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Yields of the Field Experiments 1996

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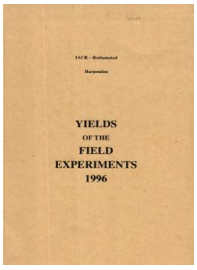

96/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley

Rothamsted Research

Rothamsted Research (1997) *96/W/RN/3 Ley/ARABLE - Leys, W. Beans, W. Wheat, W. Rye, S. Barley ;* Yields Of The Field Experiments 1996, pp 38 - 47 **- DOI: https://doi.org/10.23637/ERADOC-1-51**

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96/W/RN/3

LEY/ARABLE

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

Sponsor: P.R. Poulton.

The 59th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-95/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

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

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96/W/RN/3

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

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 only from the leys and the test crops.

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
   AF
   AB

1/2 plots

2. **FYMRES65** Farmyard manure residues, last applied 1965:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1996 (kg N) as 27.5% N:

   0
   70
   140
   210

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96/W/RN/3

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

Whole plots

1. **ROTATION** Rotations before first test crop:

   LLN 8
   LN 3
   LLC 8
   LC 3
   AF
   AB

1/2 plots

2. **FYMRES64** Farmyard manure residues, last applied 1964:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1996 (kg N) as 27.5% N:

   0
   30
   60
   90

Treatments to leys:

FYM RES Farmyard manure residues:

NONE
FYM 38 t on each occasion, last applied 1963 to 1st and 6th year leys, 1962 to 2nd and 7th year leys, 1966 to 3rd and 8th year leys, 1965 to 4th year leys, 1964 to 5th year leys

NOTE: Corrective K dressings (kg K_2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block, applied 18-Sep-95:

Continuous rotations before wheat	No FYM half plots	FYM half plots
LN3	0	0
LC3	0	0
AF	300	300
AB	300	300

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96/W/RN/3

Ex-alternating rotations		
LLN 8 ploughed for w. wheat	0	0
LLN 3 not ploughed	0	0
LLC 8 ploughed for w. wheat	0	0
LLC 3 not ploughed	0	0

Experimental diary:

Treatment crops:

Grass ley and clover/grass ley, 1st year (**ROTATION** LN1, LC1, LLN1 and LLC1):

18-Sep-95 : **T** : Ploughed.
23-Sep-95 : **T** : Rolled.
29-Sep-95 : **T** : LN1 and LLN1 only: 34.5% N at 217 kg, rotary harrowed, 50% Rossa meadow fescue and 50% Erecta RVP Timothy mixture drilled at 30 kg.
: **T** : LC1 and LLC1 only: 34.5% N at 145 kg, rotary harrowed, 40% Rossa meadow fescue, 48% Erecta RVP Timothy and 12% Huia white clover mixture drilled at 30 kg.
18-Mar-96 : **T** : PK as (0:20:32) at 469 kg.
: **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
11-Oct-96 : **T** : Second cut.

Grass leys, 2nd to 8th years (**ROTATION** LN2-3, LLN2-8)

05-Oct-95 : **T** : LLN5 only: Dolomite at 5.0 t.
18-Mar-96 : **T** : PK as (0:20:32) at 469 kg. NK as (25:0:16) at 300 kg.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : NK as (25:0:16) at 300 kg.
11-Oct-96 : **T** : Second cut.

Clover/grass leys, 2nd to 8th years (**ROTATION** LC2-3 and LLC2-8):

05-Oct-95 : **T** : LLC5 only: Dolomite at 5.0 t.
18-Mar-96 : **T** : PK as (0:20:32) at 469 kg. Muriate of potash at 80 kg.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : Muriate of potash at 80 kg.
11-Oct-96 : **T** : Second cut.

S. barley, 1st and 2nd treatment crops (**ROTATION** AB):

18-Sep-95 : **T** : Ploughed.
23-Sep-95 : **T** : Rolled.
28-Mar-96 : **T** : NPK applied as (20:10:10) at 400 kg. Rotary harrowed, Cooper, dressed Raxil S, drilled at 350 seeds per m^2.
07-May-96 : **T** : Rotary harrowed, Cooper, dressed Raxil S, re-drilled at 400 seeds per m^2.
02-Jun-96 : **T** : Ally at 30 g with Oxytril CM at 0.5 l in 200 l.
14-Jun-96 : **T** : Tilt 250 EC at 0.5 l in 300 l.
21-Aug-96 : **T** : Combine harvested.

W. beans, 3rd treatment crop (**ROTATION** AF and AB):

20-Oct-95 : **T** : PK as (0:24:24) at 168 kg.
23-Oct-95 : **T** : Punch C broadcast at 21 seeds per m^2, ploughed.

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96/W/RN/3

Experimental diary:

W. beans, 3rd treatment crop (**ROTATION** AF and AB):
- 07-Feb-96 : **T** : Carbetamex at 3.0 kg in 200 l.
- 02-Jun-96 : **T** : Clayton Turret at 2.0 l in 300 l.
- 13-Sep-96 : **T** : Combine harvested.

Fallow, 1st and 2nd treatment years (**ROTATION** AF):
- 18-Sep-95 : **T** : Plots 19 and 20: Ploughed.
- 23-Sep-95 : **T** : Plots 19 and 20: Rolled.
- 23-Oct-95 : **T** : Plots 63 and 64: Ploughed.
- 11-Apr-96 : **T** : Spring-tine cultivated.
- 21-May-96 : **T** : Rotary cultivated.
- 11-Jul-96 : **T** : Spiked rotary cultivated.

W. wheat, 1st test crop (W):
- 18-Sep-95 : **T** : Ploughed.
- 23-Sep-95 : **T** : Rolled.
- 28-Sep-95 : **T** : PK applied as (0:24:24) at 260 kg. Yaltox at 150 kg. Spring-tine cultivated.
- 29-Sep-95 : **T** : Rotary harrowed, Mercia, dressed Sibutol, drilled at 375 seeds per m^2.
- 13-Nov-95 : **T** : Panther at 2.0 l in 200 l.
- 30-Apr-96 : **T** : Halo at 1.5 l in 200 l.
- 02-May-96 : **T** : **N** 70, 140 and 210: Applied as 27.5% N.
- 13-Jun-96 : **T** : Silvacur at 1.0 l in 300 l.
- 18-Aug-96 : **T** : Combine harvested.

W. rye, 2nd test crop (R).
- 18-Sep-95 : **T** : Ploughed.
- 23-Sep-95 : **T** : Rolled.
- 28-Sep-95 : **T** : PK applied as (0:24:24) at 260 kg. Yaltox at 150 kg. Spring-tine cultivated.
- 05-Oct-95 : **T** : Dolomite at 5.0 t.
- 10-Oct-95 : **T** : Rotary harrowed, Amando, dressed Panoctine, drilled at 350 seeds per m^2.
- 13-Nov-95 : **T** : Stomp 400 SC at 3.3 l in 200 l.
- 02-May-96 : **T** : **N** 30, 60 and 90: Applied as 27.5% N.
- 07-Jun-96 : **T** : Calirus at 2.2 kg in 300 l.
- 21-Aug-96 : **T** : Combine harvested.

NOTE: Samples of grass, clover/grass, wheat and rye grain were taken for chemical analysis.

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96/W/RN/3

LEYS

1ST CUT (13/6/96) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.26	2.26	2.26
LC2	4.80	4.78	4.79
LC3	4.85	5.15	5.00
LN1	5.22	4.89	5.06
LN2	6.37	6.06	6.22
LN3	6.47	6.17	6.32
LLC1	1.00	1.29	1.15
LLC2	4.34	4.40	4.37
LLC3	5.44	5.20	5.32
LLC4	4.43	4.27	4.35
LLC5	4.09	2.88	3.49
LLC6	3.39	3.31	3.35
LLC7	5.50	5.18	5.34
LLC8	5.06	5.47	5.26
LLN1	4.00	3.81	3.91
LLN2	6.17	6.19	6.18
LLN3	6.27	5.86	6.07
LLN4	5.12	5.45	5.28
LLN5	4.65	5.58	5.11
LLN6	5.98	5.61	5.79
LLN7	6.35	6.49	6.42
LLN8	5.30	6.05	5.68
Mean	4.87	4.83	4.85

1ST CUT MEAN DM% 26.1

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96/W/RN/3

LEYS

2ND CUT (11/10/96) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.08	0.24	0.16
LC2	0.15	0.09	0.12
LC3	0.27	0.77	0.52
LN1	1.20	0.89	1.04
LN2	0.46	0.36	0.41
LN3	0.67	1.07	0.87
LLC1	0.11	0.13	0.12
LLC2	0.09	0.18	0.13
LLC3	0.47	0.25	0.36
LLC4	0.10	0.45	0.27
LLC5	0.12	0.17	0.15
LLC6	0.36	0.23	0.29
LLC7	0.37	0.23	0.30
LLC8	0.07	0.07	0.07
LLN1	0.90	0.78	0.84
LLN2	0.61	0.93	0.77
LLN3	0.53	0.97	0.75
LLN4	0.57	0.46	0.52
LLN5	0.42	0.45	0.43
LLN6	0.82	0.46	0.64
LLN7	1.00	0.97	0.98
LLN8	0.20	0.28	0.24
Mean	0.44	0.47	0.45

2ND CUT MEAN DM% 36.6

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LEYS

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.34	2.50	2.42
LC2	4.95	4.87	4.91
LC3	5.12	5.92	5.52
LN1	6.42	5.78	6.10
LN2	6.84	6.43	6.63
LN3	7.14	7.24	7.19
LLC1	1.11	1.43	1.27
LLC2	4.42	4.57	4.50
LLC3	5.92	5.45	5.68
LLC4	4.53	4.71	4.62
LLC5	4.21	3.06	3.63
LLC6	3.75	3.53	3.64
LLC7	5.87	5.42	5.65
LLC8	5.13	5.54	5.34
LLN1	4.90	4.59	4.75
LLN2	6.78	7.11	6.95
LLN3	6.80	6.83	6.82
LLN4	5.68	5.91	5.80
LLN5	5.06	6.03	5.55
LLN6	6.80	6.06	6.43
LLN7	7.36	7.46	7.41
LLN8	5.50	6.33	5.92
Mean	5.30	5.31	5.30

TOTAL OF 2 CUTS MEAN DM% 31.4

PLOT AREA HARVESTED 0.00200

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96/W/RN/3

W. WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES65	NONE	FYM	Mean
ROTATION			
LLN 8	7.61	8.31	7.96
LN 3	7.02	6.27	6.64
LLC 8	7.46	7.77	7.62
LC 3	7.29	7.64	7.46
AF	5.09	6.27	5.68
AB	5.92	6.41	6.17
Mean	6.73	7.11	6.92

N	0	70	140	210	Mean
ROTATION					
LLN 8	6.37	8.23	8.77	8.46	7.96
LN 3	3.82	7.19	7.15	8.41	6.64
LLC 8	5.73	7.97	8.48	8.28	7.62
LC 3	5.23	7.76	8.19	8.67	7.46
AF	0.65	6.60	7.69	7.79	5.68
AB	1.19	7.24	7.80	8.43	6.17
Mean	3.83	7.50	8.01	8.34	6.92

N	0	70	140	210	Mean
FYMRES65					
NONE	3.87	7.34	7.80	7.92	6.73
FYM	3.80	7.66	8.23	8.76	7.11
Mean	3.83	7.50	8.01	8.34	6.92

N		0	70	140	210
ROTATION	FYMRES65				
LLN 8	NONE	6.12	7.80	8.39	8.12
	FYM	6.62	8.65	9.16	8.81
LN 3	NONE	4.75	7.10	7.33	8.89
	FYM	2.89	7.27	6.98	7.93
LLC 8	NONE	6.27	7.44	8.16	7.98
	FYM	5.20	8.51	8.80	8.58
LC 3	NONE	4.62	8.16	8.29	8.10
	FYM	5.85	7.37	8.08	9.25
AF	NONE	0.23	6.42	7.19	6.53
	FYM	1.07	6.78	8.19	9.05
AB	NONE	1.22	7.10	7.43	7.94
	FYM	1.16	7.38	8.18	8.93

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.00183

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96/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES64	NONE	FYM	Mean
ROTATION			
LLN 8	6.35	6.82	6.59
LN 3	6.87	6.73	6.80
LLC 8	7.79	7.08	7.43
LC 3	6.79	6.57	6.68
AF	3.91	4.27	4.09
AB	4.85	4.84	4.84
Mean	6.09	6.05	6.07

N	0	30	60	90	Mean
ROTATION					
LLN 8	4.46	6.33	7.37	8.18	6.59
LN 3	4.73	6.45	7.36	8.67	6.80
LLC 8	5.63	7.99	7.87	8.25	7.43
LC 3	4.46	6.46	7.65	8.15	6.68
AF	1.72	3.45	4.92	6.27	4.09
AB	2.56	4.07	6.08	6.67	4.84
Mean	3.93	5.79	6.87	7.70	6.07

N	0	30	60	90	Mean
FYMRES64					
NONE	3.89	5.78	7.05	7.65	6.09
FYM	3.97	5.80	6.70	7.74	6.05
Mean	3.93	5.79	6.87	7.70	6.07

N		0	30	60	90
ROTATION	FYMRES64				
LLN 8	NONE	4.22	6.28	7.19	7.70
	FYM	4.70	6.38	7.55	8.66
LN 3	NONE	4.96	6.40	7.30	8.85
	FYM	4.50	6.50	7.43	8.50
LLC 8	NONE	5.64	8.12	8.47	8.92
	FYM	5.63	7.86	7.26	7.58
LC 3	NONE	4.45	6.74	8.02	7.93
	FYM	4.46	6.17	7.27	8.37
AF	NONE	1.60	3.00	5.09	5.95
	FYM	1.84	3.90	4.75	6.59
AB	NONE	2.45	4.16	6.24	6.56
	FYM	2.67	3.99	5.92	6.78

GRAIN MEAN DM% 86.8

SUB PLOT AREA HARVESTED 0.00183

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