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# Yields of the Field Experiments 1986

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## 86/R/RN/1 and 86/R/RN/2 Ley Arable - Old Grass, Leys, Wheat

### Rothamsted Research

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86/R/RN/1 and 86/R/RN/2

# LEY ARABLE

Object: To study the effects of three-year leys on the fertility of the soil as measured by a sequence of three arable test crops - Highfield and Fosters.

Sponsor: A.E. Johnston.

The 38th year, old grass, leys, w. wheat.

For previous years see 'Details' 1967 and 1973 and 74-85/R/RN/1 and 2.

The experiment is duplicated on:-

HIGHFIELD A site with much organic matter initially (ploughed out from permanent grass) (86/R/RN/1)

FOSTERS A site with little organic matter initially (86/R/RN/2)

ROTATION Treatments: The experiment originally tested four six-course rotations, with all phases present each year. For many years these rotations were:-

|         | Treatment crops | Test crops |
|---------|-----------------|------------|
| LUCERNE | LU, LU, LU      | W, P, B    |
| CLOGRA  | LC, LC, LC      | W, P, B    |
| GRASS   | LN, LN, LN      | W, P, B    |
| ARABLE  | H, SB, O        | W, P, B    |

LU = lucerne, LC = clover-grass ley, no nitrogen fertilizer,  
 LN = all-grass ley with nitrogen fertilizer, H = 1-year seeds hay,  
 SB = sugar beet, O = s. oats, W = w. wheat, P = potatoes,  
 B = s. barley.

From 1983 the test crops have been W, W, W.

RESEEDED On both fields in the first three years other plots were sown with long-term reseeded grass

OLDGRASS On Highfield plots of the old turf were left initially unploughed, for comparison with the three-year leys

In 1962 and 1963 some of the old and reseeded grass plots were divided for management identical to:-

|   |                  |
|---|------------------|
| C | Clover-grass ley |
| N | All-grass ley    |

From 1968 only two phases on each field continued in the six-course rotation (the museum blocks). The four other phases (the new sequence blocks) were used for studies on take-all (*Gaeumannomyces graminis*) in wheat. These studies ended in 1985 and these phases are no longer included in the experiment.

86/R/RN/1 and 86/R/RN/2

Additional treatments to 2nd test crop w. wheat:-

Sub plots

FYMRES68 Farmyard manure residues, last applied 1968:

NONE None

FYM 30 tonnes on each occasion

Sub plots

N Nitrogen fertilizer in 1986 (kg N) as 'Nitram':

0  
50  
100  
150

Standard applications:

2nd Treatment crops:

Lucerne: Manures: (0:18:36) at 630 kg.

All-grass ley: Manures: (0:18:36) at 420 kg. (25:0:16) at 300 kg in spring and after each cut except the last. Weedkillers: 2, 4-DB, MCPA and benazolin (as 'Legumex Extra' at 7.0 l) in 500 l.

Clover-grass ley: Manures: (0:18:36) at 420 kg. Weedkillers: 2, 4-DB, MCPA and benazolin (as 'Legumex Extra' at 7.0 l) in 500 l.

Sugar beet: Manures: (10:10:15+4.5 Mg) at 1640 kg.

2nd Test crop wheat:

W. wheat: Manures: (0:24:24) combine drilled at 210 kg.

Weedkillers: Glyphosate at 1.4 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil octanoate at 0.34 kg, mecoprop at 2.5 kg and isoproturon at 2.1 kg in 200 l.

Reseeded grass and old grass: Manures: (0:18:36) at 420 kg. All-grass half plots: (25:0:16) at 300 kg in spring and after each cut except the last. Weedkillers: 2, 4-DB, MCPA and benazolin (as 'Legumex Extra' at 7.0 l) in 500 l.

Seed: Sugar beet: Monoire, precision sown.

W. wheat: Avalon, sown at 190 kg.

Cultivations, etc.:-

2nd Treatment crops:

Lucerne: PK applied: 15 Nov, 1985. Cut: 13 June, 1986, 29 Sept.

All-grass ley, clover-grass ley, reseeded grass and old grass: PK applied: 15 Nov, 1985. NK applied to all grass-ley and all-grass half plots: 21 Mar, 1986, 5 June. First cut: 2 June.

Weedkillers applied: 2 July. Cut: 29 Sept.

Sugar beet: Ploughed: 19 Nov, 1985. Disced: 30 Apr, 1986. NPK Mg applied: 2 May. Rotary harrowed, seed sown: 3 May. Plants singled: 16 June. Lifted: 14 Nov.

2nd Test crop wheat: Glyphosate applied: 20 Sept, 1985. Ploughed: 7 Oct. Rotary harrowed: 9 Oct. PK applied, seed sown: 10 Oct. Remaining weedkillers applied: 30 Apr, 1986. N treatments applied: 2 May. Combine harvested: 20 Aug.

86/R/RN/1 AND 86/R/RN/2

DRY MATTER: TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

|                               | HIGHFIELD |      | FOSTERS |        |      |      |
|-------------------------------|-----------|------|---------|--------|------|------|
| CLOVER-GRASS LEY              |           |      |         |        |      |      |
| TOTAL OF 2 CUTS               | 6.02      |      | 5.08    |        |      |      |
| MEAN DM%                      | 21.9      |      | 21.3    |        |      |      |
| ALL-GRASS LEY                 |           |      |         |        |      |      |
| TOTAL OF 2 CUTS               | 7.97      |      | 7.73    |        |      |      |
| MEAN DM%                      | 28.5      |      | 27.9    |        |      |      |
| LUCERNE                       |           |      |         |        |      |      |
| TOTAL OF 2 CUTS               | 6.43      |      | 7.98    |        |      |      |
| MEAN DM%                      | 23.7      |      | 23.4    |        |      |      |
| OLD GRASS                     |           |      |         |        |      |      |
| HIGHFIELD                     |           |      |         |        |      |      |
| TOTAL OF 2 CUTS               | C         |      | N       |        |      |      |
| 38TH EXPTL YEAR               |           |      |         |        |      |      |
| BLOCKS 1 & 4                  | 4.07      |      | 6.75    |        |      |      |
| BLOCK 2                       | 4.05      |      | 6.37    |        |      |      |
| MEAN DM%                      | 25.3      |      | 26.2    |        |      |      |
| RESEEDED GRASS                |           |      |         |        |      |      |
| TOTAL OF 2 CUTS               |           |      |         |        |      |      |
| HIGHFIELD                     |           |      |         |        |      |      |
| FOSTERS                       |           |      |         |        |      |      |
|                               | BLOCKS    | C    | N       | BLOCKS | C    | N    |
| 38TH EXPTL YEAR               | 1 & 4     | 4.18 | 6.99    | 1 & 3  | 4.90 | 7.08 |
| 38TH EXPTL YEAR               | 2 & 3     | 4.33 | 8.18    | 2 & 4  | 4.69 | 6.52 |
| (SEEDED 1949<br>RESEDED 1973) |           |      |         |        |      |      |
| MEAN DM%                      |           | 24.1 | 27.4    |        | 22.2 | 26.9 |
| SUGAR BEET: TONNES/HECTARE    |           |      |         |        |      |      |
| HIGHFIELD                     |           |      |         |        |      |      |
| FOSTERS                       |           |      |         |        |      |      |
| ROOTS (WASHED)                |           | 48.6 |         | 49.3   |      |      |
| SUGAR PERCENTAGE              |           | 19.0 |         | 18.9   |      |      |
| TOTAL SUGAR                   |           | 9.22 |         | 9.31   |      |      |
| TOPS                          |           | 40.5 |         | 43.8   |      |      |

86/R/RN/1 HIGHFIELD

W.WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

| FYMRES68<br>SEQUENCE | NONE | FYM  | MEAN |
|----------------------|------|------|------|
| LUCERNE              | 6.65 | 6.56 | 6.60 |
| CLOGRA               | 7.11 | 7.34 | 7.22 |
| GRASS                | 7.25 | 7.27 | 7.26 |
| ARABLE               | 6.64 | 6.87 | 6.75 |
| MEAN                 | 6.91 | 7.01 | 6.96 |

| N<br>SEQUENCE | 0    | 50   | 100  | 150  | MEAN |
|---------------|------|------|------|------|------|
| LUCERNE       | 5.41 | 6.29 | 7.34 | 7.39 | 6.60 |
| CLOGRA        | 5.92 | 7.01 | 7.62 | 8.35 | 7.22 |
| GRASS         | 5.35 | 7.54 | 7.65 | 8.50 | 7.26 |
| ARABLE        | 4.80 | 6.61 | 7.91 | 7.70 | 6.75 |
| MEAN          | 5.37 | 6.86 | 7.63 | 7.98 | 6.96 |

| N<br>FYMRES68 | 0    | 50   | 100  | 150  | MEAN |
|---------------|------|------|------|------|------|
| NONE          | 5.37 | 6.63 | 7.62 | 8.03 | 6.91 |
| FYM           | 5.37 | 7.10 | 7.64 | 7.94 | 7.01 |
| MEAN          | 5.37 | 6.86 | 7.63 | 7.98 | 6.96 |

| N<br>SEQUENCE | FYMRES68 | 0    | 50   | 100  | 150  |
|---------------|----------|------|------|------|------|
| LUCERNE       | NONE     | 4.90 | 6.65 | 7.07 | 7.96 |
|               | FYM      | 5.91 | 5.93 | 7.61 | 6.81 |
| CLOGRA        | NONE     | 6.46 | 6.26 | 7.75 | 7.96 |
|               | FYM      | 5.38 | 7.75 | 7.50 | 8.73 |
| GRASS         | NONE     | 5.67 | 6.91 | 8.06 | 8.36 |
|               | FYM      | 5.04 | 8.18 | 7.24 | 8.64 |
| ARABLE        | NONE     | 4.43 | 6.69 | 7.59 | 7.83 |
|               | FYM      | 5.16 | 6.53 | 8.22 | 7.57 |

GRAIN MEAN DM% 81.1

PLOT AREA HARVESTED 0.00663

86/R/RN/2 FOSTERS

W.WHEAT 2ND TEST CROP

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

| FYMRES68<br>SEQUENCE | NONE | FYM  | MEAN |
|----------------------|------|------|------|
| LUCERNE              | 6.55 | 7.08 | 6.82 |
| CLOGRA               | 5.92 | 6.00 | 5.96 |
| GRASS                | 5.95 | 6.04 | 6.00 |
| ARABLE               | 5.98 | 5.92 | 5.95 |

|      |      |      |      |
|------|------|------|------|
| MEAN | 6.10 | 6.26 | 6.18 |
|------|------|------|------|

| N<br>SEQUENCE | 0    | 50   | 100  | 150  | MEAN |
|---------------|------|------|------|------|------|
| LUCERNE       | 5.37 | 6.97 | 7.05 | 7.87 | 6.82 |
| CLOGRA        | 4.14 | 6.25 | 6.81 | 6.63 | 5.96 |
| GRASS         | 4.37 | 5.75 | 6.71 | 7.16 | 6.00 |
| ARABLE        | 3.92 | 5.90 | 7.07 | 6.91 | 5.95 |

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| MEAN | 4.45 | 6.22 | 6.91 | 7.14 | 6.18 |
|------|------|------|------|------|------|

| N<br>FYMRES68 | 0    | 50   | 100  | 150  | MEAN |
|---------------|------|------|------|------|------|
| NONE          | 4.46 | 6.12 | 6.70 | 7.13 | 6.10 |
| FYM           | 4.44 | 6.32 | 7.13 | 7.16 | 6.26 |

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| MEAN | 4.45 | 6.22 | 6.91 | 7.14 | 6.18 |
|------|------|------|------|------|------|

| N<br>SEQUENCE | FYMRES68 | 0    | 50   | 100  | 150  |
|---------------|----------|------|------|------|------|
| LUCERNE       | NONE     | 5.42 | 6.39 | 7.29 | 7.11 |
|               | FYM      | 5.32 | 7.56 | 6.82 | 8.63 |
| CLOGRA        | NONE     | 4.21 | 6.40 | 6.04 | 7.02 |
|               | FYM      | 4.07 | 6.10 | 7.59 | 6.24 |
| GRASS         | NONE     | 4.39 | 6.00 | 6.51 | 6.92 |
|               | FYM      | 4.34 | 5.51 | 6.91 | 7.40 |
| ARABLE        | NONE     | 3.83 | 5.68 | 6.96 | 7.45 |
|               | FYM      | 4.00 | 6.13 | 7.19 | 6.37 |

GRAIN MEAN DM% 81.5

PLOT AREA HARVESTED 0.00663