4.43
D/N*PK	20/1					4.69
D/N*PK	20/2					4.31
D/N*PK	20/3					4.40

1ST CUT MEAN DM% 31.3

97/R/PG/5

2ND CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	1.13	1.49	1.00	0.37	1.00
K	2/1	1.28	1.66	1.60	1.57	1.53
O(D)	2/2	0.71	1.01	0.86	0.87	0.86
O	3	0.73	0.75	1.07	1.30	0.96
P	4/1	0.79	1.13	1.33	1.29	1.14
N2P	4/2	1.10	1.28	0.76	0.74	0.97
N1MN	6	0.83	0.82			0.83
MN	7	0.90	1.08	1.53	0.70	1.05
PNAMG	8	1.14	1.02	1.18	0.96	1.07
MN(N2)	9/1	0.92	0.78	0.47	0.43	0.65
N2MN	9/2	0.85	1.04	0.62	0.90	0.85
N2PNAMG	10	0.91	1.09	0.82	0.66	0.87
N3MN	11/1	0.95	0.83	0.64	1.39	0.95
N3MNSI	11/2	1.14	1.18	0.70	1.53	1.14
O	12	0.88	0.91	0.97	0.80	0.89
(D/F)	13/1	1.25	1.20	1.59	1.25	1.32
D/F	13/2	1.64	2.49	2.08	1.89	2.02
MN(N2*)	14/1	0.92	0.90	0.80	0.93	0.89
N2*MN	14/2	1.30	1.05	1.16	1.14	1.16
MN(N2*)	15	1.26	1.19	1.12	0.92	1.12
N1*MN	16	1.44	1.25	1.48	1.13	1.33
N1*	17	1.19	1.38	1.52	1.64	1.43
N2KNAMG	18/1			0.42	0.13	0.27
N2KNAMG	18/2					0.98
N2KNAMG	18/3	0.62	0.96			0.79
D	19/1					1.25
D	19/2					1.41
D	19/3					1.19
D/N*PK	20/1					1.20
D/N*PK	20/2					0.79
D/N*PK	20/3					0.93

2ND CUT MEAN DM% 28.2

97/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	3.81	4.47	3.12	1.23	3.16
K	2/1	2.96	4.03	3.06	3.33	3.34
O(D)	2/2	2.65	3.52	2.37	2.70	2.81
O	3	2.57	2.64	2.81	3.43	2.86
P	4/1	2.88	3.78	3.85	4.23	3.68
N2P	4/2	3.39	3.66	3.82	2.64	3.37
N1MN	6	3.94	3.94			3.94
MN	7	4.07	3.72	4.69	2.79	3.82
PNAMG	8	3.20	3.61	3.75	3.42	3.49
MN(N2)	9/1	3.57	3.57	1.84	1.38	2.59
N2MN	9/2	4.05	4.58	3.42	3.94	4.00
N2PNAMG	10	3.45	3.58	3.64	2.69	3.34
N3MN	11/1	4.47	4.41	3.23	5.09	4.30
N3MNSI	11/2	5.26	4.45	3.50	5.48	4.67
O	12	2.52	2.52	2.37	2.24	2.41
(D/F)	13/1	3.47	3.63	4.46	4.01	3.89
D/F	13/2	4.69	7.06	6.87	6.50	6.28
MN(N2*)	14/1	3.63	3.82	3.44	3.36	3.56
N2*MN	14/2	4.73	4.04	4.35	4.81	4.48
MN(N2*)	15	3.99	3.98	3.34	3.31	3.66
N1*MN	16	4.92	4.50	5.09	4.53	4.76
N1*	17	3.98	4.55	4.58	4.94	4.51
N2KNAMG	18/1			3.82	1.11	2.46
N2KNAMG	18/2					4.92
N2KNAMG	18/3	3.51	4.70			4.10
D	19/1					6.72
D	19/2					6.21
D	19/3					5.62
D/N*PK	20/1					5.89
D/N*PK	20/2					5.11
D/N*PK	20/3					5.34

TOTAL OF 2 CUTS MEAN DM% 29.7

97/R/BN/7

BARNFIELD

Object: The experiment was designed to study the effects of organic and inorganic manures on continuous root crops. It was progressively modified to study effects on other crops.

Sections 1 and 2, 3rd year of clover. Sections 3-6, 3rd year of grass/clover.

For previous years see 'Details' 1967 and 1973 and 74-96/R/BN/7.

Plot dimensions: 10.7 x 55.9.

Treatments to grass/clover, Sections 3-6: All combinations of:-

Whole plots

1. **MANURE** Fertilizers and organic manures:

(D)	(D)
(D) PK	(D) P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
0	0

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

K: 225 kg K as sulphate of potash

(Na): 90 kg Na as sodium chloride until 1973, none since

Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973)

(D): Farmyard manure at 35 t until 1975, none since

Sub-plots

2. **N PERCUT** Nitrogen fertilizer in 1997 (kg N per cut) as 34.5% N, cumulative to previous dressings and residues of forms of N previously each supplying 96 kg N per annum:

75	75, previously nitrate of soda, section 3
100	100, previously sulphate of ammonia, section 4
125	125, previously sulphate of ammonia + castor meal, section 5
150	150, previously castor meal, section 6

No nitrogen fertilizer applied in 1995. Castor meal last applied 1971, nitrate of soda and sulphate of ammonia until 1959.

Plus one plot **MANURE** KMG 100

97/R/BN/7

Treatments to clover, sections 1 and 2 (not given nitrogen fertilizer):

MANURE Fertilizers and organic manures as for grass/clover above, excluding KMG.

- NOTES:** (1) P, K and D treatments were applied to Sections 1 and 2 until 1980. None were applied subsequently until the resumption of P and K treatments only, from 1985.
(2) Yields were not taken from section 2.

Experimental diary:

02-Dec-96 : T : P applied.
04-Dec-96 : T : K applied.
07-Mar-97 : T : N applied.
11-Jun-97 : B : Cut, herbage removed.
01-Jul-97 : T : N applied.
29-Jul-97 : B : Cut, herbage removed.
11-Aug-97 : T : N applied.
11-Nov-97 : B : Cut, herbage removed.

NOTE: Herbage samples were taken for chemical analysis.

GRASS/CLOVER

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
(D)	2.14	2.47	2.93	3.84	2.84
(D)PK	2.42	4.06	3.66	4.47	3.65
PKMG	2.46	3.80	4.19	3.08	3.38
P	0.96	0.62	0.67	0.23	0.62
PK	1.94	4.14	3.80	3.61	3.37
PMG	1.00	1.10	0.56	0.73	0.85
0	1.30	1.31	1.28	1.39	1.32
Mean	1.74	2.50	2.44	2.48	2.29

MANURE KMG 100 2.34

Grand mean 2.29

1ST CUT MEAN DM% 23.7

97/R/BN/7

GRASS/CLOVER

2ND CUT (29/7/97) DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
(D)	1.99	2.13	2.97	3.23	2.58
(D) PK	2.81	3.31	3.90	4.54	3.64
PKMG	3.17	3.75	3.80	3.96	3.67
P	0.66	0.72	0.68	0.61	0.67
PK	3.41	3.29	4.34	4.34	3.85
PMG	0.97	0.80	0.54	0.27	0.64
0	1.03	1.12	0.93	0.79	0.97
Mean	2.01	2.16	2.45	2.54	2.29

MANURE KMG 100 2.26

Grand mean 2.29

2ND CUT MEAN DM% 26.2

3RD CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
(D)	0.76	1.30	2.27	2.81	1.78
(D) PK	1.92	2.37	1.85	2.06	2.05
PKMG	1.67	2.28	2.20	1.64	1.95
P	0.57	0.81	1.13	0.52	0.76
PK	1.90	2.32	2.28	2.69	2.30
PMG	0.79	1.13	1.07	0.66	0.91
0	0.73	1.19	1.21	0.99	1.03
Mean	1.19	1.63	1.72	1.62	1.54

MANURE KMG 100 2.11

Grand mean 1.56

3RD CUT MEAN DM% 22.1

97/R/BN/7

GRASS/CLOVER

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT	75	100	125	150	Mean
MANURE					
(D)	4.90	5.89	8.16	9.88	7.21
(D) PK	7.14	9.74	9.41	11.07	9.34
PKMG	7.31	9.83	10.19	8.69	9.00
P	2.18	2.15	2.48	1.37	2.05
PK	7.24	9.76	10.42	10.64	9.52
PMG	2.76	3.04	2.17	1.66	2.41
0	3.06	3.62	3.43	3.17	3.32
Mean	4.94	6.29	6.61	6.64	6.12

MANURE KMG 100 6.71

Grand mean 6.14

TOTAL OF 3 CUTS MEAN DM% 24.0

CLOVER

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D) PK	PKMG	P	PK	PMG	0	Mean
	3.44	3.34	2.58	1.48	3.16	2.13	1.46	2.51

1ST CUT MEAN DM% 17.8

2ND CUT (29/7/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D) PK	PKMG	P	PK	PMG	0	Mean
	2.86	3.30	3.19	2.23	2.93	2.88	2.05	2.78

2ND CUT MEAN DM% 23.2

97/R/BN/7

CLOVER

3RD CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D) PK	PKMG	P	PK	PMG	0	Mean
	0.54	0.91	0.70	0.34	1.04	0.88	0.66	0.72

3RD CUT MEAN DM% 19.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D) PK	PKMG	P	PK	PMG	0	Mean
	6.83	7.55	6.47	4.05	7.13	5.88	4.17	6.01

TOTAL OF 3 CUTS MEAN DM% 20.1

PLOT AREA HARVESTED 0.00155

97/R/GC/8

GARDEN CLOVER

Object: To study yields and pathogens of red clover grown continuously - Manor Garden.

The 144th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-96/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.00 x 1.40.

Treatments:

FUNG RES Residual effects of fungicide to control *Sclerotinia trifoliorum*:

NONE None

BENOMYL Benomyl sprays during previous winters, last applied November 1989.

Experimental diary:

15-Jul-97 : B : Cut, hand weeded, patches re-sown with Merviot.

04-Sep-97 : B : Cut, hand weeded, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg.

NOTE: There was severe rabbit damage to the crop between the first and second cut.

97/R/GC/8

1ST CUT (15/7/97) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	6.13	6.80	6.47

1ST CUT MEAN DM% 25.6

2ND CUT (4/9/97) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.36	1.73	1.55

2ND CUT MEAN DM% 23.2

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	7.49	8.54	8.01

TOTAL OF 2 CUTS MEAN DM% 24.4

PLOT AREA HARVESTED 0.00010