

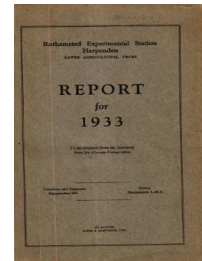
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## Report for 1933

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## The Classical Experiments

### Rothamsted Research

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## CROPS GROWN IN ROTATION, AGDELL FIELD

### PRODUCE PER ACRE.

| Year.                                           | Crop.                   | O.<br>Unmanured<br>since 1848. |                           | M.<br>Mineral Manure.†<br>No Nitrogen. |                           | C.<br>Complete Mineral<br>and Nitrogenous<br>Manure |                           |
|-------------------------------------------------|-------------------------|--------------------------------|---------------------------|----------------------------------------|---------------------------|-----------------------------------------------------|---------------------------|
|                                                 |                         | 5.<br>Fallow.                  | 6.<br>Clover<br>or Beans. | 3.<br>Fallow.                          | 4.<br>Clover<br>or Beans. | 1.<br>Fallow.                                       | 2.<br>Clover<br>or Beans. |
| Average of first twenty-one Courses, 1848-1931. |                         |                                |                           |                                        |                           |                                                     |                           |
|                                                 | Roots (Swedes) .. cwt.* | 32.0                           | 16.1                      | 174.0                                  | 206.5                     | 352.0                                               | 310.0                     |
|                                                 | Barley—                 |                                |                           |                                        |                           |                                                     |                           |
|                                                 | Dressed Grain .. bush.  | 21.6                           | 19.8                      | 22.7                                   | 26.6                      | 30.3                                                | 35.0                      |
|                                                 | Total Straw .. cwt.†    | 13.3                           | 13.2                      | 13.6                                   | 15.6                      | 18.4                                                | 21.7                      |
|                                                 | Beans—                  |                                |                           |                                        |                           |                                                     |                           |
|                                                 | Dressed Grain .. bush.‡ | —                              | 13.1                      | —                                      | 18.2                      | —                                                   | 22.3                      |
|                                                 | Total Straw .. cwt.‡    | —                              | 9.2                       | —                                      | 13.2                      | —                                                   | 15.3                      |
|                                                 | Clover Hay .. cwt.§     | —                              | 25.6                      | —                                      | 52.1                      | —                                                   | 52.0                      |
|                                                 | Wheat—                  |                                |                           |                                        |                           |                                                     |                           |
|                                                 | Dressed Grain .. bush.  | 23.1                           | 21.6                      | 26.9                                   | 29.4                      | 27.5                                                | 29.0                      |
|                                                 | Total Straw .. cwt.†    | 22.9                           | 21.2                      | 28.2                                   | 29.8                      | 29.4                                                | 29.3                      |
| Present Course (22nd), 1932 and 1933.           |                         |                                |                           |                                        |                           |                                                     |                           |
| 1932                                            | Roots (Turnips) .. cwt. | 20.2                           | 5.4                       | 86.0                                   | 118.0                     | 120.0                                               | 98.6                      |
| 1933                                            | Barley—                 |                                |                           |                                        |                           |                                                     |                           |
|                                                 | Dressed Grain .. bush.  | 6.0                            | 2.2                       | 9.5                                    | 13.9                      | 3.7                                                 | 5.4                       |
|                                                 | Total Grain .. cwt.     | 3.3                            | 1.3                       | 5.2                                    | 7.4                       | 2.0                                                 | 2.9                       |
|                                                 | Weight per bushel.. lb. | 54.8                           | 50.2                      | 55.2                                   | 55.0                      | 52.9                                                | 53.0                      |
|                                                 | Total Straw .. cwt.†    | 6.3                            | 4.8                       | 7.4                                    | 11.4                      | 9.1                                                 | 14.0                      |

\*Plots 1, 3 and 5 based upon 19 courses. Plots 2, 4 and 6 based upon 18 courses.

†Includes straw, cavings and chaff.

‡Mineral Manure: 528 lb. Superphosphate (35%); 500 lb Sulphate of Potash; 100 lb. Sulphate of Soda; 200 lb. Sulphate of Magnesia, all per acre. Nitrogenous Manure—206 lb. Sulphate of Ammonia and 2,000 lb. Rape Dust per acre. Manures applied once every four years, prior to sowing of Swedes.

‡‡Based on 8 courses.

§Based on 13 courses.

CULTIVATIONS, ETC.—Ploughed: December 13th-15th. Harrowed: March 23rd and May 3rd. Seed sown: March 23rd. Variety: Plumage Archer. Manures applied May 31st-June 2nd, 1932. Harvested: August 18th.

## WHEAT AFTER FALLOW—HOOS FIELD

Without Manure, 1851 and since.

### SCHEME FOR COMPARING A THREE YEAR FALLOW WITH A ONE YEAR FALLOW.

Each of the two strips on Hoos Wheat after Fallow is to be divided into four parts. In the year when a strip is in crop, one quarter is to continue to be fallowed, so that this quarter has a three-year fallow. Different quarters are to be selected for fallow in successive years in the rotation given in the following table :

| A N B |   | Cropping of strips A and B. |     |     |     |     |     |     |     |     |
|-------|---|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
|       |   | C=Crop. F=Fallow.           |     |     |     |     |     |     |     |     |
| 1     | 1 | Year.                       | A1. | A2. | A3. | A4. | B1. | B2. | B3. | B4. |
| 2     | 2 | 1932                        | F   | C   | C   | C   | F   | F   | F   | F   |
|       |   | 1933                        | F   | F   | F   | F   | C   | C   | F   | C   |
|       |   | 1934                        | C   | F   | C   | C   | F   | F   | F   | F   |
|       |   | 1935                        | F   | F   | F   | F   | C   | C   | C   | F   |
| 3     | 3 | 1936                        | C   | C   | F   | C   | F   | F   | F   | F   |
|       |   | 1937                        | F   | F   | F   | F   | F   | C   | C   | F   |
|       |   | 1938                        | C   | C   | C   | F   | F   | F   | F   | C   |
|       |   | 1939                        | F   | F   | F   | F   | C   | F   | C   | C   |
| 4     | 4 | 1940                        | F   | C   | C   | C   | F   | F   | F   | F   |

A comparison of the effect of a three year fallow with the effect of a one year fallow will be possible in every year.

Half the experiment will continue to be wheat after one year fallow, and continuity with previous results will thus be maintained.

### PRODUCE PER ACRE, 1933.

|                             | B1   | B2   | B4   | Mean. | Average,<br>77 years,<br>1856-1932. |
|-----------------------------|------|------|------|-------|-------------------------------------|
| Dressed Grain—bushels .. .. | 21.7 | 20.8 | 16.2 | 19.6  | 14.2                                |
| Total grain—cwt. .. ..      | 12.7 | 11.8 | 9.3  | 11.3  | 8.1                                 |
| Weight per bushel—lb. .. .. | 62.6 | 61.2 | 60.4 | 61.4  | 58.8                                |
| Total straw—cwt. .. ..      | 19.1 | 19.1 | 17.1 | 18.4  | 12.6                                |

CULTIVATIONS, ETC.—Cropped sections. Ploughed : September 2nd. Harrowed : October 15th and March 31st. Seed sown : October 15th. Variety : Red Standard. Harvested : July 26th. Fallowed sections. Ploughed : September 2nd, May 31st and June 1st. Harrowed : March 31st.

## MANGOLDS—BARNFIELD, 1933

Roots each year since 1856.

Mangolds each year since 1876.

## PRODUCE PER ACRE.

| Strip. | Strip Manures.<br>(Amounts stated are per acre.) | 1933.           |                           |                               |                                            |                       |  | 52 Year Average, 1876-1932 † |                           |                               |                                            |                       |  |
|--------|--------------------------------------------------|-----------------|---------------------------|-------------------------------|--------------------------------------------|-----------------------|--|------------------------------|---------------------------|-------------------------------|--------------------------------------------|-----------------------|--|
|        |                                                  | Cross Dressings |                           |                               |                                            |                       |  | Cross Dressings.             |                           |                               |                                            |                       |  |
|        |                                                  | O               | N                         | A                             | AC                                         | C                     |  | O                            | N                         | A                             | AC                                         | C                     |  |
|        |                                                  | None.           | Nitrate of Soda (550 lb.) | Sulphate of Ammonia (412 lb.) | Sulphate of Ammonia (412 lb.) & Rape Cake. | Rape Cake (2,000 lb.) |  | None.                        | Nitrate of Soda (550 lb.) | Sulphate of Ammonia (412 lb.) | Sulphate of Ammonia (412 lb.) & Rape Cake. | Rape Cake (2,000 lb.) |  |
|        |                                                  | Tons.           | Tons.                     | Tons.                         | Tons.                                      | Tons.                 |  | Tons.                        | Tons.                     | Tons.                         | Tons.                                      | Tons.                 |  |
| Roots  | 1                                                | 15.15           | 18.48                     | 10.60                         | 14.48                                      | 16.43                 |  | 17.49                        | 26.29                     | 21.78                         | 23.55                                      | 23.57                 |  |
|        | 2                                                | 16.98           | 17.37                     | 14.24                         | 16.32                                      | 19.44                 |  | 19.04                        | 26.89                     | 21.88                         | 27.68                                      | 26.64                 |  |
|        | 4                                                | 4.25            | (a) 8.75**                | 9.25                          | 15.01                                      | 13.69                 |  | 4.65                         | (a) 17.58                 | 14.58                         | 26.18                                      | 21.09                 |  |
|        | 5                                                | 2.88            | (b) 6.67**                | 2.50                          | 2.30                                       | 3.40                  |  | 4.90                         | (b) 18.47*                | 6.88                          | 9.47                                       | 10.20                 |  |
|        | 6                                                | 2.42            | 5.15                      | 6.13                          | 4.78                                       | 8.21                  |  | 4.08                         | 14.90                     | 13.70                         | 22.63                                      | 18.21                 |  |
|        | 7                                                | 2.81            | 8.92                      | 9.70                          | 7.55                                       | 11.56                 |  | 4.87                         | 15.35                     | 14.90                         | 22.25                                      | 19.18                 |  |
|        | 8                                                | 2.26            | 5.11                      | 1.44                          | 1.09                                       | 5.55                  |  | 3.36                         | 16.30                     | 5.48                          | 8.52                                       | 8.93                  |  |
|        | 9                                                | 8.96            | —                         | —                             | —                                          | —                     |  | —                            | 9.85                      | —                             | —                                          | —                     |  |
|        |                                                  |                 |                           |                               |                                            |                       |  |                              |                           |                               |                                            |                       |  |
| Leaves | 1                                                | 2.68            | 2.86                      | 2.39                          | 3.08                                       | 3.45                  |  | 3.03                         | 4.63                      | 4.88                          | 5.20                                       | 4.52                  |  |
|        | 2                                                | 2.57            | 3.05                      | 2.80                          | 3.37                                       | 3.47                  |  | 3.14                         | 5.15                      | 5.46                          | 6.24                                       | 4.79                  |  |
|        | 4                                                | 1.14            | (a) 2.19                  | 2.29                          | 3.30                                       | 2.51                  |  | 1.01                         | (a) 3.86                  | 2.88                          | 5.29                                       | 3.37                  |  |
|        | 5                                                | 0.99            | (b) 1.97                  | 1.75                          | 1.82                                       | 2.09                  |  | 1.05                         | (b) 4.09*                 | 2.60                          | 3.24                                       | 2.82                  |  |
|        | 6                                                | 0.76            | 1.44                      | 1.52                          | 1.44                                       | 1.83                  |  | 0.93                         | 3.19                      | 2.80                          | 5.16                                       | 2.86                  |  |
|        | 7                                                | 1.03            | 2.36                      | 2.48                          | 2.76                                       | 2.79                  |  | 1.10                         | 3.32                      | 3.02                          | 5.18                                       | 3.31                  |  |
|        | 8                                                | 0.84            | 1.56                      | 0.82                          | 0.75                                       | 1.09                  |  | 0.98                         | 3.19                      | 2.52                          | 3.27                                       | 2.84                  |  |
|        | 9                                                | 2.10            | —                         | —                             | —                                          | —                     |  | —                            | —                         | —                             | —                                          | —                     |  |
|        |                                                  |                 |                           |                               |                                            |                       |  |                              |                           |                               |                                            |                       |  |

\*\* From 1904 onwards plot 4N has been divided, 4(a) receiving Superphosphate, Sulphate of Potash, Sulphate of Magnesia, Sodium Chloride and Nitrate of Soda, amounts as above; (4b) receiving Superphosphate, Calcium Chloride, (180 lb.), Potassium Nitrate (570 lb.), and Calcium Nitrate (100 lb.). Nitrogenous manures are applied as to one-third at time of sowing and two-thirds as top dressing at a later date, except with Rape Cake which all goes on with the seed.

† Excluding 1885 when nitrogenous fertilisers were not applied, owing to poor crop, 1908 and 1927 when the crop was swedes, 1930 when the spacing of the rows was changed and 1931 when the crop was a mixture of mangolds and swedes.

\* 25 years only, 1904-1932, excluding 1908, 1927, 1930 and 1931. For this period the average yield of plot 4(a) was 18.53 for roots and 4.02 for leaves.

CULTIVATIONS, ETC.—Ploughed: January 19th-20th. Cultivated: April 11th and 12th. Harrowed: April 12th and 14th. Rolled: April 13th and 14th. Hoed: May 29th, July 3rd, 4th, 5th, 11th and 24th. Singled: June 3rd-14th. Seed sown: April 13th. Variety: Prizewinner Yellow Globe. Manures applied: April 6th, 7th, 8th, 10th and July 7th. Lifted: October 20th-31st.

## HAY—THE PARK GRASS PLOTS, 1933

| Plot. | Manuring (amounts stated are per acre.)                                                                                                                                                                                                                                           | Yield of Hay per acre. |          | Dry Matter per acre. |  |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------|----------------------|--|
|       |                                                                                                                                                                                                                                                                                   | 1st Crop.              |          | 1st Crop.            |  |
| 1     | Single dressing (206 lb.) Sulphate of Ammonia (= 43 lb. N.), (with Dung also 8 years, 1856-63)                                                                                                                                                                                    | not limed              | cwt. 8.9 | lb. 763              |  |
| 2     | Unmanured (after Dung 8 years, 1856-63)                                                                                                                                                                                                                                           | limed                  | 17.0     | 1,390                |  |
| 3     | Unmanured                                                                                                                                                                                                                                                                         | not limed              | 9.9      | 785                  |  |
| 4-1   | Superphosphate of lime (3½ cwt.)                                                                                                                                                                                                                                                  | limed                  | 8.2      | 609                  |  |
| 4-2   | Superphosphate of lime (3½ cwt.), and double dressing (412 lb.) Sulphate of Ammonia (= 86 lb. N.)                                                                                                                                                                                 | not limed              | 9.3      | 672                  |  |
| 5-1   | (N. half) Unmanured following double dressing Ammonia salts (= 86 lb. N.) 1856-97                                                                                                                                                                                                 | limed                  | 6.1      | 454                  |  |
| 5-2   | (S. half) Superphosphate (3½ cwt.) Sulphate of Potash (500 lb.) following double dressing Amm. salts (= 86 lb. N.) 1856-97                                                                                                                                                        | not limed              | 10.7     | 791                  |  |
| 6     | Complete Mineral Manure as Plot 7; following double dressing Amm. salts (= 86 lb. N.) 1856-68                                                                                                                                                                                     | limed                  | 5.2      | 402                  |  |
| 7     | Complete Mineral Manure: Super. (3½ cwt.); Sulphate of Potash (500 lb.); Sulphate of Soda (100 lb.); Sulphate Magnesia (100 lb.)                                                                                                                                                  | not limed              | 25.2     | 2,097                |  |
| 8     | Mineral Manure without Potash                                                                                                                                                                                                                                                     | limed                  | 25.8     | 2,198                |  |
| 9     | Complete Mineral Manure and double dressing (412 lb. Sulphate of Ammonia (= 86 lb. N.)                                                                                                                                                                                            | not limed              | 7.8      | 601                  |  |
| 10    | Mineral Manure (without Potash) and double dressing Amm. salts (= 86 lb. N.)                                                                                                                                                                                                      | not limed              | 12.1     | 1,001                |  |
| 11-1  | Complete Mineral Manure and treble dressing (618 lb.) Sulphate of Amm. (129 lb. N.)                                                                                                                                                                                               | not limed              | 20.1     | 1,651                |  |
| 11-2  | As Plot 11-1 and Silicate of Soda                                                                                                                                                                                                                                                 | not limed              | 20.2     | 1,721                |  |
| 12    | Unmanured                                                                                                                                                                                                                                                                         | limed                  | 23.5     | 2,022                |  |
| 13    | Dung (14 tons) in 1905, and every fourth year since (omitted 1917), Fish Guano (6 cwt.) in 1907 and every fourth year since                                                                                                                                                       | not limed              | 17.4     | 1,697                |  |
| 14    | Complete Mineral Manure and double dressing (550 lb.) Nitrate of Soda (= 86 lb. N.)                                                                                                                                                                                               | limed                  | 10.3     | 810                  |  |
| 15    | Complete Mineral Manure as Plot 7; following double dressing Nitrate of Soda (= 86 lb. N., 1858-75)                                                                                                                                                                               | not limed              | 51.2*    | 4,265*               |  |
| 16    | Complete Mineral Manure and single dressing (275 lb.) Nitrate of Soda (= 43 lb. N.)                                                                                                                                                                                               | limed                  | 60.9     | 4,995                |  |
| 17    | Single dressing (275 lb.) Nitrate of Soda (43 lb. N.)                                                                                                                                                                                                                             | not limed              | 27.0     | 2,324                |  |
| 18    | Mineral Manure (without Super.), and double dressing Sulphate of Amm. (= 86 lb. N.), 1905 and since; following Minerals and Amm. salts supplying the constituents of 1 ton of hay, 1865-1904                                                                                      | limed                  | 34.2     | 3,036                |  |
| 19    | Farmyard Dung (14 tons) in 1905 and every fourth year since (omitted in 1917), following Nitrate of Soda (= 43 lb. N.) and Minerals, 1872-1904                                                                                                                                    | not limed              | 52.6     | 4,571                |  |
| 20    | Farmyard Dung (14 tons) in 1905 and every fourth year since (omitted in 1917); each intervening year Plot 20 receives Sulphate of Potash (100 lb.); Superphosphate (200 lb.) and 1½ cwt. Nitrate of Soda (= 26 lb. N.); following Nitrate of Potash and Superphosphate, 1872-1904 | limed                  | 61.5     | 5,034                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 62.8     | 5,513                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 68.5     | 5,368                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 10.6     | 863                  |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 45.3     | 3,672                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 39.9     | 3,195                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 58.7     | 4,507                |  |
|       |                                                                                                                                                                                                                                                                                   | Limed Sun              | 55.5     | 4,363                |  |
|       |                                                                                                                                                                                                                                                                                   | Shade                  | 37.7     | 3,108                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 19.0     | 1,644                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 14.7     | 1,248                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 36.1     | 3,067                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 31.0     | 2,569                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 21.2     | 1,728                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 19.4     | 1,686                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 23.7     | 1,973                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 35.6     | 2,834                |  |
|       |                                                                                                                                                                                                                                                                                   | (6788 lb.)             |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  | 32.1     | 2,588                |  |
|       |                                                                                                                                                                                                                                                                                   | (3951 lb.)             |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 31.2     | 2,491                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | (3150 lb.)             | 23.7     | 1,944                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | (570 lb.)              | 28.6     | 2,180                |  |
|       |                                                                                                                                                                                                                                                                                   | not limed              | 32.3     | 2,894                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | (2772 lb.)             | 22.6     | 1,899                |  |
|       |                                                                                                                                                                                                                                                                                   | limed                  |          |                      |  |
|       |                                                                                                                                                                                                                                                                                   | (570 lb.)              | 28.7     | 2,384                |  |

Ground Lime was applied to the southern portion (limed) of the plots at the rate of 2,000 lb. to the acre in the Winter of 1903-4, 1907-8, 1915-16, 1923-24, 1927-28, 1931-32, and at the rate of 2,500 lb. to the acre in the Winter of 1920-21, except where otherwise stated.

Up to 1914 the limed and unlimed plot results were not separately given in the Annual Report but the mean of the two was given. From 1915 onwards the separate figures are given.

\*Botanical sample sorted before weighing and is not included in the total weight.

CULTIVATIONS, ETC.—Manures applied: February 21st-23rd, March 28th, 29th and May 12th. Cut: June 20th-22nd.

**PARK GRASS PLOTS**  
**BOTANICAL COMPOSITION PER CENT.**  
**1930 (1st Crop)**

| Plot | Manuring.                                                                                                                                                   | Liming.                                       | Grami-<br>neae.      | Legumi-<br>nosae.   | Other<br>Orders.   | "Other Orders"<br>consist largely<br>of                                                                                                                            |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------|---------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3    | Unmanured                                                                                                                                                   | Limed<br>Unlimed                              | 53.7<br>47.6         | 17.5<br>9.3         | 28.8<br>43.1       | —<br><i>Leontodon</i><br><i>hispidus</i>                                                                                                                           |
| 7    | Complete Mineral Manure.                                                                                                                                    | Limed<br><br>Unlimed                          | 51.0<br>43.4         | 43.1<br>35.3        | 5.9<br>21.3        | {<br><i>Achillea</i><br><i>millefolium</i><br><i>Heracleum</i><br><i>sphondylium</i><br><i>Achillea</i><br><i>millefolium</i>                                      |
| 9    | Complete Mineral Manure<br>and double Amm. Salts.                                                                                                           | Limed<br>Unlimed                              | 99.4<br>100.0        | 0.1<br>—            | 0.5<br>—           | —<br>—                                                                                                                                                             |
| 14   | Complete Mineral Manure and<br>double Nitrate of Soda.                                                                                                      | Limed<br>(sun)<br>Limed<br>(shade)<br>Unlimed | 90.5<br>89.7<br>96.8 | 6.3<br>7.1<br>1.1   | 3.2<br>3.2<br>2.1  | <i>Taraxacum</i><br><i>vulgare</i><br><i>Conopodium</i><br><i>denudatum</i><br><i>Anthriscus</i><br><i>sylvestris</i>                                              |
| 15   | As plot 7 following double<br>Nitrate of Soda, 1858-75.                                                                                                     | Limed                                         | }                    | not analysed        |                    |                                                                                                                                                                    |
| 17   | Single Nitrate of Soda.                                                                                                                                     | Unlimed<br>Limed<br>Unlimed                   |                      |                     |                    |                                                                                                                                                                    |
| 18   | Mineral Manure (without<br>Super) and double Sul-<br>phate Amm. 1905 and since.                                                                             | L.6,788 lb.<br>L.3,951 lb.<br>Unlimed         | 94.0<br>93.6<br>87.1 | 0.3<br>—<br>—       | 5.7<br>6.4<br>22.9 | <i>Heracleum</i><br><i>sphondylium</i><br><i>Achillea</i><br><i>millefolium</i><br><i>Rumex acetosa</i>                                                            |
| 19   | Farmyard Dung in 1905 and<br>every fourth year since<br>(omitted 1917).                                                                                     | L. 3,150 lb.<br>L. 570 lb.<br>Unlimed         | 80.3<br>82.1<br>86.9 | 12.6<br>11.4<br>6.8 | 7.1<br>6.5<br>6.3  | <i>Achillea</i><br><i>millefolium</i><br><i>Rumex acetosa</i><br><i>Cerastium</i><br><i>vulgatum</i>                                                               |
| 20   | Farmyard Dung in 1905 and<br>every fourth year since<br>(omitted in 1917) each<br>intervening year Sulphate<br>of potash, Super., and Ni-<br>trate of Soda. | L.2772 lb.<br>L. 570 lb.<br>Unlimed           | 72.9<br>66.1<br>84.3 | 9.8<br>24.2<br>10.0 | 17.3<br>9.7<br>5.7 | {<br><i>Taraxacum</i><br><i>vulgare</i><br><i>Conopodium</i><br><i>denudatum</i><br><i>Achillea</i><br><i>millefolium</i><br><i>Achillea</i><br><i>millefolium</i> |

## WHEAT—BROADBALK FIELD, 1933

| Plot. | Manurial Treatment<br>(amounts stated are per acre).                        | Dressed Grain, bushels per acre (in<br>some cases estimated from half or<br>quarter-bushel). |      |      |      |      | Total Grain, cwt. per acre. |      |      |      |      | 74-year<br>Average<br>1852-1925<br>(prior to fal-<br>low). Total<br>Grain, cwt. |
|-------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|------|------|-----------------------------|------|------|------|------|---------------------------------------------------------------------------------|
|       |                                                                             | I                                                                                            | II   | III  | IV   | Mean | I                           | II   | III  | IV   | Mean |                                                                                 |
| 2A    | Farmyard Manure (14 tons)                                                   | 31.4                                                                                         | 43.6 | 28.3 | 38.6 | 35.5 | 19.2                        | 26.3 | 17.0 | 23.0 | 21.4 | 16.3 **                                                                         |
| 2B    | Farmyard Manure (14 tons)                                                   | 30.0                                                                                         | 33.4 | 38.6 | 38.2 | 35.0 | 18.4                        | 20.6 | 22.0 | 22.5 | 20.9 | 19.4                                                                            |
| 3     | Unmanured since 1839                                                        | 13.5                                                                                         | 33.9 | 11.9 | 8.4  | 16.9 | 8.0                         | 19.9 | 7.2  | 5.2  | 10.1 | 6.7                                                                             |
| 5     | Complete Mineral Manure                                                     | 10.8                                                                                         | 32.6 | 9.7  | 7.7  | 15.2 | 6.6                         | 19.0 | 6.0  | 5.0  | 9.2  | 7.8                                                                             |
| 6     | As 5, and 206 lb. Sulphate of Ammonia                                       | 18.9                                                                                         | 34.1 | 21.7 | 20.9 | 23.9 | 11.4                        | 19.6 | 12.1 | 12.4 | 13.9 | 12.5                                                                            |
| 7     | As 5, and 412 lb. Sulphate of Ammonia                                       | 36.5                                                                                         | 35.7 | 27.2 | 29.0 | 32.1 | 21.4                        | 20.5 | 15.4 | 17.4 | 18.7 | 17.6                                                                            |
| 8     | As 5, and 618 lb. Sulphate of Ammonia                                       | 36.7                                                                                         | 31.4 | 41.5 | 36.9 | 36.6 | 21.4                        | 19.2 | 24.3 | 21.3 | 21.6 | 20.1                                                                            |
| 9     | As 5, and 275 lb. Nitrate of Soda                                           | 28.3                                                                                         | 35.3 | 26.4 | 25.5 | 28.9 | 16.5                        | 20.2 | 16.0 | 15.1 | 17.0 | 13.9††                                                                          |
| 10    | 412 lb. Sulphate of Ammonia                                                 | 29.1                                                                                         | 38.2 | 25.8 | 22.8 | 29.0 | 17.7                        | 22.3 | 15.3 | 13.9 | 17.3 | 10.9                                                                            |
| 11    | As 10, and Superphosphate (3½ cwt.)                                         | 26.5                                                                                         | 32.9 | 21.5 | 17.6 | 24.6 | 15.8                        | 18.7 | 13.2 | 10.6 | 14.6 | 12.3                                                                            |
| 12    | As 10, and Super (3½ cwt.) and Sulph. Soda<br>(366 lb.)                     | 28.3                                                                                         | 36.5 | 24.2 | 26.4 | 28.8 | 16.9                        | 21.4 | 13.9 | 15.2 | 16.8 | 15.7                                                                            |
| 13    | As 10 and Super (3½ cwt.) and Sulph. Potash<br>(200 lb.)                    | 29.0                                                                                         | 34.3 | 24.9 | 24.4 | 28.2 | 17.4                        | 20.7 | 14.6 | 14.6 | 16.8 | 17.0                                                                            |
| 14    | As 10, and Super. (3½ cwt.) and Sulph. Magnesia<br>(280 lb.)                | 28.9                                                                                         | 34.6 | 25.6 | 26.4 | 28.9 | 17.4                        | 20.3 | 15.0 | 15.6 | 17.1 | 15.5                                                                            |
| 15    | As 5, and 412 lb. Sulphate Amm. all applied in<br>Autumn                    | 24.4                                                                                         | 32.2 | 25.7 | 23.1 | 26.4 | 14.3                        | 19.2 | 15.2 | 13.8 | 15.6 | 16.1                                                                            |
| 16    | As 5, and 550 lb. Nitrate of Soda                                           | 33.9                                                                                         | 39.1 | 31.7 | 27.7 | 33.1 | 20.2                        | 23.1 | 19.3 | 16.5 | 19.8 | 17.8††                                                                          |
| 17    | Minerals alone as 5 or 412 lb. Sulphate of Amm-<br>alone in alternate years | M10.2                                                                                        | 34.3 | 8.9  | 7.4  | 15.2 | 6.2                         | 20.2 | 5.5  | 4.6  | 9.1  | M8.1                                                                            |
| 18    | Rape Cake (1,889 lb.)                                                       | A25.5                                                                                        | 31.3 | 31.3 | 26.9 | 28.8 | 15.1                        | 19.0 | 18.8 | 16.3 | 17.3 | A16.1*                                                                          |
| 19    | As 7, without Super.                                                        | 24.3                                                                                         | 41.6 | 25.9 | 19.8 | 27.9 | 14.6                        | 25.0 | 15.5 | 12.2 | 16.8 | 12.6†                                                                           |
| 20    |                                                                             | 30.0                                                                                         | 27.6 | —    | —    | 28.8 | 17.8                        | 16.8 | —    | —    | 17.3 | 10.3§                                                                           |

| Season  | I. | II. | III. | IV. | V. | Season. | I. | II. | III. | IV. | V. |
|---------|----|-----|------|-----|----|---------|----|-----|------|-----|----|
| 1925-26 | F  | F   | F    | C   | C  | 1930-31 | F  | C   | C    | C   | C  |
| 1926-27 | F  | F   | F    | C   | C  | 1931-32 | C  | F   | C    | C   | C  |
| 1927-28 | C  | C   | F    | F   | F  | 1932-33 | C  | C   | C    | C   | F  |
| 1928-29 | C  | C   | F    | F   | F  | 1933-34 | C  | C   | C    | F   | C  |
| 1929-30 | C  | C   | C    | C   | C  | 1934-35 | C  | C   | F    | C   | C  |

**Fallowing Rotation.** After the fallows of 1925-6 to 1928-9 a regular cycle of fallowing was started in the season 1930-31. This cycle and the preceding fallows are shown in the accompanying diagram (C=crop, F=fallow). The sections (I. to V.) are numbered in order from the upper or western end of the field. Preparatory to the first fallow the field was harvested in five separate sections (1924-5).

For notes, see next page.

## WHEAT—BROADBALK FIELD, 1933

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| Plot. | Manurial Treatment<br>(amounts stated are per acre).         | Bushel Weight in lb. (in some cases<br>estimated from half or quarter-bushel). |      |      |      |      | Total Straw†, cwt. per acre. |      |      |      |      | 74-year<br>Average<br>1852-1925<br>(prior to fal-<br>low). Total<br>Straw, cwt. |
|-------|--------------------------------------------------------------|--------------------------------------------------------------------------------|------|------|------|------|------------------------------|------|------|------|------|---------------------------------------------------------------------------------|
|       |                                                              | I                                                                              | II   | III  | IV   | Mean | I                            | II   | III  | IV   | Mean |                                                                                 |
|       |                                                              |                                                                                |      |      |      |      |                              |      |      |      |      |                                                                                 |
| 2A    | Farmyard Manure (14 tons)                                    | 63.2                                                                           | 63.0 | 62.6 | 63.4 | 63.0 | 43.9                         | 63.8 | 39.3 | 40.9 | 47.0 | 32.1**                                                                          |
| 2B    | Farmyard Manure (14 tons)                                    | 63.7                                                                           | 62.6 | 60.8 | 62.9 | 62.5 | 49.8                         | 63.8 | 43.6 | 45.2 | 50.6 | 34.2                                                                            |
| 3     | Unmanured since 1839                                         | 62.8                                                                           | 62.7 | 62.3 | 62.4 | 62.6 | 12.6                         | 29.0 | 11.6 | 8.4  | 15.4 | 9.8                                                                             |
| 5     | Complete Mineral Manure§§                                    | 62.8                                                                           | 63.2 | 62.0 | 62.6 | 62.6 | 10.3                         | 33.0 | 10.1 | 9.0  | 15.6 | 11.5                                                                            |
| 6     | As 5, and 206 lb. Sulphate of Ammonia                        | 62.9                                                                           | 62.3 | 60.3 | 62.3 | 62.0 | 19.5                         | 37.5 | 22.5 | 19.9 | 24.8 | 20.3                                                                            |
| 7     | As 5, and 412 lb. Sulphate of Ammonia                        | 62.9                                                                           | 61.6 | 61.5 | 63.5 | 62.4 | 36.0                         | 46.4 | 32.6 | 30.8 | 36.4 | 32.1                                                                            |
| 8     | As 5, and 618 lb. Sulphate of Ammonia                        | 62.6                                                                           | 62.7 | 63.1 | 62.2 | 62.6 | 49.5                         | 50.8 | 45.4 | 45.8 | 47.9 | 39.8                                                                            |
| 9     | As 5, and 275 lb. Nitrate of Soda                            | 62.8                                                                           | 61.8 | 63.1 | 62.6 | 62.6 | 32.4                         | 42.1 | 28.2 | 26.5 | 32.3 | 24.6††                                                                          |
| 10    | 412 lb. Sulphate of Ammonia                                  | 62.3                                                                           | 63.1 | 62.4 | 62.0 | 62.4 | 29.4                         | 38.8 | 23.0 | 21.0 | 28.0 | 17.8                                                                            |
| 11    | As 10, and Superphosphate (3½ cwt.)                          | 61.4                                                                           | 61.3 | 61.4 | 60.9 | 61.2 | 26.4                         | 32.4 | 19.8 | 17.4 | 24.0 | 21.4                                                                            |
| 12    | As 10, and Super (3½ cwt.) and Sulph. Soda<br>(366 lb.)      | 62.2                                                                           | 62.3 | 62.0 | 61.5 | 62.0 | 30.5                         | 35.8 | 23.9 | 24.6 | 28.7 | 26.8                                                                            |
| 13    | As 10, and Super (3½ cwt.) and Sulph. Potash<br>(200 lb.)    | 63.6                                                                           | 63.2 | 62.6 | 62.8 | 63.0 | 34.1                         | 43.3 | 30.3 | 31.5 | 34.8 | 30.6                                                                            |
| 14    | As 10, and Super. (3½ cwt.) and Sulph. Magnesia<br>(280 lb.) | 62.9                                                                           | 62.5 | 62.0 | 62.7 | 62.5 | 33.4                         | 39.3 | 27.5 | 27.7 | 32.0 | 26.8                                                                            |
| 15    | As 5, and 412 lb. Sulphate Amm. all applied in<br>Autumn     | 62.8                                                                           | 63.4 | 63.2 | 63.3 | 63.2 | 27.1                         | 39.1 | 27.3 | 26.0 | 29.9 | 28.2                                                                            |
| 16    | As 5, and 550 lb. Nitrate of Soda                            | 63.7                                                                           | 63.7 | 63.4 | 63.7 | 63.6 | 35.1                         | 44.2 | 32.2 | 31.8 | 35.8 | 35.2††                                                                          |
| 17    | Minerals alone as 5 or 412 lb. Sulphate of Ammonia           | M63.0                                                                          | 63.8 | 62.6 | 62.6 | 63.0 | 11.2                         | 35.7 | 9.3  | 8.1  | 16.1 | M12.3                                                                           |
| 18    | alone in alternate years                                     | A63.0                                                                          | 63.5 | 63.2 | 63.0 | 63.2 | 28.9                         | 40.8 | 34.2 | 35.0 | 34.7 | A28.1*                                                                          |
| 19    | Rape Cake (1,889 lb.)                                        | 63.0                                                                           | 63.6 | 62.3 | 62.8 | 62.9 | 25.9                         | 40.6 | 26.6 | 27.7 | 30.2 | 22.0†                                                                           |
| 20    | As 7, without Super.                                         | 63.2                                                                           | 64.8 | —    | —    | 64.0 | 32.3                         | 28.4 | —    | —    | 30.3 | 18.6§                                                                           |

† Includes straw, cavings, and chaff.

\*A=Ammonia series. M=Mineral series.

\*\*Twenty-six years only, 1900-25.

†† Thirty-three years only, 1893-1925. § Eighteen years

only, 1906-1925 (no crop in 1912 and 1914).

§§ Complete mineral manure : 3½ cwt. Super., 200 lb. Sulph. Potash, 100 lb. Sulph. Soda, 100 Sulph. Magnesia. Sulphate of Ammonia is applied

as to one-third in Autumn and two-thirds in Spring except for Plot 15. Nitrate of Soda is all given in Spring, there being two applications at an interval of a month on Plot 16.

CULTIVATIONS, ETC.—Cropped sections. Ploughed : August 19th—Sept. 5th. Cultivated : Sept. 15th-16th. Harrowed : Oct. 17th-May 8th. Seed sown : Oct. 17th. Variety : Red Standard. Manures applied : Oct. 10th-11th, Mar. 29th-30th, and May 22nd. Harvested : July 27th-28th. Followed section.—Ploughed : Aug. 19th-Sept. 5th, Apr. 24th-25th, and July 7th-10th. Cultivated : Sept. 15th-16th, and Mar. 29th-April 12th. Harrowed : Sept. 15th-June 12. Rolled : May 10th-June 2nd.