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Yields of the Field Experiments 2011

Full Table of Content

Results of the Classical and Other Long-term Experiments 2011

Rothamsted Research

Rothamsted Research (2012) *Results of the Classical and Other Long-term Experiments 2011 ;* Yields Of The Field Experiments 2011, pp 0 - 61 **- DOI: https://doi.org/10.23637/ERADOC-1-221**

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ROTHAMSTED RESEARCH

Results of the Classical and other Long-term Experiments

2011

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List of Experiments in the 2011 Yield Book

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https://doi.org/10.23637/ERADOC-1-221

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CONVENTIONS

For each experiment current treatments are shown with the factor and level names which are used in the tables.

For each experiment references are given to previous years. These refer to the '(Numerical) (Results)' previous editions of 'Yields of the Field Experiments'.

For the classical and some long-term experiments reference is made to 'Details' – separate publications, giving full descriptions of treatments until 1977 & 1973, with full titles 'Details of the Classical and Long Term Experiments up to 1977' and 'Details of the Classical and Long Term Experiments up to 1973'.

The following conventions are observed unless otherwise stated.

All areas are in hectares. All plot dimensions are in metres.

All rates of application of fertilizers, sprays etc. are per hectare.

All yields are per hectare.

For any other crop, details of abbreviations are given as necessary

Fertilizers

27%N or 34.5% N means nitrogen as calcium ammonium nitrate or ammonium nitrate.

Anhydrous Sulphate of Soda	
Chalk	
Compost	
Double Top	27% nitrogen and 30% SO_3
FYM	Farmyard manure (from bullocks)
Headland Manganese 500	500 g/l 27.5% w/w manganese carbonate
Kieserite	$MgSO_4H_2O$ 17.7% magnesium and 23.3% sulphur
Maize Tops	
Manganese sulphate	$Mn_2 (SO_4)_3$ 27% manganese and 24% sulphur
Magnesium sulphate	$MgSO_4$ H_2O 17.7% magnesium and 23.3% sulphur
Muriate of potash	60% K_2O
Nitram	34.5% N
Nitraprill	34.5% N
Nitrate of soda	$NaNO_3$ 16% nitrogen and 27% sodium

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Nitro-Chalk	Calcium Ammonium Nitrate 27% N
Potassium sulphate	50% K_2O and 18.4% sulphur
Silicate of soda	Na_2SiO_3 37% sodium and 23% silica
Sodium Sulphate	99.9% SO_4
Sulphate of ammonia	$(NH_4)_2SO_4$ 21% nitrogen 24% sulphur
Sulphate of potash	K_2SO_4 50% K_2O and 18.4% sulphur
Triple superphosphate (TSP)	47% P_2O_5

Cereal straw is removed unless otherwise stated.

GS: Growth Stage.

tm): Tank mix; two or more products applied together.
tr: means seed dressing

Machinery definitions as used in the diary.

Accord	Pneumatic drill with Suffolk coulters 12.5cm apart
Combine drilled	Drill mounted behind a rotary harrow.
Dutch harrow	Rigid tine harrow
Flexitine	Heavy spring-tine cultivator
Nodet Gougis	Pneumatic precision drill with variable spacing
Nordsten	Drill with Suffolk coulters 12 cm apart
Oyjord	Drill with Suffolk coulters 14.2 cm apart
Plough/N	Furrow slice turned to the North (-/S = South, -/E = East, -/W = West)
Shakerator	Deep tine cultivator with vibrating tines 60cm apart and 45 cm deep
Subsoiler	Deep tine cultivator with vibrating tines 60cm apart and 45 cm deep

Application code: This is used to identify the kind of application
a = application (cultivations, harvest, etc.), p = pesticide, f = fertilizer and s = seed.

Tables of means

The following abbreviations are used in variate headings:

Wheat, barley, oats, beans, lupins etc.

Grain:	Grain (at 85% dry matter)
Straw:	Straw (at 85% dry matter)

All crops

Mean D.M. %:	Mean dry matter % as harvested

Standard errors

NOTES:
(1) This report gives standard errors of differences, not of means.
(2) Annotations (e.g. * min rep, max-min, max rep) to S.E.Ds are only explained the first time they occur in any experiment.

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PESTICIDES USED

The following list of pesticides is based on The UK Pesticides Guide, CAB International and The British Crop Protection Council. CABI Publishing

KEY TO ABBREVIATIONS

ad	Adjuvant	d	Desiccant	f	Fungicide
gr	Growth regulator	h	Herbicide	i	Insecticide
m	Molluscicide	n	Nematicide	tr	Trace elements

Trade Name	Function	Active ingredient
Agriguard Chlormequat 720	gr	720 g/l chlormequat
Agriguard Fluroxypyr	h	200g/l fluroxypyr
Allure	m	1.5% w/w metaldehyde
Ally Max SX	h	143 g/l & 143 g/l metsulfuron-methyl + tribenuron-methyl
Alpha Pendimethalin 330 EC	h	330 g/l pendimethalin
Amistar	f	250 g/l azoxystrobin
Amistar Opti	f	100 g/l & 500 g/l azoxystrobin and chlorothalonil
Anchor	f	600 ml/100 kg of seed (rate recommended for legumes)
Arelon 500	h	500 g/l isoproturon
Avadex Excel 15G	h	15% w/w tri-allate
Azural	h	360 g/l glyphosate
BASF 3C Chlormequat 720	gr	720 g/l chlormequat
Beret Gold	f	200 ml/100 kg of seed
Biopower	ad	20.2 + 6.7% w/w 3,6-dioaeicosylsulphate sodium salt + 3,6-dioxaoctadecylsuphate sodium salt
Bravo 500	f	500 g/l chlorothalonil
Brutus	f	37.5 g/l & 27.5 g/l epoxiconazole and metconazole
Callisto	h	100 g/l mesotrione
Cherokee	f	chlorothalonil, 50.000 g / l cyproconazole and 62.500 g / l propiconazole
Clipper	h	360 g/l glyphosate
Cycocel	gr	460 g/l chlormequat chloride
Decoy Wetex	m	20 g/kg methiocarb
Dow Agrosciences Glyphosate 360	h	360 g/l glyphosate
Duplosan KV	h	600 g/l mecoprop-P
Fandango	f	100 g/l and 100 g/l fluoxastrobin and prothioconazole
Flexity	f	300 g/l metrafenone
Hallmark with Zeon Technology	i	100 g/l lambda cyhalothrin
Harmony M SX	h	40 g/kg + 400 g/kg metsulfuron-methyl + thifensufuron-methyl
Headland Charge	h	600 g/l mecoprop-P
Hurler	h	200 g/l fluroxypyr
Karan	i	3.000 % w/w methiocarb
Lexus Class	h	33.3 + 16.7 % carfentrazone-ethyl + Flupyrsulfuron-methyl
Landgold Lambda-Z	i	100 g/l lambda-cyhalothrin
Langold Propyzamide 400 SC	h	400 g/l propyzamide
Liberator	h	400 + 100 g/l diflufenican + flufenacet
Mesurol	m	100 g/100l
Opus	f	125 g/l epoxyconazole
Pacifica	h	10 g/kg + 30 g/kg idosulfuron-methyl-sodium + mesosulfuron-methyl
Proline	f	250.000 g/l prothioconazole
Raxil Pro	f	150 ml/100 kg of seed
Redigo Deter	f	200 ml/100 kg of seed
Roundup Metro	h	360 g/l glyphosate

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Samson	h	40 g/l nicosulfuron
Slingshot	h	360 g/l glyphosate
Splice	f	233 g/l and 67 g/l boscalid and epoxiconazole
Stomp 400 SC	h	400 g/l pendimethalin
Talius	f	200 g/l proquinazid
Weedazol-TL	h	225 g/l amitrol

Other Products used in 2011
Statis, Comet, Acanto Prima, Chimera, Tracker, Justice, CCC, Hoedown, Gallup 360, Barbarian, Thor.

Note: Seed dressing rates indicated for Anchor, Beret Gold, Mesurol, Redigo Deter and Raxil Pro are those recommended by the manufacturer and may differ from the actual rate used.

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11/R/BK/1

BROADBALK

Object: To study the effects of organic manures and inorganic fertilisers on continuous w. wheat and wheat in rotation. 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 was 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 168th 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 1968, Part 2; Station Report for 1982, Part 2, pp 5-44 and Yield Books for 74-10/R/BK/1.

Areas harvested[a]:

	Section	
Wheat:	0	0.00320
	1	0.00589
	2,4,6 and 7	0.00487
	8,9	0.00512
Oats:	3	0.00487
Maize:	5	0.00162

[a] Harvest areas in the 2007-2010 yield books were incorrectly assigned, but yields were correct.

Treatments:
In 2001 a number of the treatments were changed. The treatments are now:-

Whole plots

PLOT	Fertilizers and organic manures Treatments	
	Plot	From 2001
01 (FYM)N4	01	N4
21FYMN3	2.1	FYM N2 (1)
22FYM	2.2	FYM
03Nil	03	None
05(P)KMg	05	(P) K Mg
06N1 (P) KMg	06	N1 (P) K Mg
07N2(P)KMg	07	N2 (P) K Mg
08N3(P)KMg	08	N3 (P) K Mg
09N4(P)KMg	09	N4 (P) K Mg
10N4	10	N4
11N4PMg	11	N4 P Mg
12N1+3+1(P)K2Mg2	12	N1+3+1 (P) K2 Mg2 (2)
13N4PK	13	N4 P K
14N4PK*(Mg*)	14	N4 P K* (Mg*)
15N5(P)KMg	15	N5 (P) K Mg
16N6(P)KMg	16	N6 (P) K Mg
17N1+4+1PKMg	17	N1+4+1 P K Mg
18N1+2+1PKMg	18	N1+2+1 P K Mg
19N1+1+1KMg	19	N1+1+1 K Mg
20N4KMg	20	N4 K Mg

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(1) FYM N3 since 2005
(2) N1+3+1 (P) KMg since 2006

W. oats; Nitrogen and farmyard manure were not applied.

N1, N2, N3, N4, N5, N6: 48, 96, 144, 192, 240, 288 kg N as 33.5% N; to be applied at the same time as the second dressings in the split nitrogen plots for wheat and to the seedbed for forage maize.

Split N to wheat

N1+1+1, 1+2+1 etc: Rates as above. Timings: first two weeks of March, GS31 or mid-April (whichever comes first) and GS37/mid-May.

Split N to forage maize

N2+1, 2+2, 2+3,2+4: Rates as above. Timings: to the seedbed and post-emergence.
P: 35 kg P as triple superphosphate
(P): (none), to be reviewed in 2010/11.
K: 90 kg K as potassium sulphate.
K2: 180 kg K as potassium sulphate (plus 450 kg K autumn 2000 only)
K*: 90 kg K as potassium chloride
Mg: 12 kg Mg as kieserite.
Mg2: 24 kg Mg as kieserite.(plus 60kg Mg, autumn 2000 only).
(Mg*): (none), to be reviewed in 2010/11
FYM: Farmyard manure at 35 t

Previous treatment:-
Whole plots

PLOT		Fertilizers and organic manures:-		
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985 – 2000
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 ½[P K (Na) Mg]	N1+3 ½[P K Mg] (A)+
18N0+3FH	18	P K Na Mg (A)	N2 ½[P K (Na) Mg]	N0+3 ½[P K Mg] (A)+
19(C)	19	C	C	(C) (since 1989)
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating each year

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+ This change since 1980. Treatments shown are those to w.wheat; autumn N alternates. Maize received N3 ½[PK Mg] on both plots 17 and 18. These treatments shown incorrectly in 1999-2002 Yield books.
W. oats; Nitrogen and dung were not applied.

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 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:	30kg Mg annually to Plot 14 (applied at 26 kg 1990 to 2000), 35 kg Mg every third year to other plots since 1974 (applied at 30 kg in 1991, 1994, 1997 and 2000 and at 15 kg on half rate treatments). All as kieserite since 1974, previously as sulphate of magnesia annually.
D:	Farmyard manure at 35 t
(C):	Castor meal to supply 96 kg N until 1988, none since
F:	Full rate P K (Na) Mg as above
H:	Half rate of above.

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing. From 1968, the experiment was divided into 10 sections with the following cropping:-

SECTION

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	F	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
1989	W	W	W	W	W	W	W	P	F	W

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Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
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
1998	W	W	W	W	W	W	W	O	W	M
1999	W	W	W	W	W	W	W	M	O	W
2000	W	W	W	W	W	O	W	W	M	W
2001	W	W	W	F	W	M	O	W	W	W
2002	W	W	W	W	W	W	M	W	W	O
2003	W	W	F	W	W	W	W	O	W	M
2004	W	W	F	W	W	W	W	M	O	W
2005	W	W	W	W	W	O	W	W	M	W
2006	W	W	W	W	W	M	O	W	W	W
2007	W	W	W	W	W	W	M	W	W	O
2008	W	W	W	F	W	W	W	O	W	M
2009	W	W	W	W	W	W	W	M	O	W
2010	W	W	W	W	W	O	W	W	M	W
2011	W	W	W	W	W	M	O	W	W	W

W = w. wheat, O = w. oats (spring oats 2001), 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 2.9t 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 (omitted). No chalk was applied after autumn 1991 until autumn 2007 when differential amounts were applied to selected plots (see "Results 2008").

(3) In 2003 and 2004 section 0 was used for an experiment (CS/595) investigating different herbicides to control *Equisetum arvense*.

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11/R/BK/1

Experimental Diary:

All Sections

			Rate	Unit
01-Sep-10	p	Weedazol-TL, Not on section 8 or maize section (Water volume = 296 lt / ha)	20	l/ha
07-Oct-10	f	Triple Super Phosphate, Strips 11,13,14,17,18	171	kg/ha
07-Oct-10	f	Muriate of Potash, On strip 14	181	kg/ha
08-Oct-10	a	Applied FYM, All sections apart from section 3 (W. oats) of Strips 2.2 and 2.1	35	t/ha
10-Oct-10	a	Ploughed		
13-Oct-10	a	Cultipressed		
14-Oct-10	a	Cultipressed		
01-Nov-10	p	Sprayed Regatta, Water volume = 200 lt / ha (Sections 0,1,2,4,6,7,9 only)	0.6	l/ha
10-Nov-10	p	Karan Slug pellets, Not section 5 (Maize section)	3	kg/ha
12-Nov-10	a	Erect rabbit fence		
23-Nov-10	p	Karan Slug pellets	2.5	kg/ha
16-Dec-10	a	Cut Hedges, started		
17-Dec-10	a	Cut Hedges		
05-Apr-11	f	Applied Sulphate of Potash, strips 5,6,7,8,9,12,13,15,16,17,18,19 and 20 (treatment)	217	kg/ha
06-Apr-11	f	Applied Kieserite, strips 5,6,7,8,9,11,12,15,16,17,18,19 and 20 only (treatment)	80	kg/ha
06-May-11	a	Removed rabbit fence		
10-May-11	a	Cut paths		
12-May-11	a	Flexi Tined, fallows		
16-May-11	a	Cut paths		
19-May-11	a	Rotorvated down paths		
23-May-11	a	Cut paths		
24-May-11	a	Cut paths		
08-Jun-11	a	Cut paths		
09-Jun-11	a	Cut paths		
10-Jun-11	a	Rotorvated fallows		
27-Jun-11	a	Cut paths		
28-Jul-11	p	Sprayed Statis 360 + Mixture B, Water volume = 200 lt/ha (sections 0,1,9,2,3,4,,6,7 only)	3+3	l/ha
29-Jul-11	a	Cut Paths		
12-Aug-11	a	Combined O+Es, Opened up trials with comercial combine ready for yields to be taken		
12-Aug-11	a	Baled O+Es, Baled area discard area cut to open out trials		
30-Aug-11	a	Rolled to crush field horse tail stems (equisteum arvense) to aid chemical penetration when sprayed with roundup.		
08-Sep-11	a	Topped, to tidy stubble before primary cultivation		

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Cropped Sections

Winter Wheat			Rate	Unit
19/10/2010	a	Drilled Hereward trt Redigo Deter, 350 seeds / metre sq (Started and rained off)	159	kg/ha
20-Oct-10	a	Drilled Hereward trt Redigo Deter, 350 seeds / metre sq	159	kg/ha
15-Mar-11	f	Applied Nitram Fertliser - 48 kg/ha N. Applied to strips 12,17,18, 19.	139	kg/ha
8-Mar-11	p	Sprayed Cherokee - Water volume = 118 lt/ha. Applied to sections 0,1,9,2,4,7,8.	1.25	l/ha
13-Apr-11	f	Applied Nitram - wheat only. Strips 6 and 18	139	kg/ha
13-Apr-11	f	Applied Nitram - Wheat only. Strips 7 and 19	278	kg/ha
13-Apr-11	f	Applied Nitram - Wheat only. Strips 8 and 12; N3 to strip 2.1.	417	kg/ha
13-Apr-11	f	Applied Nitram - Wheat only. Strips 9, 10, 11, 13, 14, 17 and 20; N4 to Strip 1.	556	kg/ha
13-Apr-11	f	Applied Nitram - Wheat only. Strip 15.	696	kg/ha
13-Apr-11	f	Applied Nitram - Wheat only. Strip 16.	835	kg/ha
04-May-11	f	Sprayed Ally Max - Sections 0, 1, 2, 3, 4, 6, 7 and 9, 200 l/ha wate	42	g/ha
		and Starane 2 - Sections 0, 1, 2, 3, 4, 6, 7 and 9, 200 l/ha water	0.75	l/ha
06-May-11	p	Sprayed Bravo 500 - Sections 0, 1, 2, 4, 7, 8 and 9,	1.0	l/ha
		Tracker - Sections 0, 1, 2, 4, 7, 8 and 9,	1.0	l/ha
	p	Agriguard Chlormequat 720 - Sections 0, 1, 2, 4, 7, 8 and 9	2.25	l/ha
	p	Justice - Sections 0, 1, 2, 4, 7, 8 and 9, all above in 200 l/ha wate	0.25	l/ha
12-May-11	f	Applied Nitram, Sections 12, 17, 18 and 19	139	kg/ha
19-May-11	p	Sprayed Opus, sections 0, 1, 2, 4, 7, 8 and 9. 200 l/ha	0.8	l/ha
	p	Comet 200, sections 0, 1, 2, 4, 7, 8 and 9. 200 l/ha	0.6	l/ha
	p	and Bravo 500 - Sections 0, 1, 2, 4, 7, 8 and 9. 200 l/ha	1.0	l/ha
15-Aug-11	a	Combined for yields		
15-Aug-11	a	Straw weights		
16-Aug-11	a	Combined - O+Es		
16-Aug-11	a	Baled - Remaining straw baled and removed		
17-Aug-11	a	removed bales		
15-Sep-11	a	Topped - Headlands and section 8		

Winter Oats

19-Oct-10	a	Drilled Gerald trt Beret Gold, 350 seeds / metre sq	122	kg/ha
23-Nov-10	p	Sprayed Lexus Class + Hallmark with zeon technology, Section 3 (W. oats only). Water volume = 200 lt / ha	60 + 50	g/ha ml/ha
12-May-11	p	Sprayed Amistar and Agriguard, Section 3 only. 200 l/ha water	0.5 &1.75	l/ha
10-Aug-11	a	Combined for yields, Oats only		
10-Aug-11	a	Straw weights, Oats section only		

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Forage Maize			Rate	Unit
07-Apr-11	p	Sprayed Statis 360, 200 lt/ha water. Maize section only	3	l/ha
14-Apr-11	a	Flexi Tined, Section 5. Maize		
26-Apr-11	a	Drilled Hudson tr. Mesurol, Maize plots	10.2	seed/m^2
26-Apr-11	a	Rolled, Maize plots		
26-Apr-11	a	Power harrow (Roadtare) Maize plots.		
03-May-11	f	Applied Nitram, Plot 065 only	139	kg/ha
03-May-11	f	Applied Nitram, Plots 075, 125, 175, 185 and 195.	278	kg/ha
03-May-11	f	Applied Nitram, Plots 2.15 and 085	417	kg/ha
03-May-11	f	Applied Nitram, Plots 015, 095, 105, 115, 135 and 145	556	kg/ha
03-May-11	f	Applied Nitram, Plot 155	696	kg/ha
03-May-11	f	Applied Nitram, Plot 165	835	kg/ha
24-Jun-11	p	Sprayed Calisto + Samson Extra, water volume = 200 lt/ha (Sprayed Maize, section 5, only)	1.0 + 0.5	l/ha
28-Jun-11	f	Applied Nitram, Plot 195	139	kg/ha
28-Jun-11	f	Applied Nitram, Plot 185	278	kg/ha
28-Jun-11	f	Applied Nitram, Plot 125	417	kg/ha
28-Jun-11	f	Applied Nitram, Plot 175	556	kg/ha
23-Sep-11	a	Cut Maize for yields and discards		
30-Sep-11	a	Topped Maize		

Wilderness

21-Oct-10	a	Topped, grass area of the wilderness only

NOTE: Samples of wheat and oat grain and straw and forage maize were taken for chemical analysis. Unground wheat grain and straw from Section 1 and maize samples from Section 5 were archived. The entry for 12 May in the wheat section on page 11 was originally entered in error under the maize section. It was corrected on Dec 3rd 2018 by A Macdonald.

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11/R/BK/1

WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	4/W1	7/W2	2/W3	6/W34	0/W7	1/W45	9/W53	8/W3	Mean
01(FYM)N4	8.90	8.84	7.68	7.24	*	*	*	*	8.16
21FYMN3	9.78	9.71	8.92	8.32	6.80	7.37	6.73	3.57	7.65
22FYM	5.96	5.58	5.71	5.52	5.09	5.89	5.36	4.05	5.39
03Nil	1.87	1.23	1.37	1.44	1.32	1.11	0.99	1.58	1.36
05(P)KMg	1.81	1.81	1.53	1.81	1.60	1.80	1.45	3.18	1.87
06N1(P)KMg	3.50	2.90	3.25	2.70	2.59	2.62	2.67	2.75	2.87
07N2(P)KMg	5.36	4.03	4.29	3.99	3.63	4.43	3.57	2.98	4.03
08N3(P)KMg	6.76	5.31	5.33	4.93	3.81	4.11	4.29	3.56	4.76
09N4(P)KMg	7.19	5.66	6.60	5.74	5.42	4.83	4.93	4.28	5.58
10N4	5.31	4.15	4.30	2.03	1.47	1.70	0.93	1.37	2.66
11N4PMg	5.21	5.69	5.88	5.15	4.89	4.33	4.80	4.12	5.01
12N1+3+1(P)KMg	7.63	6.54	6.89	6.74	6.06	5.43	6.02	5.12	6.30
13N4PK	6.82	5.65	5.92	5.48	4.75	4.62	4.90	3.95	5.26
14N4PK*(Mg*)	6.84	5.56	6.22	6.14	5.56	5.33	5.39	3.33	5.55
15N5(P)KMg	8.03	6.56	5.52	5.99	5.49	5.15	5.42	1.92	5.51
16N6(P)KMg	8.30	6.66	6.52	7.78	5.85	5.30	6.23	2.73	6.17
17N1+4+1PKMg	8.48	7.63	6.89	7.92	5.43	5.38	5.81	2.96	6.31
18N1+2+1PKMg	7.50	6.17	6.25	4.46	5.17	4.72	4.98	3.83	5.41
19N1+1+1KMg	6.00	5.27	4.48	2.35	3.84	3.96	2.92	2.60	3.93
20N4KMg	*	*	*	*	1.56	0.78	*	*	1.17
Mean	6.38	5.52	5.45	5.05	4.23	4.15	4.30	3.22	4.80

GRAIN MEAN DM% 84.0

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11/R/BK/1

STRAW TONNES/HECTARE

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

SECTION PLOT	4/W1	7/W2	2/W3	6/W34	0/W7	1/W45	9/W53	8/W3	Mean
01(FYM)N4	3.15	*	*	*	*	*	*	*	3.15
21FYMN3	4.16	*	*	*	*	3.10	*	3.82	3.69
22FYM	2.39	*	*	*	*	2.22	*	3.79	2.80
03Nil	0.55	*	*	*	*	0.27	*	0.32	0.38
05(P)KMg	0.46	*	*	*	*	0.57	*	2.00	1.01
06N1(P)KMg	1.48	*	*	*	*	1.03	*	1.75	1.42
07N2(P)KMg	1.96	*	*	*	*	1.72	*	1.92	1.87
08N3(P)KMg	2.21	*	*	*	*	1.19	*	2.82	2.07
09N4(P)KMg	2.28	*	*	*	*	1.74	*	4.29	2.77
10N4	1.42	*	*	*	*	0.73	*	1.02	1.06
11N4PMg	1.40	*	*	*	*	1.54	*	3.20	2.05
12N1+3+1(P)KMg	2.31	*	*	*	*	2.17	*	4.69	3.06
13N4PK	2.22	*	*	*	*	1.80	*	3.53	2.52
14N4PK*(Mg*)	2.36	*	*	*	*	2.04	*	3.44	2.61
15N5(P)KMg	3.22	*	*	*	*	2.08	*	4.44	3.25
16N6(P)KMg	3.60	*	*	*	*	2.27	*	3.74	3.20
17N1+4+1PKMg	3.76	*	*	*	*	2.14	*	6.09	4.00
18N1+2+1PKMg	2.49	*	*	*	*	1.94	*	4.02	2.82
19N1+1+1KMg	2.34	*	*	*	*	1.93	*	3.11	2.46
20N4KMg	*	*	*	*	*	0.25	*	*	0.25
Mean	2.30	*	*	*	*	1.62	*	3.22	2.37

STRAW MEAN DM% 77.1

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11/R/BK/1

W. OATS
TONNES/HECTARE

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

PLOT	GRAIN	STRAW
01(FYM)[N4]	7.02	2.75
21[FYMN2]	8.32	2.90
22[FYM]	7.24	2.29
03Nil	1.82	0.45
05 (P) KMg	2.00	0.61
06[N1](P)KMg	2.40	0.62
07[N2](P)KMg	3.05	1.02
08[N3](P)KMg	3.86	0.95
09[N4](P)KMg	3.89	1.15
10[N4]	4.61	1.70
11[N4]PMg	6.69	2.11
12[N1+3+1](P)KMg	4.74	1.32
13[N4]PK	4.41	1.42
14[N4]PK*(Mg*)	5.40	1.80
15[N5](P)KMg	6.80	2.76
16[N6](P)KMg	8.12	3.31
17[N1+4+1]PKMg	6.85	2.40
18[N1+2+1]PKMg	3.71	1.12
19[N1+1+1]KMg	3.55	1.04
MEAN DM%	88.2	75.2

FORAGE MAIZE
WHOLE CROP (100% DM) TONNES/HECTARE

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

PLOT	WHOLE CROP
01(FYM)N4	10.11
21FYMN3	10.80
22FYM	13.95
03Nil	1.74
05(P)KMg	3.33
06N1(P)KMg	5.89
07N2(P)KMg	9.22
08N3(P)KMg	6.15
09N4(P)KMg	6.80
10N4	1.28
11N4PMg	4.52
12N2+3(P)KMg	8.54
13N4PK	8.40
14N4PK*(Mg*)	8.18
15N5(P)KMg	6.56
16N6(P)KMg	5.06
17N2+4PKMg	6.06
18N2+2PKMg	6.86
19N2+1KMg	2.99
MEAN DM%	18.8

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SECTION 8: CLEAN GRAIN, TONNES/HA, AFTER REMOVING WEED SEEDS.

YEAR	2004	2005	2006	2007	2009
SECTION	8/W3	8/W4	8/W5	8/W6	8/W1
PLOT					
01 (FYM)N4	-	-	-	-	-
2.1 FYMN2		4.32	2.21	1.45	2.87
2.2 FYM		3.23	2.73	1.65	3.23
03 Nil	0.50	0.69	0.72	0.97	2.13
05 (P)KMg	0.76	1.32	1.01	0.98	3.94
06 N1(P)KMg	1.24	1.75	0.95	1.03	2.76
07 N2(P)KMg	1.67	2.08	1.28	0.82	3.70
08 N3(P)KMg	1.24	2.53	2.12	0.95	5.15
09 N4(P)KMg	1.93	3.09	2.61	1.75	5.74
10 N4	0.65	1.43	0.73	0.36	2.38
11 N4PMg	1.39	2.52	1.03	1.29	2.41
12 N1+3+1(P)K2Mg2[b]	0.86	3.36	1.03	1.72	3.66
13 N4PK	1.54	3.39	2.45	0.99	5.37
14 N4PK*(Mg*)	1.52	[a]3.63	1.57	0.74	5.60
15 N5(P)KMg	1.01	2.70	1.28	0.76	5.51
16 N6(P)KMg	1.43	3.47	1.18	1.18	5.23
17 N1+4+1PKMg		3.52	0.43	1.62	2.52
18 N1+2+1PKMg		3.27	1.06	1.59	3.39
19 N1+1+1KMg		2.21	0.97	1.35	2.64
20 N4KMg	*	*	*	*	*

Note: Section 8 fallow in 2008

[a]Value estimated from mean % clean grain on plots 9-16.

[b]N1+3+1(P)KMg since 2006

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11/R/HB/2

HOOS BARLEY

Object: To study the effects of organic manures and inorganic fertilizers on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised on parts of the experiment. The rotation was discontinued in 1979 and the whole experiment reverted to continuous s. barley. The experiment was modified for 2003. The main plots continue as previously. The Silicate Test plots continue but are not split to test rates of N (basal N is applied). The remaining plots are to be used to study the effect on yield of P residues, (basal N applied).

The 160th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-10/R/HB/2.

Main plots

Treatments:

Whole plots

1. MANURE	Plot	Fertilizers and Organic Manures Form of N 1852-1966	Additional treatments 1852-2002	Treatments since 2003
---	11	None	-	-
-P-	21	None	P	(P)
--K	31	None	K (Na) Mg	K(Mg)
-PK	41	None	PK (Na) Mg	(P) K (Mg)
A--	12	A	-	-
AP-	22	A	P	(P)
A-K	32	A	K (Na) Mg	K(Mg)
APK	42	A	PK (Na) Mg	(P) K (Mg)
D1852	72	None	D	D
(D)	71	None	(D)	(D)
(A)	62	None	(Ashes)	(Ashes)
-	61	None	-	-
D2001 [(a)]	73[(a)]	-	D	D
P2KMg [(a)]	63 [(a)]	-	P2KMg	P2KMg

[(a)] Plots 63 and 73 started in 2001

Form of N: A, sulphate of ammonia to supply 48kg N
P: 35 kg P as triple superphosphate in 1974 and from 1988 to 2002, single superphosphate in other years
(P): (none), P application to be reviewed for 2013
P2: 44kg P as triple superphosphate
K: 90 kg K as sulphate of potash
(Na): (none), 16 kg Na as sulphate of soda until 1973
Mg: 35kg Mg as kieserite every third year since 1974 (applied at 30 kg in 1992, 1995 and 1998) (sulphate of magnesia annually until 1973). Annually to new plot 63.
(Mg): (none), Mg application to be reviewed for 2013

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D1852: Farmyard manure at 35t since 1852
D2001: Farmyard manure at 35t since 2001
(D): Farmyard manure 1852 – 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

Silicate Test plots

Treatments:

Whole plots

MANURE	Plot	Fertilizers: Additional treatment 1852-1979	Changes since 1980	Treatments since 2003
N----	131	-	-	N3
NP---	231	P	-	N3 (P)
N-K--	331	K(Na)Mg	-	N3 K(Mg)
NPK--	431	PK(Na)Mg	-	N3(P)K(Mg)
N—S-	134	Si	Si omitted	N3 (Si)
NP-S-	234	P Si	Si omitted	N3(P) (Si)
N-KS-	334	K(Na)MgSi	Si omitted	N3 K(Mg)(Si)
NPKS-	434	PK(Na)MgSi	Si omitted	N3(P)K(Mg)(Si)
N---S	132	-	Si added	N3 Si
NP--S	232	P	Si added	N3(P) Si
N-K-S	332	K(Na)Mg	Si added	N3 K(Mg) Si
NPK-S	432	PK(Na)Mg	Si added	N3(P)K(Mg) Si
N--SS	133	Si	-	N3 Si
NP-SS	233	P Si	-	N3(P) Si
N-KSS	333	K(Na)MgSi	-	N3 K(Mg) Si
NPKSS	433	PK(Na)MgSi	-	N3(P)K(Mg) Si

N: From 1852-1966 whole plots received 48kg N as nitrate of soda. Between 1968-2002 whole plots were split to test 4 rates of N as "Nitro-chalk" (cumulative applications until 1973, on a cyclic system from 1974).
N3: Basal N, 144kg as "Nitro-chalk" since 2003
Si: Silicate of soda at 450kg (Note: S also refers to silicate of soda)
(Si): Silicate of soda omitted since 1980
P, (P), K, Mg, (Mg), (Na): as above

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P Test plots

Treatments:

Since 2003 the remaining plots [ex-Castor meal (plots 14, 24, 34 & 44) and those testing combinations of NPK with and without Mg (plots 55, 56, 57 & 58)] have been used to study the effect of P residues on yield. Previous treatments have resulted in different levels of available P in the soil. Large dressing of K were applied to some plots to increase levels of exchangeable K in the soil such that K should not limit yield; plots 141 and 241 were sacrificed and used as discard areas so that the K application did not encroach on adjacent no K plots on the Silicate Test. Other plots received the normal rate of K. The level of exchangeable Mg in the soil is such that Mg should not limit yield; the need to apply Mg will be reviewed for 2012.

Whole plots
Manure

Plot	Treatment since 2003
142	N3K*
143	N3K*
144	N3K*
242	N3K*
243	N3K*
244	N3K*
341	N3K
342	N3K
343	N3K
344	N3K
441	N3K
442	N3K
443	N3K
444	N3K
551	N3K
552	N3K
561	N3K
562	N3K
571	N3K*
572	N3K*
581	N3K*
582	N3K*

N3: Basal N, 144kg as “Nitro-chalk”
K: 90kg K as sulphate of potash
K*: 450kg K as sulphate of potash

In 2005 the extra dressings of K (i.e. K*) was stopped and the whole experiment reverted to K dressings of 90 kg K/ha/year.

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11/R/HB/2

Experimental Diary

Date		Application	Rate	Unit
13-Sep-10	p	Weedazol-TL - Water volume = 296 l/ha	20	l/ha
25-Oct-10	a	Spread FYM - Spread according to plan on plots 721,722,723,724,731,732,733,734 (Used 3,600 kg)	35	t/ha
25-Oct-10	f	Applied Sulphate of Potash - Applied according to plan	217	kg/ha
25-Oct-10	f	Applied Triple Superphosphate - Plots 634, 633, 632, 631	215	kg/ha
26-Oct-10	f	Applied Kieserite -To plots 634, 533, 632, 631	233 kg	kg/ha
01-Nov-10	f	Applied silicate of soda - plots 433, 333, 233, 133, 432, 332, 232, 132	450 kg	kg/ha
03-Nov-10	a	Ploughed		
04-Nov-10	a	Ploughed - Finished		
07-Feb-11	s	Drilled Tipple Sp. Barley trt Beret Multi - 189 kg/ha	350 seed	m^2
07-Feb-11	a	Spring Tined.		
06-Apr-11	a	Rotorvated paths		
13-Apr-11	f	Applied Nitro-chalk to N treatments		
13-Apr-11	f	Applied Nitram - Series AA,C and 5 only	420	kg/ha
09-May-11	p	Sprayed Acanto Prima, Chimera and Harmony M SX - 200 l/ha water	1.6 kg 140 g 100 g	kg/ha g/ha g/ha
31-May-11	p	Sprayed Mobius, Corbel and Bravo 500 - 200 l/ha water.	0.43 0.5 1.0	l/ha l/ha l/ha
10-Jun-11	a	Rotorvated paths		
06-Jul-11	a	Pulled wild oats - 97 in plot area		
12-Jul-11	a	Pulled wild oats - 21 pulled		
23-Jul-11	p	Sprayed Statis 360 @ 3 l/ha	200	l/ha
09-Aug-11	a	Combined O+Es - O+Es only to open out trial ready for yield harvest		
09-Aug-11	a	Baled straw - Baled to remove straw		
10-Aug-11	a	Plots combined for yields		
10-Aug-11	a	Straw weights		
10-Aug-11	a	Combined. Cleared the remaining crop after yields done		
10-Aug-11	a	Baled and removed straw		
22-Aug-11	a	Combined O+Es		

NOTE: Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.

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11/R/HB/2

MAIN PLOTS

GRAIN TONNES/HECTARE

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

MANURE	N	0	48	96	144	MEAN
---		1.31	1.63	1.67	1.60	1.55
-P-		1.83	2.52	3.04	3.23	2.66
--K		0.86	1.11	1.44	1.27	1.17
-PK		1.57	2.46	4.03	2.30	2.59
A--		1.12	1.42	1.84	1.81	1.55
AP-		1.93	2.74	3.55	3.00	2.80
A-K		0.76	0.85	1.39	1.20	1.05
APK		1.58	2.22	3.64	3.21	2.66
FYM1852onwards		6.60	7.33	7.93	7.25	7.28
FYM1852-1871		1.48	3.29	2.54	1.78	2.27
(A)		1.80	1.66	1.85	1.76	1.77
-		0.88	1.07	1.54	1.45	1.24
FYM2001onwards		5.33	5.79	6.31	5.86	5.82
P2K		1.44	3.77	4.68	4.36	3.56
MEAN		2.03	2.70	3.25	2.86	2.71

Grain Mean DM% 89.1

STRAW TONNES/HECTARE

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

MANURE	N	0	48	96	144	MEAN
---		0.56	0.72	0.61	0.58	0.62
-P-		0.44	0.83	1.15	1.22	0.91
--K		0.26	0.52	0.65	0.34	0.44
-PK		0.49	1.12	1.86	1.14	1.15
A--		0.34	0.46	0.62	0.78	0.55
AP-		0.66	0.92	1.26	0.88	0.93
A-K		0.18	0.27	0.57	0.36	0.35
APK		0.40	0.93	1.80	1.43	1.14
FYM1852onwards		2.79	3.04	3.06	3.18	3.01
FYM1852-1871		0.42	1.61	0.99	0.90	0.98
(A)		0.61	0.66	0.59	0.54	0.60
-		0.20	0.34	0.57	0.31	0.35
FYM2001onwards		1.97	2.25	2.46	2.28	2.24
P2K		0.40	1.61	1.88	1.81	1.42
MEAN		0.69	1.09	1.29	1.12	1.05

Straw Mean DM% 85.2

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11/R/HB/2

SILICATE PLOTS
GRAIN TONNES/HECTARE

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

Silicate	PK	N3--	N3P-	N3-K	N3PK	MEAN
	(-)-	1.88	4.18	1.23	4.07	2.84
	(Si)-	2.22	3.95	2.22	4.91	3.32
	(-)Si	2.62	4.09	2.37	4.87	3.48
	(Si)Si	2.97	3.69	3.11	4.96	3.68
	MEAN	2.42	3.97	2.23	4.70	3.33

Grain Mean DM% 85.2

PHOSPHATE PLOTS

GRAIN TONNES/HECTARE

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

PLOTS	
142	2.00
143	1.90
144	1.43
242	5.10
243	4.99
244	4.79
341	2.54
342	2.79
343	2.61
344	3.15
441	3.74
442	3.90
443	4.03
444	4.58
551	4.88
552	4.32
561	3.52
562	3.61
571	1.92
572	2.37
581	0.77
582	0.44
MEAN	3.15

Grain Mean DM% 85.6

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11/R/WF/3

WHEAT AND FALLOW

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

The 156th year, w. wheat.

For previous years see 'Details' 1967, 1973 and Yield Books for 74-10/R/WF/3.

Whole plot dimensions: 9 x 211

Treatments:
Two plots, one sown to w. wheat, one fallow; alternating in successive years.

Experimental Diary

			Rate	Unit
10-Oct-10	a	Ploughed		
13-Oct-10	a	Cultipressed		
15-Oct-10	s	Drilled Hereward trt Redigo Deter - 350 seeds / metre sq	158	kg/ha
16-Oct-10	a	Rolled		
17-Oct-10	p	Sprayed Regatta - water volume = 200 lt/ha 0.6 l/ha		
24-Mar-11	a	Flexi Tined -Fallow areas only		
28-Mar-11	p	Sprayed Cherokee- Water volume = 118 lt/ha. Applied to WW area only	1.25	l/ha
13-Apr-11	a	Flexi Tined - Fallow plot		
14-Apr-11	a	Power harrowed - Fallow section		
05-May-11	p	Sprayed Bravo 500,	1.0	l/ha
		Tracker,	1.0	l/ha
		Agriguard Chlormequat 720,	2.25	l/ha
		Ally Max	42	g/ha
		and Starane 2 - 200 lt/ha water	0.75	l/ha
16-May-11	a	Cut paths		
19-May-11	p	Sprayed Opus,	0.8	l/ha
		Comet 200,	0.6	l/ha
		and Bravo 500 - 100 l/ha water	1.0	l/ha
23-May-11	a	Cut paths		
23-May-11	a	Rotavated fallows		
20-Jun-11	a	Cut paths		
01-Aug-11	a	Cut paths		
12-Aug-11	a	Combined O+Es - Opened up trials with commercial combine ready for yields to be taken		
12-Aug-11	a	Baled O+Es - Baled area discard area cut to open out trials		
03-Sep-11	a	Combined for yields		
03-Sep-11	a	Straw weights		
05-Sep-11	a	Combined - Discards		

Note: Unground grain and straw was archived.

GRAIN AND STRAW YIELDS TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.605	0.5218
MEAN DM%	82.78	87.00
PLOT AREA HARVESTED	0.04431	

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11/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986 (P test) and of additional potassium since 2007 (K test); on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 156th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-10/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	96 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** Maintenance P (20 kg P) applied annually from 2000 to maintain existing levels of available P In the soil. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

	2000-11	1986-92
O	None	None
P (P1)	20 kg P	44 kg P
P (P2)	20 kg P	87 kg P
P (P3)	20 kg P	131 kg P

NOTE: P treatments were applied at 61.5 kg P in error in 2000.

Plus

Whole plots (K test, previously N test until 1991

1. **OLD RES** Residues of manures applied annually 1876 – 1901:

O	None
D	Farmyard manure at 35 t
N*	96 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

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11/R/EX/4

2. K Potassium applied annually from 2007 as muriate of potash

O	None
K1	75 kg K_2O (62.2 kg K)
K2	150 kg K_2O (124.5 kg K)

Whole plots
Nitrogen: 50 kg N as ammonium sulphate (to supply sufficient S) during first two weeks in March, 200 kg N as ammonium nitrate at GS31/mid-April (whichever comes first) and 50 kg N as ammonium nitrate at GS37 (not later than mid-May)

Experimental diary

K Test			Rate	Unit
07-Oct-10	f	Basal P (triple superphosphate) - plots 02,04,06,08 and 10	75	kg/ha
		Muriate of Potash - plots 23,43,63,83,103	125	kg/ha
		Muriate of Potash - plots 24,44,64,84,104	250	kg/ha
P Test				
07-Oct-10	f	Triple Super Phosphate - plots 011-013,031-033,051-053, 071-073, 091-093	75	kg/ha
07-Oct-10	f	Muriate of Potash - plots 011-014, 031-034, 051-054, 071-074, 091-094.	250	kg/ha
All Plots				
10-Oct-10	a	Ploughed		
10-Oct-10	a	Ploughed		
13-Oct-10	a	Cultipressed		
15-Oct-10	s	Drilled Xi 19 trt Anchor - 350 seeds / metre sq	145	kg/ha
16-Oct-10	a	Rolled		
17-Oct-10	p	Sprayed Regatta - water volume = 200 lt/ha	0.6	l/ha
14-Mar-11	f	Applied Ammonium Sulphate Fertiliser	238	kg/ha
28-Mar-11	p	Sprayed Cherokee - Water volume = 118 lt/ha. Applied to WW area only	1.25	l/ha
06-Apr-11	f	Applied Kieserite	80	kg/ha
13-Apr-11	f	Applied Nitram	580	kg/ha
05-May-11	p	Sprayed Bravo 500,	1.0	l/ha
		Tracker,	1.0	l/ha
		Agriguard Chlormequat 720,	2.25	l/ha
		Ally Max	42	g/ha
		and Starane 2 - 200 lt/ha water	0.75	l/ha
10-May-11	f	Applied Nitram	146	kg/ha
16-May-11	a	Cut paths		
19-May-11	p	Sprayed Opus,	0.8	l/ha
		Comet 200	0.6	l/ha
		and Bravo 500 - 100 l/ha water	1.0	l/ha
23-May-11	a	Cut paths		

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03-Jun-11	a	Rotavated paths
08-Jun-11	a	Cut paths
20-Jun-11	a	Cut paths
01-Aug-11	a	Cut paths
12-Aug-11	a	Combined O+Es - Opened up trials with commercial combine ready for yields to be taken
12-Aug-11	a	Baled O+Es - Baled area discard area cut to open out trials
16-Aug-11	a	Straw weights
16-Aug-11	a	Combined - O+Es
17-Aug-11	a	straw baled

P TEST

GRAIN TONNES/HECTARE

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

P_RES OLD_RES	O	P(P1)	P(P2)	P(P3)	Mean
O	2.54	4.97	5.35	5.76	4.65
D	4.40	7.32	7.26	7.41	6.60
N	1.76	6.15	7.27	6.70	5.47
P	3.91	7.28	8.21	7.42	6.70
NPKNAMG	3.50	5.62	7.04	7.72	5.97
MEAN	3.22	6.27	7.03	7.00	5.88

GRAIN MEAN DM% 86.0%

STRAW TONNES/HECTARE

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

P_RES OLD_RES	O	P1	P2	P3	MEAN
O	0.71	1.42	1.27	1.69	1.27
D	1.38	2.02	1.95	1.95	1.83
N	0.66	1.82	2.00	2.27	1.69
P	1.15	2.32	2.09	2.17	1.93
NPKNAMG	1.07	1.64	1.75	2.11	1.64
MEAN	1.00	1.85	1.81	2.04	1.67

STRAW MEAN DM% 84.1%

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K TEST

GRAIN TONNES/HECTARE

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

K_TEST OLD_RES	KO	K1	K2	Mean
O	6.24	7.64	7.36	6.87
D	7.81	8.25	7.98	7.96
N*	6.69	6.75	7.39	6.88
PK	7.43	6.50	7.62	7.25
N*PK	7.00	6.61	7.80	7.10
MEAN	7.03	7.15	7.63	7.21

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.181	0.404	min.rep
	0.202	0.157	0.350	max-min
		0.128X	0.286	max.rep

(No comparisons in categories where s.e.d. marked with an X

Grain mean DM% 86.6

STRAW TONNES/HECTARE

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

K_TEST OLD_RES	K0	K1	K2	Mean
O	1.56	2.39	1.94	1.87
D	2.12	2.52	2.02	2.19
N*	1.62	1.75	2.33	1.83
PK	2.11	2.01	1.96	2.05
N*PK	1.55	1.76	2.55	1.85
MEAN	1.79	2.09	2.16	1.96
REP	10	5	5	

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.124	0.278	min.rep
	0.139	0.108	0.241	max-min
		0.088X	0.197	max.rep

(No comparisons in categories where s.e.d. marked with an X

Straw mean DM% 85.1

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11/R/PG/5

PARK GRASS

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

The 156th year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-10/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)
None (FYM)	Plot 2/2	None (FYM until 1863)
None	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1PKNaMg	Plot 6	N1 P K Na Mg
PKNaMg	Plot 7	P K Na Mg
PNaMg	Plot 8	P Na Mg
PKNaMg(N2)	Plot 9/1	P K Na Mg (+ N2 until 1989)
N2PKNaMg	Plot 9/2	N2 P K Na Mg
N2PNaMg	Plot 10	N2 P Na Mg
N3PKNaMg	Plot 11/1	N3 P K Na Mg
N3PKNaMgSi	Plot 11/2	N3 P K Na Mg Si
None	Plot 12	None
(FYM/F)	Plot 13/1	None (FYM/F until 1993/1995)
FYM/PM	Plot 13/2	FYM/PM (FYM/F until 1999)
PKNaMg (N2*)	Plot 14/1	P K Na Mg (+ N2* until 1989)
N2*PKNaMg	Plot 14/2	N2* P K Na Mg
PKNaMg (N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*PKNaMg	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNaMg	Plot 18	N2 K Na Mg
FYM	Plot 19	FYM
FYM/N*PK	Plot 20	FYM/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 in years with no farmyard manure)
P:	35 kg P (15 kg P to plot 20 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 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
FYM:	Farmyard manure at 35 t every fourth year

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11/R/PG/5

1. Manure, fertilisers and organic manures (cont'd)

F:	Fishmeal every fourth year to supply 63 kg N (stopped 1999; replaced by PM)
PM	Pelleted poultry manure at 2 t, every fourth year to supply 63 kg N (started 2003)

Sub-plots

2. **Lime** Liming plots 1-18 (excluding 18/2):

a	Ground chalk applied as necessary to achieve pH7
b	Ground chalk applied as necessary to achieve pH6
c	Ground chalk applied as necessary to achieve pH5
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 1965 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 was applied in 2008-2009; the sixth application in a triennial scheme of soil pH analysis and remedial chalk applications.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

Lime Liming plots 18-20

NOTE: Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1964. Since 1975 plot 18-1 has been split into two for treatments 'c' and 'd' as above and plot 18-3 split into two for treatments 'a' and 'b. Plots 19 and 20 received no further chalk after 1968; plot 18/2 no further chalk after 1972.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

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11/R/PG/5

Experimental diary

			Rate	Unit
29-Nov-10	f	Applied Triple Super Phosphate - As treatment (see plan for details)	171	kg/ha
29-Nov-10	f	Applied Triple Super Phosphate - As treatment (see plan for details)	73	kg/ha
19-Jan-11	a	Removed fallen branch		
09-Feb-11	f	Applied Potassium Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16, 18 and 20 only	542	kg/ha
09-Feb-11	f	Applied Soduim Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16 and 18 only	43	kg/ha
09-Feb-11	f	Applied Magnesium Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16 and 18 only	111	kg/ha
24-Feb-11	f	Applied Soduim Sulphate - plots 8,10 and 11-2	43	kg/ha
24-Feb-11	f	Applied Magnesium Sulphate - plots 8,10 and 11-2	111	kg/ha
24-Feb-11	f	Applied Potassium Sulphate - plot 11-2	542	kg/ha
24-Feb-11	f	Applied silicate of soda - plot 11-2	450	kg/ha
25-Feb-11	f	Applied Potassium Sulphate - plots 2-1 and 20 (plot 20 received a total of 542 kg/ha in two applications on Feb 9 & 25.	542	kg/ha
24-Mar-11	f	Applied Ammonium Sulphate Fertiliser - See plan for details of treatments		
24-Mar-11	f	Applied Sodium Nitrate - See plan for details of treatments		
25-Mar-11	a	Applied Poultry manure - To plot 13/2	2	t/ha
13-Apr-11	p	Phostoxin - Gassed moles		
18-Apr-11	a	Cut surrounds - Cut round trial		
19-Apr-11	a	Cut paths		
04-May-11	a	Cut around edge of trial		
05-May-11	a	Cut paths		
17-May-11	a	Cut paths		
25-May-11	a	Cut around edge of trial		
08-Jun-11	a	Cut paths		
22-Jun-11	a	Cut yields - to finish		
23-Jun-11	a	Cut yields - 1st Cut yields.		
23-Jun-11	a	Cut discards		
23-Jun-11	a	Turned grass - Hay making		
24-Jun-11	a	Turned hay - Turned twice		
24-Jun-11	a	Rowed up hay		
24-Jun-11	a	Baled by contractor and removed.		
29-Jun-11	a	Cut paths		
30-Jun-11	a	Put out marker posts		
01-Aug-11	a	Cut paths		
03-Nov-11	a	Cut paths		

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21-Nov-11	a	Cut yields - 2nd cut, herbage weighed and sampled
22-Nov-11	a	Cut yields - 2nd cut. herbage weighed and sampled; finished
22-Nov-11	a	Cut and baled - removed grass

1ST CUT (22-24/6/11) DRY MATTER TONNES/HECTARE

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

Grand mean 2.87

	Manure	Lime	a	b	c	d	Mean
N1	1		2.04	1.28	0.96	0.81	1.27
K	2/1		1.06	1.32	0.42	0.38	0.80
None (FYM)	2/2		1.08	1.25	0.53	0.62	0.87
None	3		0.93	1.39	0.35	0.58	0.81
P	4/1		2.95	2.49	1.85	1.87	2.29
N2P	4/2		2.63	2.83	2.60	1.32	2.34
N1PKNaMg	6		4.75	4.81			4.78
PKNaMg	7		4.44	4.51	3.91	1.99	3.71
PNaMg	8		2.68	2.70	2.35	2.57	2.58
PKNaMg (N2)	9/1		4.00	4.23	2.59	0.69	2.88
N2PKNaMg	9/2		5.47	5.56	3.56	2.28	4.22
N2PNaMg	10		2.67	3.14	3.04	1.53	2.59
N3PKNaMg	11/1		6.18	4.80	4.91	2.35	4.56
N3PKNaMgSi	11/2		5.07	4.57	4.20	3.28	4.28
None	12		1.99	1.35	0.96	0.94	1.31
(FYM/F)	13/1		3.56	3.54	2.52	1.38	2.75
FYM/PM	13/2		4.28	5.07	3.66	3.29	4.08
PKNaMg (N2*)	14/1		3.95	3.91	3.93	4.25	4.01
N2*PKNaMg	14/2		4.67	4.41	4.10	3.46	4.16
PKNaMg (N2*)	15		4.55	4.24	4.19	1.75	3.68
N1*PKNaMg	16		5.01	5.45	4.83	3.59	4.72
N1*	17		1.83	1.74	1.48	1.84	1.72
N2KNaMg	18		1.35	1.74	1.65	0.61	1.34
N2KNaMg	18/2						2.56
FYM	19/1						2.73
FYM	19/2						3.68
FYM	19/3						3.16
FYM/N*PK	20/1						4.39
FYM/N*PK	20/2						3.97
FYM/N*PK	20/3						4.67

1ST CUT MEAN DM% 27.9

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11/R/PG/5

2ND CUT (21-22/11/11) DRY MATTER TONNES/HECTARE

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

Grand Mean 1.14

	Manure	Lime	a	b	c	d	Mean
N1	1		1.02	0.77	0.76	0.74	0.82
K	2/1		0.76	0.56	0.48	0.44	0.56
None (FYM)	2/2		0.63	0.65	0.49	0.70	0.62
None	3		0.70	0.95	0.46	0.78	0.72
P	4/1		1.27	1.04	1.26	1.21	1.20
N2P	4/2		1.31	1.19	1.24	1.21	1.24
N1PKNaMg	6		0.84	0.81			0.83
PKNaMg	7		1.01	1.04	1.50	1.02	1.14
PNaMg	8		1.35	1.32	1.42	1.47	1.39
PKNaMg (N2)	9/1		1.16	1.31	1.04	0.32	0.96
N2PKNaMg	9/2		1.33	1.26	1.20	1.97	1.44
N2PNaMg	10		0.70	1.01	1.13	1.63	1.12
N3PKNaMg	11/1		1.41	1.07	1.04	2.72	1.56
N3PKNaMgSi	11/2		1.63	1.24	1.23	3.18	1.82
None	12		1.12	0.78	0.75	0.61	0.81
(FYM/F)	13/1		1.51	1.53	1.10	0.61	1.19
FYM/PM	13/2		1.52	2.19	2.01	1.65	1.84
PKNaMg (N2*)	14/1		0.94	1.10	1.34	1.44	1.21
N2*PKNaMg	14/2		0.94	1.01	0.95	1.32	1.06
PKNaMg (N2*)	15		1.01	1.19	1.42	1.01	1.16
N1*PKNaMg	16		1.27	1.44	1.70	1.28	1.42
N1*	17		1.04	1.13	0.93	1.18	1.07
N2KNaMg	18		0.73	0.81	0.91	0.29	0.68
N2KNaMg	18/2						1.15
FYM	19/1						1.32
FYM	19/2						1.34
FYM	19/3						1.11
FYM/N*PK	20/1						1.66
FYM/N*PK	20/2						1.32
FYM/N*PK	20/3						1.39

2ND CUT MEAN DM% 24.55

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11/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

Grand Mean 4.01

	Manure	Lime	a	b	c	d	Mean
N1	1		3.06	2.05	1.72	1.54	2.09
K	2/1		1.82	1.89	0.90	0.82	1.36
None (FYM)	2/2		1.71	1.90	1.02	1.31	1.49
None	3		1.63	2.34	0.81	1.36	1.54
P	4/1		4.21	3.53	3.12	3.09	3.49
N2P	4/2		3.94	4.02	3.85	2.54	3.58
N1PKNaMg	6		5.59	5.62			5.61
PKNaMg	7		5.45	5.56	5.41	3.01	4.86
PNaMg	8		4.03	4.02	3.76	4.04	3.96
PKNaMg (N2)	9/1		5.16	5.54	3.63	1.01	3.84
N2PKNaMg	9/2		6.80	6.83	4.76	4.25	5.66
N2PNaMg	10		3.37	4.15	4.17	3.16	3.71
N3PKNaMg	11/1		7.59	5.87	5.96	5.07	6.12
N3PKNaMgSi	11/2		6.70	5.81	5.43	6.46	6.10
None	12		1.10	2.13	1.71	1.54	2.12
(FYM/F)	13/1		5.07	5.07	3.62	1.99	3.94
FYM/PM	13/2		5.80	7.25	5.67	4.94	5.92
PKNaMg (N2*)	14/1		4.89	5.01	5.27	5.69	5.22
N2*PKNaMg	14/2		5.61	5.42	5.05	4.78	5.21
PKNaMg (N2*)	15		5.55	5.42	5.61	2.76	4.84
N1*PKNaMg	16		6.28	6.88	6.53	4.87	6.14
N1*	17		2.87	2.86	2.41	3.02	2.79
N2KNaMg	18		2.08	2.55	2.56	0.90	2.02
N2KNaMg	18/2						3.71
FYM	19/1						4.06
FYM	19/2						5.03
FYM	19/3						4.27
FYM/N*PK	20/1						6.06
FYM/N*PK	20/2						5.29
FYM/N*PK	20/3						6.06

TOTAL OF 2 CUTS MEAN DM% 26.25

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11/R/GC/8

GARDEN CLOVER

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

The 158th year, red clover.

For previous years see `Details' 1967 and 1973, and Yield books for 74-10/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:

		Rate	Unit
16-Dec-10	Magnesium sulphate	520	kg/ha
	TSP	158	kg/ha
	Potassium sulphate	300	kg/ha
	and chalk - applied to whole experiment	1.25	kg/ha
09-May-11	First cut		
30-Jun-11	Second cut		
24-Aug-11	Third cut		

NOTE: Samples of clover taken from each cut for chemical analysis

1ST CUT (09/05/11) DRY MATTER TONNES/HECTARE

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

Grand mean 3.85

FUNG_RES	NONE	BENOMYL
	4.21	3.50

1ST CUT MEAN DM% 21.9

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11/R/GC/8

SECOND CUT (30/06/11) DRY MATTER TONNES/HECTARE

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

Grand mean 4.19

FUNG_RES	NONE	BENOMYL
	4.63	3.76

2ND CUT MEAN DM% 18.8

THIRD CUT (24/08/11) DRY MATTER TONNES/HECTARE

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

Grand mean 4.10

FUNG_RES	NONE	BENOMYL
	4.08	4.11

3RD CUT MEAN DM% 22.3

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

Grand mean 12.14

FUNG_RES	NONE	BENOMYL
	12.92	11.37

TOTAL OF 3 CUTS MEAN DM% 21.0

PLOT AREA HARVESTED CUT 1, 2 & 3 0.00014

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11/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without leys – Woburn, Stackyard D.

Sponsors: A. J. Macdonald

The 74th year, leys, w. beans, w. wheat, w. rye

For previous years see 'Details' 1967 & 1973 and Yield Books for 74-10/W/RN/3.

Design: 5 series of 8 plots, split for treatments other than rotations.

Whole plot dimensions: 8.53 x 40.7

Treatments: All phases of four five-course rotations were originally present:

ROTATION

LEY	Clover/grass ley:	L, L, L, P, W
CLO	All legume ley:	SA, SA,SA, P, W until 1971 then CL, CL, CL, P, W.
A	Arable with roots:	P, R, C, P, W until 1971 then P, B, B, P, W.
A H	Arable with hay:	P, R, H, P, W until 1971 then P, B, H, P, W.

P = potatoes, R = w. rye, C = carrots, W= w. wheat, B = s. barley, H = hay, L = clover/grass ley, SA = sainfoin ley, CL = red clover ley.

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated.
On four plots in each block arable rotations alternated each five years with ley rotations.
From 1976 all the rotations were changed on all phases except for the first and second test crops in 1976:

LN 3	(Previous LEY) LN1, LN2, LN3, W, R
LC 3	(Previous CLO) LC1, LC2, LC3, W, R
AF	(Previous A) F, F, BE, W, R
AB	(Previous A H) B, B, BE, W, R

From 1988 rotations AF and AB are replaced by AM and ABe respectively. Phased in at the beginning of each treatment crop sequence.

AM	R, BE, M, W, R
ABe	R, M, BE, W, R

LN1 to LN3 = three year grass ley with N, 1st year to 3rd year,
LC= clover/grass ley, no N, BE = beans (s. oats until 1980), F = fallow,
M = forage maize

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11/W/RN/3

Plots hitherto in alternating rotations were changed to test eight-year leys and two test crops:

LLN LLN1, LLN2, LLN3, LLN4, LLN5, LLN6, LLN7, LLN8, W, R
LLC LLC1, LLC2, LLC3, LLC4, LLC5, LLC6, LLC7, LLC8, W, R
LLN1 to LLN8 = eight year grass ley with nitrogen, first year to eighth year, similarly for LLC – clover/grass ley, no nitrogen

The new scheme started by sowing these new leys in spring 1976 on four phases and in spring 1977 on the fifth phase (2nd test crop in 1976).

In 1992 w. rye (R) replaced s. barley (B) as the second test crop. Yields are taken from the leys, arable treatment crops and the test crops.

From 2007 plots previously in the 1st cycle of testing eight-year leys followed by two arable test crops (i.e. those plots which were changed to eight-year ley treatments in 1976 or 1977) changed to a three-year arable rotation followed by two arable test crops. Plots were "phased in" but joined the relevant point in the rotation. From 2008 the second cycle 8-yr grass and grass/clover leys changed to 3-yr grass or grass/clover leys respectively. They will be phased in between 2008 and 2012.
LLN/AO (Previously 1st cycle, 8-yr grass ley) R, BE, O, W, R
LLC/ABe (Previously 1st cycle, 8-yr grass/clover ley) R, O, BE, W, R
LLC/LC3 (Previously 2nd cycle, 8-yr grass ley) Lc 1, Lc 2, Lc 3, W, R
LLN/LN3 (Previously 2nd cycle, 8-yr grass/clover ley) Ln 1, Ln 2, Ln 3, W, R

From 2009 W oats (O) replaced forage maize (M) in the AM and ABe rotations on block III and were phased in on blocks V, IV, II and I in subsequent years. The AM treatment was re-named AM/AO.

Treatments to first test crop w. wheat, all combinations of:

Whole plots:

1. **ROTATION** Rotations before wheat:

   LLN 8
   LN 3
   LLC 8
   LC 3
   LLC/LC3 not yet in phase
   LLN/LN3 not yet in phase
   LLN/AO not yet in phase
   LLC/ABe not yet in phase
   AM/AO
   ABe

1/ 2 plots:

2. **NSPLIT(FYM res)** Farmyard manure residues, last applied 1960s:
   Split N v single N dressing to wheat, tested 2001-5

   Nsplit (noFYM)
   Nsingle(FYM)

1/8 plots:

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11/W/RN/3

3. **N** Nitrogen fertilizer as split dressings in spring 2011 (kg N) as 34.5% N:

0	0	
80	40 + 40	) to be applied
160	40 + 120	) late-February/early-March
240	40+ 200	) and mid-April

Treatments to second test crop w.rye, all combinations of:

Whole plots:

1. **ROTATION** Rotations before first test crop:
   LLN8
   LN 3
   LLC 8
   LC 3
   LLC/LC3 not yet in phase
   LLN/LN3 not yet in phase
   LLN/AO not yet in phase
   LLC/ABe not yet in phase
   AM/AO
   ABe

1/ 2 plots:

2. **NSPLIT(FYM res)** Farmyard manure residues, last applied 1960s:
   Nsplit to wheat (no FYM)
   Nsingle to wheat (FYM)

   1/8 plots:

3. **N** Nitrogen fertilizer in spring 2009 (kg N) as 34.5%:
   0
   50
   100
   150

Treatments to leys:

FYM RES Farmyard manure residues:

NONE
FYM 38 t on each occasion, last applied 1960s.

NOTE: Corrective K dressings (kg K_2O ha^{-1}) as muriate of potash, applied where necessary to first test crop w. wheat and long-term leys in the wheat block, applied about September 2010 (actual date not recorded).

Continuous rotations	No FYM	FYM Res
Before wheat	Half plots	Half plots
Abe/Be	250	270
AO/O	300	350
LLn/AO	30	120
None to other plots.		

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11/W/RN/3

Experimental Diary

Grass ley and clover/grass ley (ROTATION LN1, LLN/LN1, LC1, LLC/LC1**)**

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200 l/ha. To all stubbles and grass to be ploughed out.	4	l/ha
24-Oct-10	f	Broadcast Potassium Sulphate	140	kg/ha
		and TSP.	213	kg/ha
25-Oct-10	a	Ploughed, ransomes 3 furrow at 14". Plots for Wheat, Rye, Oats and Leys only.		
29-Oct-10	a	Rotary Harrowed, plots for Wheat, Oats, Rye and Leys only.		
29-Oct-10	s	Drilled Ley mixture. Grass only ley, Laura Fescue and Promesse Timothy, 50/50 split. Grass/Clover ley, Laura, Promesse and Avota white Clover, 44/44/12 split.	40	kg/ha
29-Oct-10	a	Cambridge Rolled.		
01-Nov-10	f	Broadcast Nitrochalk, 27%N:		
		Clover/Grass ley.	93	kg/ha
		Grass ley.	185	kg/ha
25-Mar-11	f	Broadcast Nitram, to grass only ley plots.	217	kg/ha
25-Mar-11	f	Broadcast Muriate of Potash, to all ley plots.	167	kg/ha
21-Jun-11	a	Yield strip mown, sampled and weighed (Cut 1).		
22-Jun-11	a	Mown with Kuhn.		
25-Jun-11	a	Leys tedded.		
26-Jun-11	a	Windrowed.		
27-Jun-11	a	Round baled.		
31-Oct-11	a	Yield strip mown, sampled and weighed (Cut 2).		

Grass ley and clover/grass ley (ROTATION, LN2-3, LLN/LN2-3, LC2-3, LLC/LC2-3**)**

			Rate	Unit
25-Mar-11	f	Broadcast Nitram, to grass only ley plots.	217	kg/ha
25-Mar-11	f	Broadcast Muriate of Potash, to ley plots.	167	kg/ha
25-Mar-11		Broadcast Potassium Sulphate	140	kg/ha
		and TSP.	213	kg/ha
21-Jun-11	a	Yield strip mown, sampled and weighed (Cut 1).		
22-Jun-11	a	Mown with Kuhn.		
25-Jun-11	a	Leys tedded.		
26-Jun-11	a	Windrowed.		
27-Jun-11	a	Round baled.		
27-Jun-11	f	Broadcast 34.5 % N Nitram. Grass only ley plots on blocks 2 and 4.	217	kg/ha
27-Jun-11	f	Broadcast Muriate of Potash. Ley plots only on blocks 2 and 4.	83	kg/ha

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15-Aug-11	p	Sprayed Hoedown in 200l/ha. To all crops except leys to be kept.	4	l/ha
31-Oct-11	a	Yield strip mown, sampled and weighed (Cut 2).		

W Beans

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200 l/ha to all stubbles and grass to be ploughed out.	4	l/ha
24-Oct-10	f	Broadcast TSP, pre arable crops only.	127	kg/ha
14-Dec-10	s	Broadcast Wizard @ 33 seeds/m^2. Ploughed in with Ransomes 3 furrow at 14".		
25-Mar-11	f	Broadcast Potassium Sulphate to arable crops.	150	kg/ha
15-Aug-11	p	Sprayed Hoedown in 200 l/ha.	4	l/ha
31-Aug-11	a	Combined plots for yields with Sampo and swathed straw		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		

W Wheat (1st Test Crop)

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200 l/ha.	4	l/ha
24-Oct-10	f	Broadcast TSP.	127	kg/ha
25-Oct-10	a	Ploughed with Ransomes 3 furrow at 14".		
29-Oct-10	a	Rotary Harrowed.		
29-Oct-10	s	Drilled Glasgow, dressed Redigo Deter, 350 seeds/m^2.		
29-Oct-10	a	Cambridge Rolled.		
22-Mar-11	f	Broadcast Nitrochalk, 27%N; 1st Split N application, as scheduled.	145	kg/ha
25-Mar-11	f	Broadcast Potassium Sulphate, to arable crops.	150	kg/ha
28-Mar-11	p	Sprayed Cherokee	1.25	l/ha
		and Manganese in 200l/ha.	1.50	l/ha
12-Apr-11	f	Broadcast Nitrochalk, 27%N; 2nd Split N application:		
		Nitrochalk – N1 plots	145	kg/ha
		Nitrochalk – N2 plots	436	kg/ha
		Nitrochalk – N3 plots	727	kg/ha
11-May-11	p	Sprayed Tracker	1.0	l/ha
		with Bravo 500	1.0	l/ha
		Justice	0.25	l/ha
		and CCC; all in 200l/ha.	2.25	l/ha
20-May-11	p	Sprayed Thor in 200l/ha.	20	g/ha
15-Aug-11	p	Sprayed Hoedown in 200l/ha.	4	l/ha
31-Aug-11	a	Combined for yields with Sampo and swathed straw		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		

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W Rye (2nd Test Crop)

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200 l/ha.	4	l/ha
21-Oct-10	a	Broadcast Limestone, block 1 only.	5	t/ha
24-Oct-10	f	Broadcast TSP.	127	kg/ha
25-Oct-10	a	Ploughed, Ransomes 3 furrow at 14".		
29-Oct-10	a	Rotary Harrowed plots.		
29-Oct-10	s	Drilled Agronom, dressed Tripod, 350 seeds/m^2.		
29-Oct-10	a	Cambridge Rolled.		
25-Mar-11	f	Broadcast Potassium Sulphate.	150	kg/ha
12-Apr-11	f	Broadcast Nitrochalk, 27%N, as scheduled.		
		Nitrochalk – rye, N1 plots	180	kg/ha
		Nitrochalk – rye, N2 plots	364	kg/ha
		Nitrochalk – rye, N3 plots	545	kg/ha
18-Apr-11	f	Broadcast Nitram, 34.5 %N; treatment crops only.	290	kg/ha
31-Aug-11	a	Combined all plots for yields with Sampo and swathed straw		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		

W Oats (Rotation)

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200 l/ha.	4	l/ha
24-Oct-10	f	Broadcast TSP, pre arable crops only.	127	kg/ha
25-Oct-10	a	Ploughed, Ransomes 3 furrow at 14".		
29-Oct-10	a	Rotary Harrowed plots.		
29-Oct-10	s	Drilled Gerald, 350 seeds/m^2.		
29-Oct-10	a	Cambridge Rolled.		
25-Mar-11	f	Broadcast Potassium Sulphate.	150	kg/ha
18-Apr-11	f	Broadcast Nitram N, 34.5 %N.	290	kg/ha
20-May-11	p	Sprayed Thor in 200l/ha	20	g/ha
31-Aug-11	a	Combined all plots for yields with Sampo and swathed straw		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		

11/W/RN/3

LEYS

1st CUT (21/06/11) DRY MATTER TONNES/HECTARE

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

FYM_RES	NONE	FYM	Mean
LEY			
LC1	1.93	2.31	2.12
LC2	4.09	3.39	3.74

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LC3	4.29	2.88	3.59
LN1	4.30	3.82	4.06
LN2	4.78	5.18	4.98
LN3	5.26	5.52	5.39
(LLC/LC) LC1	3.76	2.87	3.31
(LLC/LC) LC2	4.21	3.55	3.88
(LLC/LC) LC3	4.29	4.49	4.39
(LLC/LC) LN1	4.01	4.69	4.35
(LLC/LC) LN2	4.72	4.59	4.66
(LLC/LC) LN3	5.32	6.01	5.67
MEAN	4.25	4.11	4.18

1ST CUT MEAN DM% 28.3
1ST CUT Units AREA HARVESTED 0.00200

2nd CUT (24-30/11/11) DRY MATTER TONNES/HECTARE

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

FYM_RES LEY	NONE	FYM	Mean
LC1	0.25	0.35	0.30
LC2	1.20	0.84	1.02
LC3	0.00	0.00	0.00
LN1	0.40	0.40	0.40
LN2	2.00	1.67	1.84
LN3	0.00	0.00	0.00
(LLC/LC) LC1	0.40	0.34	0.37
(LLC/LC) LC2	1.31	1.05	1.18
(LLC/LC) LC3	0.00	0.00	0.00
(LLC/LC) LN1	0.47	0.66	0.56
(LLC/LC) LN2	0.90	1.18	1.04
(LLC/LC) LN3	0.00	0.00	0.00
MEAN	0.58	0.54	0.56

2nd CUT MEAN DM% 27.2
2nd CUT Units AREA HARVESTED 0.00200

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM_RES LEY	NONE	FYM	Mean
LC1	2.18	2.66	2.42
LC2	5.29	4.24	4.76
LC3	4.29	2.88	3.59
LN1	4.70	4.22	4.46

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LN2	6.78	6.85	6.82
LN3	5.26	5.52	5.39
(LLC/LC) LC1	4.17	3.20	3.69
(LLC/LC) LC2	5.53	4.60	5.06
(LLC/LC) LC3	4.29	4.49	4.39
(LLC/LC) LN1	4.48	5.34	4.91
(LLC/LC) LN2	5.62	5.77	5.69
(LLC/LC) LN3	5.32	6.01	5.67
MEAN	4.83	4.65	4.74

TOTAL OF 2 CUTS MEAN DM% 28.3

AREA HARVESTED 0.00200

ARABLE TREATMENT CROPS
11/W/RN/3

BEANS

GRAIN TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
(AO) Be	1.68	1.60	1.64
(LLn/AO) Be	1.27	1.29	1.28
(LLc/ABe) Be	3.49	4.37	3.93
(ABe) Be	1.68	1.71	1.70
MEAN	2.03	2.25	

Grain mean DM% 83.6
Plot area harvested 0.00413

OATS

GRAIN TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
(Abe) O	5.16	5.12	5.14
(AO) O	5.95	6.28	6.12
(LLc/Abe) O	3.55	3.16	3.35
(LLn/AO) O	6.73	6.35	6.54
Mean	5.35	5.23	

Grain mean DM% 86.7
Plot area harvested 0.00413

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RYE

GRAIN TONNES/HECTARE

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

FYMRES	NONE	FYM	Mean
ROTATION			
(ABe) R	3.83	3.39	3.61
(AO) R	3.22	3.49	3.36
(LLn/AO) R	5.49	5.56	5.53
(LLc/ABe) R	4.34	4.20	4.27
MEAN	4.22	4.16	4.19

Grain mean DM%	84.6
Plot area harvested	0.00413

W.WHEAT (1st TEST CROP)

GRAIN TONNES/HECTARE

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

ROTATION	**FYMRES**	**none**	**FYM**	Mean
LLn/Ln		4.52	5.32	4.92
Ln		4.94	4.54	4.74
LLc/ABe		4.79	4.67	4.73
Lc		4.73	4.38	4.55
AO		3.39	3.55	3.47
ABe		2.49	3.88	3.19
LLn/AO		4.64	5.39	5.02
LLc/Lc		5.48	5.93	5.71
MEAN		4.37	4.71	4.54

ROTATION	**N**	**0**	**80**	**160**	**240**
LLn/Ln		3.37	4.22	6.22	5.89
Ln		2.92	4.99	5.70	5.34
LLc/ABe		2.77	4.27	5.92	5.95
Lc		2.62	4.88	5.64	5.07
AO		1.25	2.92	4.59	5.11
ABe		0.87	2.75	4.88	4.25
LLn/AO		2.28	4.61	6.30	6.87
LLc/Lc		3.25	5.75	6.68	7.13
MEAN		2.42	4.30	5.74	5.70

FYMRES	**N**	**0**	**80**	**160**	**240**
None		2.18	4.09	5.63	5.59
FYM		2.65	4.51	5.85	5.82

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	FYMRES				
ROTATION	**N**	**0**	**80**	**160**	**240**
LLn/Ln	none	3.23	3.85	5.57	5.45
	FYM	3.50	4.59	6.87	6.33
Ln	none	3.02	5.37	5.94	5.41
	FYM	2.82	4.61	5.45	5.28
LLc/ABe	none	2.49	3.56	6.78	6.35
	FYM	3.06	4.99	5.06	5.55
Lc	none	2.15	4.87	6.11	5.77
	FYM	3.09	4.90	5.18	4.36
AO	none	1.29	2.85	4.64	4.79
	FYM	1.21	2.99	4.55	5.44
ABe	none	0.44	2.35	4.05	3.14
	FYM	1.29	3.15	5.72	5.37
LLn/AO	none	1.87	4.29	5.63	6.77
	FYM	2.70	4.93	6.96	6.97
LLc/Lc	none	2.96	5.62	6.35	7.00
	FYM	3.54	5.89	7.02	7.27

Plot area harvested		0.00192
Grain mean	DM%	84.3

RYE (2nd TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES	none	FYM	MEAN
ROTATION			
LLn/Ln	4.23	4.91	4.57
Ln	4.93	5.01	4.97
LLc/Lc	5.02	4.17	4.60
Lc	4.26	4.95	4.60
AO	3.59	3.61	3.60
ABe	3.60	3.86	3.73
LLn/AO	3.74	3.95	3.84
LLc/Abe	4.19	3.77	3.97

N	0	50	100	150
ROTATION				
LLn/Ln	2.72	5.17	5.32	5.07
Ln	3.47	4.82	5.44	6.15
LLc/Lc	3.40	4.38	5.43	5.17
Lc	3.57	4.48	5.34	5.01
AO	1.25	3.46	4.66	5.02
ABe	1.76	3.61	4.55	4.99
LLn/AO	2.42	3.47	4.48	4.99
LLc/ABe	2.34	3.28	4.96	5.32
MEAN	2.62	4.09	5.02	5.22

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N	0	50	100	150	Mean
FYMRES					
None	2.77	3.97	4.88	5.16	4.19
FYM	2.47	4.20	5.17	5.27	4.28

N		0	50	100	150
ROTATION					
FYMRES					
LLn/Ln	none	2.82	4.23	4.71	5.14
	FYM	2.62	6.10	5.93	4.99
Ln	none	3.71	4.87	5.12	6.04
	FYM	3.23	4.78	5.77	6.26
LLc/Lc	none	3.96	4.79	5.72	5.63
	FYM	2.84	3.98	5.14	4.71
Lc	none	3.47	4.03	4.88	4.64
	FYM	3.68	4.94	5.79	5.38
AO	none	1.35	3.29	4.64	5.09
	FYM	1.15	3.64	4.68	4.95
ABe	none	1.93	3.60	4.42	4.45
	FYM	1.59	3.63	4.69	5.54
LLn/AO	none	2.36	3.24	4.62	4.74
	FYM	2.48	3.71	4.35	5.24
LLc/ABe	none	2.55	3.70	4.91	5.55
	FYM	2.13	2.86	5.01	5.09

Plot area harvested	0.00192
Grain mean DM%	84.5

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11/W/RN/12

ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the effects of a range of types of organic matter – Woburn, Stackyard B.

Sponsors: A. J. Macdonald

The 47th year, winter wheat

For previous years see 'Details' 1973 and Yield Books for 74-10/W/RN/12.

Design: 4 blocks of 8 plots

Whole plot dimensions: 8.0 x 29.5 (8.0 x 26.5 on Block III).

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter from different sources. An arable rotation was started on two blocks on 1972 and the remaining two blocks in 1973. After a period of testing the residues, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. A second test phase began when leys on the first pair of blocks were ploughed for the 1st test crop in 1987 and on the second pair for the 1st test crop in 1988. From 1988 two blocks, and 1989 the other two, to 1994, plots were split into 6 sub-plots to test five levels of nitrogen and nil. From 1995 to 1997 residual effects of that nitrogen were measured. In 1998 to 2000 yields were taken from whole plots only. In 2001 plots were split into half-plots to test two rates of N.
For 2003 the experiment was modified to test further inputs of organic matter. An arable rotation (w. rye, s. barley, w. beans, w. wheat, forage maize) was started on seven plots within each block; the eighth was sown to a grass/clover ley.

Whole plots

1. **Treatment** (Not necessarily applied each year):

1966-1971/2	1979/82-1986/7	Since 2003
Fd	Fd	F
Ln	Lc6	F
St	St	St
Gm	Lc8	CC
Pt	Lc8	Co
Fs	Fs	Dg10
Dg	Dg	Dg25
Lc	Lc6	Lc

F: no organic amendment. St: chopped straw at 7.5t/ha. CC: cover crop prior to spring sown crops. Co: compost at 40t/ha. Dg10: FYM at 10t/ha. Dg25: FYM at 25t/ha. Dg: FYM at 50t/ha. Fd: fertilizers equivalent to FYM. Fs: fertilizers equivalent to straw (+P). Lc/Lc6/Lc8: grass/clover leys. Ln: grass ley + N. Gm: green manure. Pt: peat.

Since 2003, all treatments, except Dg25, have also received PKS fertilizers:
20 kg P/ha, 83 kg K/ha, 36 kg S/ha

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11/W/RN/12

In addition in 2003 F and CC treatments received 120 kg N/ha, St received 90 kg N/ha. Dg10 received 60 kg N/ha. No N was applied to Dg25, Co or Lc treatments.

Nitrogen
In 2008 all plots, except Lc (permanent grass/clover), split into 6 to test rates of N. For crops receiving nitrogen rates rotate as follows:
N0 > N1 > N2 > N3 > N4 > N5 > N0 etc.

For 2009 s. barley crop nitrogen rates (kg N/ha) were:
0, 35, 70, 105, 140, 175 as nitro-chalk (27% N).

No N was applied to the beans in 2010

For 2011 W. wheat nitrogen rates (kg N/ha) were:
0, 50, 100, 150, 200, 250 as nitro-chalk (27% N),

Experimental Diary

			Rate	Unit
30-Sep-10	p	Sprayed Gallup 360 in 200l	4.0	l/ha
10-Oct-10	a	Straw treatment applied, chopped and spread -Straw plots only.		
11-Oct-10	a	Compost and FYM treatments applied by manure spreader as scheduled.		
12-Oct-10	a	Ploughed - With Ransomes 3 furrow. Arable plots only.		
14-Oct-10	s	Rotary Harrowed, drilled Gallant, dressed Redigo, arable plots only. 360 seeds/m^2.		
21-Mar-11	f	Broadcast Nitrochalk, 27%N Early N application (N1) as scheduled to N1, N2, N3, N4 and N5 plots.	185	kg/ha
25-Mar-11	f	Broadcast Potassium Sulphate	200	kg/ha
		and TSP - All plots except Dg 25.	97.5	kg/ha
28-Mar-11	p	Sprayed Cherokee	1.25	l/ha
		with Manganese in 200l/ha - Wheat	1.5	l/ha
13-Apr-11	f	Broadcast Nitrochalk, 27%N. Main N application to wheat, as scheduled - N2, N3, N4 or N5 plots	370-926	kg/ha
11-May-11	p	Sprayed Tracker	1.0	l/ha
		with Bravo 500	1.0	l/ha
		with Justice	0.25	l/ha
		and CCC. - Wheat only. All in 200l	2.25	l/ha
21-Jun-11	a	Yield strip mown, sampled and weighed. - Ley plots only.		
22-Jun-11	a	Mown with Kuhn. Leys only.		
25-Jun-11	a	Leys tedded.		
26-Jun-11	a	Windrowed - Leys only.		
27-Jun-11	a	Round baled - Ley plots only.		
15-Aug-11	p	Sprayed Hoedown in 200l - Wheat only.	4.0	l/ha
01-Sep-11	a	Combined plots for yield		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		

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GRAIN TONNES/HECTARE

***** Table of means *****

Nitrogen Treatment	0	50	100	150	200	250	Mean
F(Fd)	0.36	1.97	3.28	3.50	4.13	3.98	2.87
F(Ln,Lc6)	0.79	2.34	3.76	3.73	3.97	4.99	3.26
St(St)	0.38	2.38	3.63	3.97	4.37	4.34	3.18
CC(Gm,Lc8)	0.84	2.19	3.58	4.22	4.34	4.69	3.31
Co(Pt,Lc8)	1.84	3.13	4.03	4.09	4.57	4.79	3.74
Dg10(Fs)	0.68	2.31	3.26	4.01	4.10	4.35	3.12
Dg25(Dg)	1.48	2.76	3.54	3.60	4.01	3.83	3.20
Mean	0.91	2.44	3.58	3.87	4.21	4.42	3.24

Standard errors of differences of means

Table	Treatment	Nitrogen	Treatment Nitrogen
s.e.d.	0.276	0.116	0.394

Except when comparing means with the same level(s) of Treatment 0.308

Stratum standard errors and coefficients of variations

Stratum	d.f	se	cv%
Block plots	18	0.391	12.1
Blocks.Plots.Splots	105	0.435	13.4

Grain mean DM% 85.3

Plot area harvested 0.00185

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11/W/RN/12

GRASS/CLOVER

DRY MATTER TONNES/HECTARE

***** Table of means *****

Year	1st Cut	2nd Cut	Total
2003	-	-	-
2004	1.82	-	1.82
2005	1.86	0.13	1.99
2006	4.07	-	4.07
2007	3.12	1.36	4.48
2008	5.72	1.65	7.37
2009	4.77	-	4.77
2010	4.41	-	4.41
2011	1.46	0.39	1.85

Cut dry matter t/ha (21/6/11 & 24/11/11)

Note: See previous Yield Books (2004-10) for cutting dates

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11/R/CS/326 and 11/W/CS/326

AMOUNTS OF STRAW

Object: To study the effects of different amounts of straw, incorporated into the soil, on w. wheat – Rothamsted (R) Great Knott III, Woburn (W) Far Field I

Sponsors: A Macdonald and M. J. Glendining,

The 25th year, w. wheat

For previous years see Yield Books for 87-10/R & W/CS/326

Design: 4 randomised blocks of 4 plots (R)
3 randomised blocks of 4 plots (W)

Whole plot dimensions: 3.0 x 13.5 (R). 0.004 ha
3.0 x 14.5 (W).

Treatments:

STRAW Amounts of straw incorporated into the seedbed (t/ha), cumulative to previous annual dressings:

		R	W
NONE	None	-	-
NORMAL	Normal	3.50	3.12
2 NORMAL	Twice normal	7.00	6.24
4 NORMAL	Four times normal	14.00	12.48

Experimental Diary

Great Knott III (R)

			Rate	Unit
04-Sept-10	a	Load straw		
13-Sep-10	a	Lime - Applied by contractors	4	t/ha
20-Sep-10	a	Reaper	3	l/ha
21-Sep-10	a	Ploughing started		
22-Sep-10	a	Ploughing completed		
11-Oct-10	a	Cultipressed		
15-Oct-10	a	Drilled Hereward trt Redigo Deter - 350 seeds/m^2	158	kg/ha
16-Oct-10	a	Rolled		
17-Oct-10	p	Sprayed Regatta - water volume = 200 l/ha	0.6	l/ha
13-Dec-10	p	Spread Avadex Excel 15 G	15	kg/ha
09-Mar-11	f	Applied Double Top Fertilizer -	133	kg/ha
29-Mar-11	p	Sprayed Cherokee in118 l water	1.25	l/ha
08-Apr-11	f	Applied Nitram Feriliser	262	kg/ha
13-Apr-11	p	Sprayed Pacifica	0.5	kg/ha
		and Bio-Power - wheat only	1.0	l/ha

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21-Apr-11	p	Sprayed Opus,	0.8	l/ha
		Bravo 500	1.0	l/ha
		and Agriguard Chlormequat - Wheat only. In 200 l water	2.25	l/ha
06-May-11	p	Sprayed Bravo 500,	1.0	l/ha
		Tracker,	1.0	l/ha
		Agriguard Chlormequat 720	2.25	l/ha
		and Justice in 200 l water. Wheat only	0.25	l/ha
10-May-11	f	Applied Nitram	261	kg/ha
11-May-11	a	Cut paths		
20-May-11	p	Sprayed Opus	0.8	l/ha
		Comet 200	0.6	l/ha
		and Bravo 500	1.0	l/ha
23-May-11	a	Cut paths		
08-Jun-11	a	Cut paths		
27-Jun-11	a	Cut paths		
26-Jul-11	a	Cut paths		
16-Aug-11	a	Combined for yields		

Far Field I (W)

			Rate	Unit
10-Oct-10	a	Straw treatment applied, chopped and spread, rate 1 = 15.3 kg.		
16-Oct-10	a	Ploughed with 3 furrow Ransome at 14".		
18-Oct-10	s	Combination Drilled Hereward, dressed Beret Gold.		
		Cambridge Rolled- 350 seeds/m^2.		
03-Mar-11	f	Broadcast Double Top	185	kg/ha
26-Mar-11	p	Sprayed Atlantis WG + Bio Power.		
		Atlantis	0.4	kg/ha
		with Biopower in 200 l water.	1.0	l/ha
28-Mar-11	p	Sprayed wheat with Cherokee	1.25	l/ha
		and Manganese in 200 l water.	1.5	l/ha
18-Apr-11	f	Broadcast 34.5 %N Nitram.	262	kg/ha
11-May-11	p	Sprayed Ally Max SX	42	g/ha
		with Gala with Opus	0.75	l/ha
		and Bravo 500 in 200 l water	1.0	l/ha
16-May-11	f	Broadcast Nitram, 34.5%N.	116	kg/ha
20-May-11	p	Sprayed Comet	0.6	l/ha
		with Opus	0.8	l/ha
		and Bravo 500 in 200 l water.	1.0	l/ha
01-Sep-11	a	Combined for yield		
02-Sep-11	a	Straw weights		

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11/R/CS/326

GRAIN TONNES/HECTARE

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

Treatment	
-	7.47
1	7.66
2	7.73
4	7.82
Mean	7.67

Standard errors of differences of means

Table	Treatment
s.e.d.	0.141

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.200	2.6

Grain mean dm% 81.8

STRAW TONNES/HECTARE

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

Treatment	
-	2.67
1	3.05
2	2.76
4	3.36
Mean	2.96

Standard errors of differences of means

Table	Treatment
s.e.d.	0.279

Stratum standard errors and coefficients of variation

Straw (at 85% dry matter) tonnes/hectare

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.394	13.3

Straw mean dm% 80.2

Plot area harvested 0.00284

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11/W/CS/326

GRAIN TONNES/HECTARE

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

Treatment	
-	3.40
1	4.05
2	3.25
4	3.24
Mean	3.49

Standard errors of differences of means

Table	Treatment
s.e.d.	0.656

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.803	23.0

GRAIN MEAN DM% 86.8

STRAW TONNES/HECTARE

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

Treatment	
-	1.56
1	1.92
2	1.60
4	1.53
Mean	1.65

Standard errors of differences of means

Table	Treatment
s.e.d.	0.347

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.4.25	25.7

STRAW MEAN DM% 90.8

Plot area harvested 0.00305

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11/R/CS/477

CONTINUOUS MAIZE

Object: To monitor the fate of organic carbon in the soil organic matter – Hoosfield

Sponsors: A. J. Macdonald

The 15th year, forage maize and s. barley

For previous years see Yield Books for 97-10/R/CS/477

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 12.0 x 25.0

Treatments:-

CROP Crop and straw treatments:

M	Continuous maize, stubble incorporated
(M)B	S. barley after five years maize, stubble incorporated
MT	Maize, stubble plus 10 t maize tops incorporated
B(M)	S. barley, after ten years of Maize, straw removed
BT	Continuous spring barley, straw removed plus 10 t maize tops incorporated
B	Continuous spring barley, straw removed

Note: Cropping was changed from Maize to S. barley on the BM treatment in 2010

Experimental diary

			Rate	Unit
29-Sep-10	a	Spread maize on plots - 300 kg per plot, on plots 3,6,9,12,16,18.	10	t/ha
30-Sep-10	p	Sprayed Barbarian - Water volume = 200 l/ha	4	l/ha
07-Oct-10	f	Triple Super Phosphate - Whole Experiment	171	kg/ha
07-Oct-10	f	Muriate of Potash - To whole experiment	181	kg/ha
10-Oct-10	a	Ploughed		
24-Mar-11	a	Spring tined		
25-Mar-11	s	Drilled Optic sp Barley trt Beret Multi @ 350 seeds/m^2. See plan for plots drilled barley and plots to be drilled Maize	153	kg/ha
25-Mar-11	a	Rolled - Spring barley plots and O+Es		
13-Apr-11	a	Flexi Tined - Ready to drill		
26-Apr-11	s	Drilled Hudson tr Mesurol @ 10.2 seeds/m^2 - Maize plots.		
26-Apr-11	a	Rolled maize plots		
26-Apr-11	p	Power harrow (Roadtare) Maize plots		
04-May-11	f	Applied Double Top Fertilizer - Barley and Maize	356	kg/ha

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09-May-11	p	Sprayed Acanto Prima,	1.6	kg/ha
		Harmony M SX	100	g/ha
		and Headland Charge in 200 l water.	0.75	l/ha
02-Jun-11	a	Cut paths		
14-Jun-11	p	Sprayed Bravo 500,	1.0	l/ha
		Flexity	0.2	l/ha
		and Mobius	0.43	l/ha
20-Jun-11	a	Cut paths		
30-Jun-11	p	Sprayed Callisto	1.0	l/ha
		and Samson in 200 l water	0.5	l/ha
30-Jul-11	p	Sprayed Statis 360 in 200l water - Sp barley only.	3	l/ha
01-Aug-11	a	Cut paths		
22-Aug-11	a	Combined s. barley for yields		
23-Sep-11	a	Cut Maize for yields - and discards		
12-Oct-11	a	Rolled		

MAIZE

WHOLE CROP (AT 100% DRY MATTER) TONNES/HECTARE

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

Treatment	
M	7.14
MT	6.60
Mean	6.87

Standard errors of differences of means

Table	Treatment
s.e.d.	0.451

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	2	0.552	8.0

MEAN DM% 18.4

PLOT AREA HARVESTED 0.00108

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SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
(M)B	4.98
BT	5.35
B	4.66
B(M)	6.06
Mean	5.26

Standard errors of differences of means

Table	Treatment
s.e.d.	0.296

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.362	6.9

Grain mean dm% 82.4

Plot area harvested 0.00525

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11/W/CS/478

CONTINUOUS MAIZE

Object: To monitor the fate of organic carbon in the soil organic matter – Woburn, Stackyard AI

Sponsors: A. J. Macdonald

The 15th year, forage maize and s. barley

For previous years see Yield Books for 97-10/W/CS/478

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 9.0 x 25.00

Treatments:-

CROP	Crop and straw treatments:
M	Continuous maize, stubble incorporated
(M)B	S. barley after five years maize, stubble incorporated
MT	Maize, stubble plus 10 t maize tops incorporated
B(M)	S. barley, after ten years of maize, straw removed
BT	Continuous spring barley, straw removed plus 10 t maize tops incorporated
B	Continuous spring barley, straw removed

Note: Cropping was changed from Maize to S. barley on the BM treatment in 2010

Experimental diary

			Rate	**Unit**
23-Nov-10	a	Spread chopped maize as scheduled. - Relevant plots only.		
23-Nov-10	a	Ploughed. - Dowdeswell 4 furrow at 14".		
25-Mar-11	a	Flexi Tined.		
25-Mar-11	s	Combination Drilled Optic @ 350 seeds/m^2. Cambridge rolled - Spring barley plots only.		
25-Apr-11	f	Broadcast Double Top. 27%N, 30% SO_3.	356	kg/ha.
05-May-11	a	Rotary Harrowed. Drilled Hudson dressed Mesurol. @ 10.2 seeds/m^2 - Maize plots.		
20-May-11	p	Sprayed Thor in 200l water - Spring Barley	20	g/ha.
07-Jun-11	p	Sprayed Callisto	1.0	l/ha
		with Samson in 220 l water - Maize plots only.	0.75	l/ha
01-Sep-11	a	Combined s. barley for yield		
02-Sep-11	a	Combined O+Es		
07-Sep-11	a	Baled and removed straw		
26-Sep-11	a	Cut Maize for yields		
06-Oct-11	a	Cut discards - Cut remainder of maize, bale and clear bales		

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11/W/CS/478

MAIZE

WHOLE CROP (AT 100% DRY MATTER) TONNES/HECTARE

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

Treatment	
M	9.92
MT	10.72
Mean	10.32

Standard errors of differences of means

Table	Treatment
s.e.d.	1.663

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	2	2.036	19.7

MEAN DM% 32.7

PLOT AREA HARVESTED 0.00108

SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
(M)B	3.80
BT	3.96
B	3.50
B(M)	4.56
Mean	3.95

Standard errors of differences of means

Table	Treatment
s.e.d.	0.150

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.183	4.6

Grain mean dm% 83.4 Plot area harvested 0.00525

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Rothamsted Experimental Station

The Weather : Monthly Summary : 2011

(Departure from 30-year means (1981 - 2010) in brackets)

	Sunshine		Mean temperatures °C								Rain			Drainage	Wind
			Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	20 inch	***
	Hours	( )	°C	( )	°C	( )	point	frosts *	30 cm	100 cm	12cm(5") turf wall		Days**	mm	km/hr
January	45.4	(-16.60)	6.0	(-0.68)	1.6	(+0.40)	2.28	16	4.6	5.9	84.6	(+14.63)	21	91.9	10.0
February	48.7	(-31.56)	8.8	(+1.89)	3.6	(+2.72)	4.04	8	5.6	6.2	56.8	(+6.66)	21	26.4	11.3
March	149.6	(+34.68)	10.7	(+0.85)	2.4	(-0.32)	3.18	15	6.6	6.8	10.0	(-40.80)	12	0.8	9.0
April	234.4	(+73.14)	17.6	(+4.98)	6.7	(+2.67)	6.61	4	10.8	9.4	5.2	(-49.86)	4	0.1	9.5
May	237.6	(+43.01)	17.4	(+1.32)	7.6	(+0.72)	6.47	4	12.8	11.6	23.6	(-31.09)	11	0.1	10.1
June	214.3	(+16.13)	19.0	(-0.14)	9.5	(-0.21)	9.36	1	14.7	13.0	83.0	(+29.74)	16	0.5	9.1
July	171.2	(-33.98)	19.9	(-1.83)	10.9	(-1.02)	10.06	0	16.1	14.5	44.6	(-5.27)	14	0.1	7.9
August	141.2	(-55.04)	19.9	(-1.67)	11.7	(-0.14)	11.4	0	16.3	15.2	81.2	(+17.47)	20	9.2	7.5
September	160.3	(+16.88)	19.6	(+1.28)	11.1	(+1.14)	12.2	0	15.1	14.7	38.4	(-19.22)	14	1.4	9.3
October	143.2	(+31.46)	16.6	(+2.60)	9.0	(+1.85)	8.9	4	13.2	13.7	25.2	(-56.47)	11	0.0	10.3
November	68.8	(-1.92)	12.4	(+2.66)	6.2	(+2.44)	7.9	4	10.9	12.0	36.4	(-40.19)	15	6.2	9.3
December	74.5	(+20.66)	8.6	(+1.71)	2.8	(+1.16)	2.5	11	6.8	9.0	82.4	(+12.88)	17	46.6	13.1
Year	1689.1	(+96.9)	14.7	(+1.1)	6.9	(+1.0)	7.1	67.0	11.1	11.0	571.5	(-161.5)	176.0	183.3	9.7

* Number of nights grass minimum was below 0.0 °C

** Number of days rain was 0.2 mm or more

*** At 2 metres above ground

30 year Mean Rainfall = 733mm

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Woburn Experimental Farm

The Weather : Monthly Summary : 2011

(Departure from 30-year means (1981 - 2010) in brackets)

	Sunshine		Mean temperatures °C								Rain			Wind
			Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	***
	Hours	( )		( )		( )	point	frosts *	30 cm	100 cm	Tipping bucket		days **	km/hr
												( )		
January	43.3	(-16.7)	6.3	(-0.7)	1.4	(+0.1)	3.3	17	5.0	6.3	75.6	(+21.1)	23	8.3
February	53.5	(-21.4)	9.1	(+1.7)	3.7	(+2.8)	5.9	5	6.0	6.4	54.2	(+12.0)	20	10.3
March	154.8	(+41.4)	11.3	(+1.0)	2.2	(-0.5)	5.8	12	6.8	6.9	5.2	(-40.7)	7	7.2
April	226.2	(+75.3)	18.1	(+5.0)	5.4	(+1.7)	8.4	13	11.0	9.0	5.2	(-47.0)	5	7.2
May	226.4	(+39.2)	17.8	(+1.3)	7.5	(+0.9)	7.6	6	12.8	10.8	37.4	(-15.9)	11	9.7
June	208.5	(+20.5)	19.5	(-0.1)	9.3	(-0.1)	10.3	2	15.3	12.3	57.2	(+7.1)	14	8.1
July	152.1	(-45.0)	20.4	(-1.7)	10.0	(-1.7)	11.0	0	16.4	14.0	51.6	(+1.7)	14	6.2
August	140.2	(-48.6)	20.6	(-1.3)	11.4	(-0.2)	12.9	0	16.7	14.9	66.4	(+8.6)	15	7.1
September	169.7	(+32.7)	20.1	(+1.4)	10.9	(+1.3)	14.4	0	15.3	14.6	50.8	(-6.3)	16	9.7
October	133.7	(+21.9)	17.2	(+2.7)	8.6	(+1.7)	10.9	5	13.5	14.0	21.2	(-49.6)	12	9.6
November	68.2	(+1.9)	12.8	(+2.8)	6.0	(+2.3)	8.9	5	11.0	12.3	30.8	(-31.7)	16	7.4
December	57.7	(+12.1)	8.8	(+1.6)	2.8	(+1.3)	5.2	8	6.8	9.6	74.0	(+18.2)	21	12.5
Year	1634.2	(+113.2)	15.2	(+1.1)	6.6	(+0.8)	8.7	73.0	11.4	10.9	529.6	(-122.4)	174.0	8.6

* Number of nights grass minimum was below 0.0 °C

30 year Mean Rainfall = 652mm

** Number of days rain was 0.2 mm or more

***At 2 metres above ground

https://doi.org/10.23637/ERADOC-1-221