

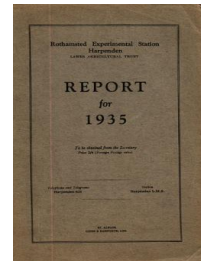
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## Report for 1935

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## Continuous Rotation Experiments

### Rothamsted Research

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## FOUR COURSE ROTATION EXPERIMENT, ROTHAMSTED

### RESIDUAL VALUES OF HUMIC AND PHOSPHATIC FERTILISERS

For details, see 1932 Report, p. 127

#### MANURES APPLIED, SEASON 1934-5

| Treatment | Organic Fertilisers (cwt. per acre) |       |                  |                               | Additional Artificial Fertilisers (cwt. per acre) |                               |                                         |
|-----------|-------------------------------------|-------|------------------|-------------------------------|---------------------------------------------------|-------------------------------|-----------------------------------------|
|           | Organic Matter                      | N     | K <sub>2</sub> O | P <sub>2</sub> O <sub>5</sub> | N. as S. of A.                                    | K <sub>2</sub> O as Mur. Pot. | P <sub>2</sub> O <sub>5</sub> as Super. |
| 1 ..      | 50 (as F.Y.M.)†                     | 1.800 | 1.851            | 0.611                         | None†                                             | 1.149                         | 0.589                                   |
| 2 ..      | 50 (as Adco)                        | 1.030 | 0.793            | 1.167                         | 0.770                                             | 2.207                         | 0.033                                   |
| 3 ..      | 120.37 (as straw)                   | 0.670 | 1.457            | 0.012                         | 1.130                                             | 1.543                         | 1.188                                   |
| 4 ..      |                                     | None  |                  |                               | 0.36                                              | 0.6                           | 1.2                                     |
| 5 ..      |                                     | None  |                  |                               | 0.36                                              | 0.6                           | 1.2*                                    |

\* As mineral phosphate.

† The F.Y.M. used had too high a ratio of N. to organic matter, and had to be slightly diluted with straw. The adjustment was made so that a quantity of the mixture containing 50 cwt. of organic matter, also contained 1.8 cwt. of N. No additional sulphate of ammonia was therefore required. The weights applied per acre were 199.6 cwt. F.Y.M. and 6.6 cwt. straw.

#### CULTIVATIONS, ETC.

|                         | Barley                   | Seeds†                   | Potatoes                 | Wheat                     |
|-------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| Variety .. ..           | Plumage Archer           | Ryegrass                 | Ally                     | Yeoman                    |
| Date of Sowing ..       | March 13                 | Sept. 12                 | April 12                 | Oct. 23                   |
| Manures applied—        |                          |                          |                          |                           |
| Dung and Adco           | Dec. 12                  | Sept. 7                  | Dec. 17                  | Sept. 10                  |
| Artificials to Adco     |                          |                          |                          |                           |
| and Dung ..             | Dec. 12                  | Sept. 7                  | Dec. 17                  | Sept. 10                  |
| Straw .. ..             | Dec. 13-Jan. 7           | Sept. 7-8                | Jan. 8-10                | Sept. 11                  |
| Artificials to straw .. | Dec. 12, Feb. 12, Mar. 7 | Sept. 7, Dec. 20, Mar. 7 | Dec. 17, Feb. 12, Mar. 7 | Sept. 10, Dec. 20, Mar. 7 |
| Treatments 4 and 5 ..   | March 7                  | Sept. 12, Mar. 19        | April 5                  | Oct. 20, Mar. 19          |
| Date of harvesting ..   | Aug. 12                  | June 22                  | Oct. 14                  | Aug. 13                   |
| Previous crop ..        | Potatoes                 | Barley                   | Wheat                    | Seeds hay                 |
| Cultivations—           |                          |                          |                          |                           |
| Ploughing ..            | Dec. 13—Jan. 7-8         | Sept. 7-8                | Jan. 8-10                | July 18, Sept. 11-13      |
| Harrowing ..            | March 12, 14             | Sept. 12, 13             | Mar. 29, May 7, 16       | Oct. 20, 23, Mar. 21      |
| Rolling ..              |                          | Sept. 12, 13             | April 1, May 7           | March 26                  |
| Ridging ..              |                          |                          | April 1, May 24, July 19 |                           |
| Grubbing ..             |                          |                          | June 25, July 10         |                           |

† The seeds mixture of ryegrass and white clover, previously sown under barley, was replaced in 1934-35 by ryegrass alone, sown in autumn after ploughing the barley stubble.

## PLAN AND YIELDS

Wheat—AW, plots 1-25

Yields in lb., grain above, straw below.

N.W.

|                          |                          |                         |                          |                          |
|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| 5<br>45.1<br>79.4<br>III | 2<br>64.5<br>97.0<br>I   | 1<br>57.3<br>77.7<br>IV | 3<br>62.8<br>100.7<br>II | 4<br>57.8<br>88.2<br>V   |
| 5<br>43.4<br>71.6<br>V   | 1<br>55.8<br>87.2<br>II  | 3<br>69.2<br>121.3<br>I | 4<br>56.5<br>99.5<br>III | 2<br>47.2<br>80.3<br>IV  |
| 3<br>44.3<br>64.7<br>V   | 2<br>44.1<br>64.4<br>III | 5<br>50.2<br>80.8<br>II | 4<br>52.7<br>109.3<br>IV | 1<br>65.6<br>132.9<br>I  |
| 1<br>45.5<br>64.5<br>V   | 3<br>48.0<br>69.8<br>III | 4<br>61.3<br>105.2<br>I | 5<br>47.6<br>117.4<br>IV | 2<br>47.6<br>113.9<br>II |
| 4<br>55.7<br>87.8<br>II  | 1<br>50.2<br>76.8<br>III | 5<br>53.0<br>103.5<br>I | 3<br>46.2<br>116.8<br>IV | 2<br>41.9<br>79.6<br>V   |

Potatoes—AP, plots 26-50

Yields in lb.

N.W.

|                    |                   |                    |                    |                    |
|--------------------|-------------------|--------------------|--------------------|--------------------|
| 26 3<br>183<br>V   | 27 2<br>224<br>I  | 28 5<br>193<br>II  | 29 4<br>263<br>IV  | 30 1<br>152<br>III |
| 31 4<br>359<br>I   | 32 2<br>133<br>IV | 33 1<br>148<br>V   | 34 5<br>181<br>III | 35 3<br>129<br>II  |
| 36 1<br>224<br>IV  | 37 4<br>206<br>II | 38 3<br>180<br>III | 39 5<br>212<br>I   | 40 2<br>158<br>V   |
| 41 4<br>308<br>III | 42 5<br>241<br>V  | 43 3<br>228<br>IV  | 44 2<br>217<br>II  | 45 1<br>290<br>I   |
| 46 2<br>217<br>III | 47 4<br>224<br>V  | 48 3<br>226<br>I   | 49 1<br>212<br>II  | 50 5<br>232<br>IV  |

Ryegrass—AR, plots 51-75

Yields in lb., hay

N.W.

|                |                 |                |                 |               |
|----------------|-----------------|----------------|-----------------|---------------|
| 3<br>181<br>I  | 4<br>112<br>III | 1<br>68<br>II  | 2<br>37<br>IV   | 5<br>83<br>V  |
| 3<br>100<br>II | 4<br>105<br>V   | 5<br>104<br>I  | 2<br>43<br>III  | 1<br>36<br>IV |
| 2<br>140<br>I  | 4<br>130<br>II  | 3<br>42<br>V   | 1<br>49<br>III  | 5<br>82<br>IV |
| 5<br>120<br>II | 1<br>115<br>I   | 3<br>65<br>III | 4<br>109<br>IV  | 2<br>36<br>V  |
| 4<br>82<br>I   | 2<br>112<br>II  | 1<br>41<br>V   | 5<br>116<br>III | 3<br>50<br>IV |

Barley—AB, plots 76-100

Yields in lb., grain above, straw below

N.W.

|                         |                          |                          |                         |                          |
|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| 4<br>85.6<br>94.9<br>V  | 2<br>89.0<br>106.0<br>I  | 5<br>80.6<br>90.9<br>IV  | 3<br>54.0<br>61.0<br>II | 1<br>86.6<br>90.9<br>III |
| 5<br>75.9<br>91.1<br>II | 2<br>71.5<br>77.0<br>III | 1<br>58.6<br>66.4<br>V   | 4<br>81.0<br>87.0<br>IV | 3<br>97.0<br>109.0<br>I  |
| 2<br>62.4<br>70.1<br>IV | 1<br>82.3<br>87.7<br>I   | 5<br>75.4<br>87.6<br>III | 4<br>81.2<br>84.8<br>II | 3<br>64.2<br>69.8<br>V   |
| 2<br>57.4<br>62.6<br>V  | 4<br>74.8<br>83.7<br>III | 1<br>72.1<br>76.9<br>II  | 5<br>65.7<br>79.8<br>I  | 3<br>61.2<br>68.8<br>IV  |
| 5<br>76.8<br>89.7<br>V  | 2<br>61.1<br>65.9<br>II  | 3<br>62.3<br>65.2<br>III | 1<br>55.5<br>62.5<br>IV | 4<br>96.5<br>108.0<br>I  |

## SUMMARY OF RESULTS, 1935

| Manure           | Year of Cycle | Wheat cwt. per Acre |       | Potatoes tons per Acre | Barley cwt. per Acre |       | Ryegrass cwt. per Acre dry matter |
|------------------|---------------|---------------------|-------|------------------------|----------------------|-------|-----------------------------------|
|                  |               | Grain               | Straw |                        | Grain                | Straw |                                   |
| Manure as F.Y.M. | I             | 24.0                | 48.7  | 5.31                   | 31.5                 | 33.5  | 28.4                              |
|                  | II            | 20.4                | 32.0  | 3.88                   | 27.6                 | 29.4  | 16.7                              |
|                  | III           | 18.4                | 28.1  | 2.78                   | 33.1                 | 34.8  | 12.1                              |
|                  | IV            | 21.0                | 28.5  | 4.10                   | 21.2                 | 23.9  | 8.9                               |
|                  | V             | 16.7                | 23.6  | 2.71                   | 22.4                 | 25.4  | 10.0                              |
| Manure as Adco*  | I             | 23.6                | 35.6  | 4.10                   | 34.0                 | 40.5  | 34.5                              |
|                  | II            | 17.4                | 41.7  | 3.98                   | 23.4                 | 25.2  | 27.7                              |
|                  | III           | 16.2                | 23.6  | 3.98                   | 27.3                 | 29.4  | 10.7                              |
|                  | IV            | 17.3                | 29.4  | 2.44                   | 23.9                 | 26.8  | 9.1                               |
|                  | V             | 15.4                | 29.2  | 2.90                   | 22.0                 | 23.9  | 9.0                               |
| Manure as Straw  | I             | 25.4                | 44.4  | 4.14                   | 37.1                 | 41.7  | 44.7                              |
|                  | II            | 23.0                | 36.9  | 2.36                   | 20.6                 | 23.3  | 24.6                              |
|                  | III           | 17.6                | 25.6  | 3.30                   | 23.8                 | 24.9  | 16.1                              |
|                  | IV            | 16.9                | 42.8  | 4.18                   | 23.4                 | 26.3  | 12.3                              |
|                  | V             | 16.2                | 23.7  | 3.35                   | 24.6                 | 26.7  | 10.4                              |
| Super.           | I             | 22.5                | 38.6  | 6.58                   | 36.9                 | 41.3  | 20.3                              |
|                  | II            | 20.4                | 32.2  | 3.78                   | 31.0                 | 32.4  | 32.0                              |
|                  | III           | 20.7                | 36.5  | 5.64                   | 28.6                 | 32.0  | 27.6                              |
|                  | IV            | 19.3                | 40.1  | 4.82                   | 31.0                 | 33.3  | 27.0                              |
|                  | V             | 21.2                | 32.3  | 4.10                   | 32.7                 | 36.3  | 25.9                              |
| Rock Phosphate   | I             | 19.4                | 37.9  | 3.88                   | 25.1                 | 30.5  | 25.5                              |
|                  | II            | 18.4                | 29.6  | 3.54                   | 29.0                 | 34.8  | 29.5                              |
|                  | III           | 16.5                | 29.1  | 3.32                   | 28.8                 | 33.5  | 28.7                              |
|                  | IV            | 17.4                | 43.0  | 4.25                   | 30.8                 | 34.8  | 20.3                              |
|                  | V             | 15.9                | 26.2  | 4.42                   | 29.4                 | 34.3  | 20.6                              |

The number I denotes application of manure at the beginning of the present season (1934-35) ; II, application in the previous season, etc.

\*The Adco treated straw was dried out in June and had to be completely re-wetted. The analysis given on p. 146 shows that the compost was particularly deficient in nitrogen (0.33%N). A reasonable figure would be 0.5%N.

**SIX COURSE ROTATION EXPERIMENT,**SEASONAL EFFECTS OF N, P<sub>2</sub>O<sub>5</sub> AND K<sub>2</sub>O

(For details see 1932 Report, p. 131)

**CULTIVATIONS, ETC.—ROTHAMSTED**

|                            | Sugar Beet                                   | Barley                   | Clover Hay         | Wheat                | Potatoes                                 | Rye                            |
|----------------------------|----------------------------------------------|--------------------------|--------------------|----------------------|------------------------------------------|--------------------------------|
| Variety                    | Kuhn                                         | Plumage<br>Archer        | Broad Red          | Yeoman               | Ally                                     |                                |
| Date of Sowing             | April 29                                     | March 13                 | April 24           | Oct. 16              | April 12                                 | Oct. 27                        |
| Manures applied            | April 29                                     | March 8                  | Nov. 5,<br>April 8 | Oct. 9,<br>Mar. 19   | April 5,                                 | Oct. 26,<br>Mar. 20<br>Oct. 18 |
| Lime applied               |                                              | March 4                  |                    |                      |                                          |                                |
| Date of harvest-<br>ing    | Oct. 30-<br>Nov. 4                           | Aug. 12                  | Crop failed        | Aug. 10              | Oct. 15                                  | July 29                        |
| Previous crop              | Rye                                          | Sugar beet               | Barley             | Clover               | Wheat                                    | Potatoes                       |
| Cultivations—<br>Ploughing | Sept. 13,<br>Feb. 11,<br>12                  | Jan. 7-8                 |                    | Sept. 15             | Sept. 10,<br>Mar. 18                     | Oct. 18                        |
| Harrowing                  | Sept. 25,<br>27, Oct.<br>13, April<br>24, 29 | Mar. 7, 14,<br>April 18, |                    | Oct. 16,<br>Mar. 21, | Sept. 27,<br>April 2,<br>3, May<br>7, 16 | Oct. 26, 27<br>Mar. 21         |
| Rolling                    | Oct. 13,<br>April 29,<br>30                  | Mar. 15,<br>April 18     |                    | Mar. 26              | April 2, 3,<br>May 7                     | Oct. 27                        |
| Singling                   | June 12,<br>13                               |                          |                    |                      |                                          |                                |
| Hoeing                     | June 3, 15,<br>27<br>July 17,<br>27          |                          |                    |                      |                                          |                                |
| Ridging                    |                                              |                          |                    |                      | April 3,<br>May 25,<br>July 17           |                                |
| Grubbing                   |                                              |                          |                    |                      | June 25,<br>July 8                       |                                |

L

## CULTIVATIONS, ETC.—WOBURN

|                            | Sugar Beet                                     | Barley                          | Clover Hay          | Wheat                                                                         | Potatoes                                                              | Rye                                                     |
|----------------------------|------------------------------------------------|---------------------------------|---------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------|
| Variety                    | Kuhn                                           | Plumage<br>Archer               | Broad Red           | Yeoman                                                                        | Ally                                                                  |                                                         |
| Date of sowing             | April 29                                       | March 6                         | May 1               | Nov. 6<br>Resown<br>Nov. 19                                                   | April 5                                                               | Nov. 3                                                  |
| Manures applied            | April 29                                       | March 7,<br>April 5,<br>March 5 | Nov. 7,<br>Mar. 19, | Nov. 7,<br>Mar. 19                                                            | April 5,                                                              | Nov. 3,<br>Mar. 28<br>Oct. 12                           |
| Lime applied               |                                                |                                 |                     |                                                                               |                                                                       |                                                         |
| Date of harvest-<br>ing    | Nov. 19                                        | Aug. 6                          | July 24             | Aug. 8                                                                        | Oct. 2                                                                | July 24                                                 |
| Previous crop              | Rye                                            | Sugar Beet                      | Barley              | Clover failed                                                                 | Wheat                                                                 | Potatoes                                                |
| Cultivations—<br>Ploughing | Oct. 4-5,<br>Feb. 20                           | Jan. 7-10                       |                     | July 20-21                                                                    | Oct. 5,<br>Mar. 4                                                     | Oct. 5-8                                                |
| Harrowing                  | Oct. 15, 16,<br>Mar. 19,<br>April 3,<br>15, 29 | Mar. 6, 19                      | May 1,<br>Mar. 19   | Oct. 27,<br>Nov. 6,<br>Mar. 6,<br>19, 28,<br>Apr. 15,<br>May 2, 8,<br>Mar. 20 | Oct. 10,<br>Nov. 6,<br>Mar. 19,<br>Apr. 3,<br>29<br>June 4<br>Mar. 26 | Oct. 30,<br>Nov. 3,<br>Mar. 6,<br>28, Apr.<br>15, May 2 |
| Rolling                    | Mar. 26,<br>Apr. 29                            | Mar. 6, 19                      | Mar. 20             |                                                                               |                                                                       | Mar. 21                                                 |
| Singling                   | June 6-11                                      |                                 |                     |                                                                               |                                                                       |                                                         |
| Hoeing                     | June 4, 20,<br>27-30,<br>Sept. 9-<br>10        |                                 |                     | May 28-30                                                                     | June 4,<br>July 2,                                                    |                                                         |
| Ridging                    |                                                |                                 |                     |                                                                               | April 4, 5,<br>May 8,<br>July 9                                       |                                                         |

*Note:* The green manure crop of rye immediately preceding sugar beet (see 1932 Report, p. 131) was discontinued in 1934-5, both at Rothamsted and Woburn. Thus there are now only two green manure crops, mustard after rye before sugar beet, and rye after wheat before potatoes.

## ROTHAMSTED, 1935

## Barley\*—BB, plots 1-15

Yields in lb., grain above, straw below.

|                      |                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| 4K<br>109.2<br>132.8 | 1K<br>100.7<br>119.3 | 1N<br>94.6<br>111.4  | 0N<br>89.0<br>104.0  | 3P<br>101.8<br>126.2 |
| 0K<br>109.3<br>134.2 | 3K<br>108.6<br>134.9 | 4N<br>107.5<br>140.5 | 1P<br>103.3<br>122.2 | 2P<br>105.6<br>128.4 |
| 2K<br>113.4<br>140.6 | 3N<br>107.9<br>144.1 | 2N<br>107.2<br>123.8 | 4P<br>107.7<br>126.8 | 0P<br>91.9<br>108.6  |

N  
↑

## Potatoes—BP, plots 16-30

Yields in lb.

|           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|
| 4P<br>358 | 0P<br>360 | 3K<br>400 | 4K<br>428 | 4N<br>381 |
| 1P<br>356 | 3P<br>366 | 2K<br>415 | 1N<br>397 | 0N<br>306 |
| 2P<br>398 | 1K<br>368 | 0K<br>368 | 3N<br>402 | 2N<br>370 |

## Rye—BR, Plots 31-45

Yields in lb., grain above, straw below

|                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 3P<br>54.9<br>147.1 | 1P<br>53.7<br>154.3 | 1N<br>60.0<br>141.0 | 3N<br>51.4<br>156.1 | 4K<br>49.8<br>139.2 |
| 4P<br>62.2<br>163.8 | 2P<br>49.9<br>154.6 | 0N<br>60.4<br>149.1 | 0K<br>60.9<br>153.1 | 1K<br>56.0<br>155.0 |
| 0P<br>59.6<br>135.4 | 4N<br>51.4<br>159.1 | 2N<br>56.1<br>148.4 | 3K<br>61.0<br>149.0 | 2K<br>55.5<br>151.0 |

N  
↑

## Sugar Beet—BS, plots 46-60

Yields in lb., roots (dirty) above, tops centre, sugar percentage below

|                           |                           |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 4K<br>472<br>365<br>18.06 | 1K<br>470<br>343<br>17.37 | 2N<br>574<br>584<br>17.28 | 0N<br>544<br>441<br>17.83 | 3P<br>503<br>439<br>17.40 |
| 2K<br>476<br>458<br>17.02 | 0K<br>525<br>566<br>16.79 | 3N<br>496<br>625<br>16.77 | 4P<br>525<br>342<br>17.32 | 2P<br>562<br>480<br>17.74 |
| 3K<br>537<br>528<br>17.74 | 1N<br>566<br>541<br>17.80 | 4N<br>566<br>672<br>17.11 | 1P<br>596<br>590<br>17.49 | 0P<br>637<br>626<br>17.63 |

## Clover Hay—BC, plots 61-75

Crop failed

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 0P<br>— | 1P<br>— | 2N<br>— | 1N<br>— | 2K<br>— |
| 4P<br>— | 2P<br>— | 3N<br>— | 1K<br>— | 0K<br>— |
| 3P<br>— | 4N<br>— | 0N<br>— | 3K<br>— | 4K<br>— |

N  
↑

## Wheat—BW, plots 76-90

Yields in lb., grain above, straw below

|                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 0K<br>70.8<br>116.2 | 1K<br>71.1<br>116.9 | 4N<br>74.0<br>125.0 | 1N<br>65.2<br>110.8 | 1P<br>72.4<br>131.6 |
| 3K<br>78.8<br>131.2 | 4K<br>78.3<br>130.7 | 0N<br>64.0<br>94.5  | 3P<br>65.9<br>109.1 | 4P<br>72.9<br>122.6 |
| 2K<br>82.1<br>137.4 | 3N<br>80.3<br>131.7 | 2N<br>65.3<br>102.2 | 0P<br>62.8<br>99.7  | 2P<br>58.0<br>104.5 |

\* A mistake was made in the fertiliser applications to barley at both Rothamsted and Woburn. The varying nitrogen dressings were applied to the five plots which should have had varying quantities of potash, and *vice versa*. The rate of application of potash to the barley was also too high. A unit dressing was 0.374 cwt.  $K_2O$  per acre instead of 0.25 cwt. The rates of application of N and  $P_2O_5$  were correct. The plan shows the actual treatments which were given.

## WOBURN, 1935

Clover Hay—CC, Plots 1-15  
Yields in lb., green weights

|             |             |             |             |             |
|-------------|-------------|-------------|-------------|-------------|
| 3K<br>141.0 | 0K<br>115.0 | 4P<br>170.0 | 3P<br>130.0 | 4N<br>75.0  |
| 4K<br>215.0 | 1K<br>100.0 | 1P<br>166.0 | 1N<br>176.0 | 3N<br>68.0  |
| 2K<br>58.5  | 0P<br>70.0  | 2P<br>128.0 | 2N<br>125.0 | 0N<br>153.0 |

N.W.  
↑Wheat—CW, Plots 16-30  
Yields in lb., grain above, straw below

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| 3N<br>40.2<br>65.2 | 1N<br>17.9<br>27.1 | 0P<br>33.7<br>53.5 | 4P<br>35.0<br>58.0 | 3K<br>34.7<br>57.0 |
| 2N<br>31.7<br>51.0 | 0N<br>11.5<br>14.0 | 2P<br>34.0<br>51.0 | 1K<br>38.2<br>55.0 | 0K<br>42.0<br>65.5 |
| 4N<br>46.2<br>80.5 | 3P<br>37.7<br>57.0 | 1P<br>38.7<br>60.0 | 4K<br>44.0<br>69.0 | 2K<br>39.2<br>60.5 |

Barley\*—CB, Plots 31-45  
Yields in lb., grain above, straw below

|                    |                    |                    |                     |                     |
|--------------------|--------------------|--------------------|---------------------|---------------------|
| 4N<br>67.0<br>92.5 | 0N<br>44.2<br>54.7 | 4P<br>73.5<br>91.5 | 2P<br>80.5<br>103.5 | 2K<br>80.2<br>100.2 |
| 1N<br>49.5<br>53.0 | 3N<br>69.2<br>83.2 | 1P<br>74.7<br>85.0 | 1K<br>79.7<br>94.7  | 3K<br>85.0<br>93.0  |
| 2N<br>61.2<br>63.0 | 3P<br>63.0<br>69.0 | 0P<br>69.5<br>75.5 | 0K<br>71.2<br>78.0  | 4K<br>74.0<br>84.0  |

N.W.  
↑Rye—CR, Plots 46-60  
Yields in lb., grain above, straw below

|                    |                    |                     |                     |                     |
|--------------------|--------------------|---------------------|---------------------|---------------------|
| 2P<br>43.5<br>85.7 | 1P<br>48.0<br>92.2 | 4K<br>49.0<br>91.7  | 1K<br>55.5<br>102.7 | 1N<br>43.0<br>77.7  |
| 3P<br>50.0<br>90.7 | 4P<br>47.0<br>87.7 | 2K<br>52.0<br>104.7 | 4N<br>62.5<br>123.7 | 0N<br>40.5<br>68.7  |
| 0P<br>49.5<br>88.2 | 3K<br>47.0<br>87.7 | 0K<br>55.0<br>105.7 | 2N<br>55.2<br>104.7 | 3N<br>57.0<br>110.7 |

Potatoes—CP, Plots 61-75  
Yields in lb.

|           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|
| 2P<br>389 | 1P<br>356 | 3N<br>441 | 0N<br>381 | 4K<br>437 |
| 0P<br>356 | 3P<br>372 | 1N<br>409 | 2K<br>451 | 1K<br>381 |
| 4P<br>393 | 4N<br>372 | 2N<br>366 | 0K<br>409 | 3K<br>384 |

N.W.  
↑Sugar Beet—CS, Plots 76-90  
Yields in lb., roots (dirty) above,  
tops centre, sugar percentage below

|                           |                           |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 1N<br>395<br>309<br>15.81 | 2N<br>375<br>301<br>15.66 | 0P<br>477<br>356<br>15.95 | 1P<br>505<br>337<br>15.66 | 2K<br>441<br>326<br>15.61 |
| 3N<br>441<br>331<br>15.52 | 0N<br>373<br>296<br>15.75 | 4P<br>531<br>373<br>15.66 | 1K<br>543<br>363<br>16.21 | 0K<br>456<br>304<br>15.12 |
| 4N<br>510<br>283<br>15.70 | 2P<br>507<br>340<br>15.92 | 3P<br>530<br>346<br>15.72 | 3K<br>485<br>325<br>16.16 | 4K<br>431<br>341<br>16.07 |

\* Error in manuring (see p. 163).

## ROTHAMSTED, 1935

1.—Mean yields per acre and increments in yield per cwt. of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

|                                                |       | Average,<br>1930-34 | 1935  | Standard<br>error,<br>1935 |                                            |       | Average,<br>1930-34 | 1935 | Standard<br>error,<br>1935 |
|------------------------------------------------|-------|---------------------|-------|----------------------------|--------------------------------------------|-------|---------------------|------|----------------------------|
| <b>Sugar Beet</b><br>Roots<br>(washed)<br>tons | Yield | 6.72                | 8.56  |                            | <b>Clover Hay</b><br>Dry<br>matter<br>cwt. | Yield | 19.5*               | **   |                            |
|                                                | N     | 0.81                | -0.28 | ±1.10                      |                                            | N     | 15.8*               |      |                            |
|                                                | P     | 0.24                | -3.38 | ±1.10                      |                                            | P     | -0.4*               |      |                            |
|                                                | K     | 0.27                | -0.24 | ±0.66                      |                                            | K     | 1.2*                |      |                            |
| Tops<br>tons                                   | Yield | 8.71                | 9.05  |                            | <b>Wheat</b><br>Grain<br>cwt.              | Yield | 24.6                | 25.3 |                            |
|                                                | N     | 3.06                | 6.51  | ±2.39                      |                                            | N     | 2.7†                | 8.4  | ±4.1                       |
|                                                | P     | -0.30               | -8.56 | ±2.39                      |                                            | P     | 0.4                 | 3.3  | ±4.1                       |
|                                                | K     | -0.48               | -1.55 | ±1.43                      |                                            | K     | 1.2                 | 3.2  | ±2.5                       |
| Sugar<br>percentage                            | Mean  | 16.81               | 17.42 |                            | Straw<br>cwt.                              | Yield | 47.9                | 42.0 |                            |
|                                                | N     | -0.23               | -1.65 | ±0.50                      |                                            | N     | 20.1†               | 19.3 | ±8.3                       |
|                                                | P     | -0.68               | -0.47 | ±0.50                      |                                            | P     | 1.8                 | 5.6  | ±8.3                       |
|                                                | K     | 0.39                | 1.16  | ±0.30                      |                                            | K     | 1.7                 | 6.2  | ±5.0                       |
| Total<br>Sugar<br>cwt.                         | Yield | 23.3                | 29.8  |                            | <b>Potatoes</b><br>tons                    | Yield | 6.47                | 6.75 |                            |
|                                                | N     | 2.4                 | -3.8  | —                          |                                            | N     | 1.87                | 1.85 | ±0.93                      |
|                                                | P     | -0.2                | -12.7 | —                          |                                            | P     | 0.98                | 0.07 | ±0.93                      |
|                                                | K     | 1.6                 | 1.0   | —                          |                                            | K     | 3.26                | 1.08 | ±0.56                      |
| <b>Barley</b> §<br>Grain<br>cwt.               | Yield | 26.7                | 37.1  |                            | <b>Rye</b><br>Grain<br>cwt.                | Yield | 30.2†               | 20.1 |                            |
|                                                | N     | 4.0                 | 11.9  | ±3.5                       |                                            | N     | 3.5†                | -6.3 | ±3.1                       |
|                                                | P     | 3.6                 | 7.3   | ±3.5                       |                                            | P     | 0.6†                | 1.5  | ±3.1                       |
|                                                | K     | 0.7                 | 0.7   | ±1.4                       |                                            | K     | 1.2†                | -2.5 | ±1.9                       |
| Straw<br>cwt.                                  | Yield | 31.3                | 45.2  |                            | Straw<br>cwt.                              | Yield | 49.3†               | 53.7 |                            |
|                                                | N     | 9.9                 | 25.3  | ±5.3                       |                                            | N     | 2.4†                | 8.4  | ±4.4                       |
|                                                | P     | 7.9                 | 9.7   | ±5.3                       |                                            | P     | 4.4†                | 11.7 | ±4.4                       |
|                                                | K     | 3.3                 | 1.2   | ±2.1                       |                                            | K     | -2.8†               | -4.9 | ±2.7                       |

\*4 years only, 1933 crop failed. §Error in manuring (see p. 163). †1931-34. ‡1934 only. \*\*crop failed. Significant results in heavy type. Negative sign means depression.

2.—Average percentage increments in yield for each application of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

|                                      | N                   |       | P                   |        | K                   |       | Standard<br>error,<br>1935 |
|--------------------------------------|---------------------|-------|---------------------|--------|---------------------|-------|----------------------------|
|                                      | Average,<br>1930-34 | 1935  | Average,<br>1930-34 | 1935   | Average,<br>1930-34 | 1935  |                            |
| <b>Sugar Beet</b> —Roots<br>(washed) | 1.35                | -0.49 | 0.82                | -5.92  | 1.61                | -0.71 | ±1.92                      |
| Tops                                 | 5.60                | 10.79 | -0.61               | -14.19 | -0.56               | -4.28 | ±3.96                      |
| Sugar percentage                     | 0.26                | -1.42 | -0.41               | -0.41  | 0.58                | 1.67  | ±0.43                      |
| Total sugar                          | 1.09                | -1.92 | 0.19                | -6.37  | 2.27                | 0.85  | —                          |
| <b>Barley</b> §—Grain<br>Straw       | 2.69                | 4.82  | 2.18                | 2.94   | 0.69                | 0.75  | ±1.42                      |
|                                      | 5.06                | 8.39  | 3.83                | 3.21   | 2.62                | 1.02  | ±1.75                      |
| <b>Clover Hay</b> —Dry matter        | 9.92*               | —     | -3.90*              | —      | 0.80*               | —     | —                          |
| <b>Wheat</b> —Grain<br>Straw         | 2.92†               | 4.99  | 0.38                | 1.94   | 0.99                | 3.20  | ±2.45                      |
|                                      | 7.36†               | 6.90  | 0.30                | 2.00   | 0.52                | 3.67  | ±2.98                      |
| <b>Potatoes</b>                      | 4.39                | 4.10  | 2.51                | 0.15   | 12.34               | 4.01  | ±2.06                      |
| <b>Rye</b> —Grain<br>Straw           | 1.72†               | -4.68 | 0.33†               | 1.10   | 1.02†               | -3.09 | ±2.33                      |
|                                      | 0.73†               | 2.34  | 1.34†               | 3.28   | -1.40†              | -2.27 | ±1.24                      |

\*4 years only, 1933 crop failed. §Error in manuring (see p. 163). †1931-34. ‡1934 only. Significant results in heavy type. Negative sign means depression.

**WOBURN, 1935****1.—Mean yields per acre and increments in yield per cwt. of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.**

|                                                    |       | Average,<br>1930-34 | 1935        | Standard<br>error,<br>1935 |                                                |       | Average,<br>1930-34 | 1935        | Standard<br>error,<br>1935 |
|----------------------------------------------------|-------|---------------------|-------------|----------------------------|------------------------------------------------|-------|---------------------|-------------|----------------------------|
| <b>Sugar<br/>Beet</b><br>Roots<br>(washed)<br>tons | Yield | 7.12                | 6.38        |                            | <b>Clover<br/>Hay</b><br>Dry<br>matter<br>cwt. | Yield | 24.6**              | 12.3        |                            |
|                                                    | N     | 3.31                | <b>2.91</b> | ±0.98                      |                                                | N     | -9.2**              | -17.2       | ±7.9                       |
|                                                    | P     | -1.24               | 1.21        | ±0.98                      |                                                | P     | -8.4**              | 10.7        | ±7.9                       |
|                                                    | K     | 1.09                | -0.59       | ±0.58                      |                                                | K     | 7.5**               | 9.4         | ±4.8                       |
| Tops<br>tons                                       | Yield | 6.71                | 5.87        |                            | <b>Wheat</b><br>Grain<br>cwt.                  | Yield | 9.2†                | 12.5        |                            |
|                                                    | N     | 2.45                | -0.05       | ±0.76                      |                                                | N     | 12.0†               | <b>21.9</b> | ±2.4                       |
|                                                    | P     | -0.29               | 0.51        | ±0.76                      |                                                | P     | -1.3†               | 0.5         | ±2.4                       |
|                                                    | K     | 2.00                | 0.26        | ±0.46                      |                                                | K     | -1.0†               | 0.1         | ±1.4                       |
| Sugar<br>percentage                                | Mean  | 17.06               | 15.77       |                            | Straw<br>cwt.                                  | Yield | 23.6†               | 19.6        |                            |
|                                                    | N     | -1.17               | -0.26       | ±0.55                      |                                                | N     | 28.0†               | <b>40.8</b> | ±3.5                       |
|                                                    | P     | 0.03                | -0.35       | ±0.55                      |                                                | P     | -2.2†               | 1.5         | ±3.5                       |
|                                                    | K     | 0.79                | <b>0.74</b> | ±0.33                      |                                                | K     | -4.3†               | 1.3         | ±2.1                       |
| Total<br>Sugar<br>cwt.                             | Yield | 24.3                | 20.1        |                            | <b>Potatoes</b><br>tons                        | Yield | 9.19                | 7.02        |                            |
|                                                    | N     | 9.7                 | 8.8         |                            |                                                | N     | 4.74                | 0.17        | ±1.11                      |
|                                                    | P     | -4.2                | 3.3         |                            |                                                | P     | 0.68                | 1.07        | ±1.11                      |
|                                                    | K     | 4.8                 | -1.0        |                            |                                                | K     | 0.80                | 0.42        | ±0.66                      |
| <b>Barley*</b><br>Grain<br>cwt.                    | Yield | 22.5                | 24.8        |                            | <b>Rye</b><br>Grain<br>cwt.                    | Yield | 23.1†               | 18.0        |                            |
|                                                    | N     | 18.7                | <b>15.5</b> | ±4.6                       |                                                | N     | 0.8†                | <b>13.7</b> | ±2.0                       |
|                                                    | P     | 1.3                 | -0.9        | ±4.6                       |                                                | P     | -7.0†               | -0.7        | ±2.0                       |
|                                                    | K     | 3.0                 | 1.0         | ±1.8                       |                                                | K     | -0.6†               | -2.9        | ±1.2                       |
| Straw<br>cwt.                                      | Yield | 40.1                | 29.1        |                            | Straw<br>cwt.                                  | Yield | 35.8†               | 33.9        |                            |
|                                                    | N     | 25.4                | <b>25.2</b> | ±8.5                       |                                                | N     | 4.5†                | <b>34.1</b> | ±3.5                       |
|                                                    | P     | -0.9                | 3.7         | ±8.5                       |                                                | P     | -7.9†               | -0.6        | ±3.5                       |
|                                                    | K     | 4.9                 | 1.0         | ±3.4                       |                                                | K     | -1.8†               | -6.2        | ±2.1                       |

\*Error in manuring (see p. 163). †1931-34. ‡1934 only. \*\*1931-33. Significant results in heavy type. Negative sign means depression.

**2.—Average percentage increments in yield for each application of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.**

|                                     | N                   |              | P                   |       | K                   |             | Standard<br>error,<br>1935 |
|-------------------------------------|---------------------|--------------|---------------------|-------|---------------------|-------------|----------------------------|
|                                     | Average,<br>1930-34 | 1935         | Average,<br>1930-34 | 1935  | Average,<br>1930-34 | 1935        |                            |
| <b>Sugar Beet—Roots</b><br>(washed) | 5.97                | <b>6.85</b>  | -2.38               | 2.85  | 4.56                | -2.30       | ±2.29                      |
| Tops                                | 5.27                | -0.12        | -0.65               | 1.29  | 6.93                | 1.09        | ±1.96                      |
| Sugar percentage                    | -0.67               | -0.25        | 0.04                | -0.33 | 1.15                | <b>1.17</b> | ±0.52                      |
| Total sugar                         | 5.05                | 6.56         | -2.33               | 2.48  | 5.52                | -1.19       |                            |
| <b>Barley*</b> —Grain               | 13.21               | <b>9.35</b>  | 0.66                | -0.56 | 3.77                | 1.57        | ±2.76                      |
|                                     | 9.83                | <b>13.01</b> | -0.19               | 1.93  | 2.90                | 1.31        | ±4.39                      |
| <b>Clover Hay—Dry matter</b>        | -5.58**             | -20.94       | -4.94**             | 13.07 | 7.39**              | 19.16       | ±9.66                      |
| <b>Wheat—Grain</b>                  | 15.30†              | <b>26.27</b> | -2.40†              | 0.56  | 0.94†               | 0.16        | ±2.83                      |
|                                     | 16.93†              | <b>31.18</b> | -2.11†              | 1.12  | -0.08†              | 1.63        | ±2.71                      |
| <b>Potatoes</b>                     | 8.47                | 0.36         | 0.47                | 2.28  | 1.86                | 1.51        | ±2.36                      |
| <b>Rye—Grain</b>                    | 0.52†               | <b>11.46</b> | -4.55†              | -0.56 | -0.61†              | -4.00       | ±1.63                      |
|                                     | 1.90†               | <b>15.08</b> | -3.30†              | -0.26 | -1.23†              | -4.55       | ±1.57                      |

\*Error in manuring (see p. 163). \*\*1931-33. †1931-34. ‡1934 only. Significant results in heavy type. Negative sign means depression.

### THREE COURSE ROTATION EXPERIMENT ROTHAMSTED, 1935

EFFECT OF PLOUGHING IN STRAW AND OF WINTER GREEN-MANURE CROPS  
For details see 1933 Report, p. 118.

#### CULTIVATIONS, ETC.

|                       | Barley                           | Sugar Beet                        | Potatoes                             |
|-----------------------|----------------------------------|-----------------------------------|--------------------------------------|
| Variety ..            | Plumage Archer                   | Kuhn                              | Ally                                 |
| Date of sowing        | March 13                         | April 29                          | April 12                             |
| Manures applied       |                                  |                                   |                                      |
| Artificial ..         | October 19, March 7              | September 11, April 29            | November 2, April 6-8                |
| Adco and Straw        | October 19                       | September 11                      | November 2                           |
| Date of Harvesting .. | August 12                        | October 22-23                     | October 15                           |
| Previous crop ..      | Potatoes                         | Barley                            | Sugar Beet                           |
| Cultivations—         |                                  |                                   |                                      |
| Ploughing ..          | October 19-20,<br>February 19-20 | September 11-12,<br>April 1       | November 3,<br>March 20-21           |
| Harrowing ..          | October 27,<br>March 13          | September 25, 27,<br>April 24, 29 | November 5, April 2, 3,<br>May 7, 16 |
| Rolling ..            | October 27, March 15             | September 27, April 29            | April 2, 3, May 7                    |
| Singling ..           |                                  | June 13-14                        | July 9                               |
| Hoeing ..             |                                  | June 15, 27, July 17, 27          | April 3, May 24, July 19             |
| Ridging ..            |                                  |                                   | June 25, July 9                      |
| Grubbing ..           |                                  |                                   |                                      |

#### GREEN MANURE CROPS—GREEN WEIGHTS—TONS PER ACRE

| Preceding  |         | Manured 1934-35 |      |       |       |      | Manured 1933-34 |      |       |       |      |
|------------|---------|-----------------|------|-------|-------|------|-----------------|------|-------|-------|------|
|            |         | Art'ls.         | Adco | St. 1 | St. 2 | Mean | Art'ls.         | Adco | St. 1 | St. 2 | Mean |
| Barley     | Vetches | 0.58            | 0.51 | 0.64  | 0.64  | 0.59 | 0.71            | 0.59 | 0.78  | 0.75  | 0.71 |
|            | Rye ..  | 1.79            | 1.72 | 1.49  | 1.77  | 1.69 | 2.13            | 1.51 | 1.63  | 1.88  | 1.79 |
| Sugar Beet | Vetches | 0.49            | 0.53 | 0.62  | 0.51  | 0.54 | 0.36            | 0.34 | 0.45  | 0.60  | 0.44 |
|            | Rye ..  | 3.67            | 5.60 | 2.30  | 4.21  | 3.94 | 4.64            | 3.28 | 3.92  | 5.24  | 4.27 |
| Potatoes   | Vetches | 0.27            | 0.44 | 0.29  | 0.39  | 0.35 | 0.30            | 0.24 | 0.30  | 0.34  | 0.30 |
|            | Rye ..  | 1.46            | 1.10 | 0.94  | 1.32  | 1.20 | 1.66            | 1.52 | 1.49  | 1.60  | 1.57 |

#### PERCENTAGE DRY MATTER

| Preceding   |         | Sample 1 | Sample 2 |
|-------------|---------|----------|----------|
| Barley ..   | Vetches | 5.92     | 7.22     |
|             | Rye     | 9.96     | 8.71     |
| Sugar Beet  | Vetches | 8.16     | 8.33     |
|             | Rye     | 12.94    | 13.51    |
| Potatoes .. | Vetches | 6.52     | 9.91     |
|             | Rye     | 13.80    | 14.15    |

For each break of the rotation, two large samples each of rye and vetches were taken for dry matter determination. These were weighed fresh, dried at 100°C, cleaned from soil as far as possible and weighed again. The dry matter percentages thus include a dirt tare correction.

## PLAN AND YIELDS

Barley—DB, Plots 49-72. Yields in lb. grain above, straw below.

|                           |                            |                            |                           |                           |                           |
|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| St 1 R I<br>86.8<br>110.2 | Ad R I<br>84.5<br>100.2    | Ad V II<br>87.5<br>106.5   | Ad V I<br>83.2<br>99.3    | Ad R II<br>72.9<br>78.6   | St 1 V I<br>87.8<br>105.2 |
| St 1 O I<br>89.4<br>107.1 | St 2 V II<br>87.0<br>110.0 | St 1 V II<br>88.9<br>103.6 | St 2 V I<br>85.2<br>109.6 | St 2 R I<br>84.3<br>88.8  | St 2 O I<br>88.6<br>94.5  |
| Ar R I<br>83.8<br>103.2   | Ar R II<br>76.9<br>82.0    | Ar O I<br>84.1<br>109.9    | Ad O I<br>82.1<br>91.2    | St 1 O II<br>84.5<br>97.0 | Ar V II<br>82.0<br>103.1  |
| St 1 R II<br>73.1<br>84.9 | Ad O II<br>79.7<br>90.9    | St 2 R II<br>73.3<br>81.7  | St 2 O II<br>80.1<br>94.9 | Ar V I<br>65.2<br>117.8   | Ar O II<br>80.5<br>96.2   |

Sugar Beet—DS, Plots 25-48. Yields in lb. roots (dirty) above, tops centre, sugar percentage below.

|                                  |                                |                                  |                                 |                                  |                                  |
|----------------------------------|--------------------------------|----------------------------------|---------------------------------|----------------------------------|----------------------------------|
| St 1 O II<br>551<br>412<br>17.46 | Ad O I<br>522<br>396<br>18.18  | Ad R II<br>507<br>344<br>18.32   | Ar V II<br>564<br>390<br>18.35  | Ar R I<br>569<br>476<br>17.95    | St 2 O I<br>560<br>438<br>18.01  |
| St 2 O II<br>507<br>517<br>17.37 | Ad V II<br>538<br>522<br>17.63 | St 2 R I<br>572<br>433<br>19.24  | St 2 V I<br>614<br>486<br>18.35 | St 1 R II<br>540<br>350<br>18.64 | Ar O I<br>561<br>480<br>17.77    |
| Ar R II<br>446<br>451<br>17.98   | Ad O II<br>528<br>542<br>17.92 | St 2 R II<br>522<br>351<br>18.58 | St 1 V I<br>594<br>466<br>18.35 | St 1 R I<br>540<br>374<br>18.69  | Ad V I<br>496<br>340<br>18.24    |
| Ad R I<br>489<br>330<br>17.98    | Ar V I<br>447<br>472<br>17.23  | St 1 O I<br>442<br>436<br>17.72  | Ar O II<br>429<br>340<br>18.29  | St 2 V II<br>449<br>378<br>18.15 | St 1 V II<br>428<br>352<br>18.15 |

Potatoes—DP, Plots 1-24. Yields in lb.

|                  |                  |                  |                  |                 |                  |
|------------------|------------------|------------------|------------------|-----------------|------------------|
| St 1 R II<br>274 | St 2 R I<br>336  | Ar R I<br>300    | St 2 O II<br>246 | Ar O II<br>200  | Ad O I<br>337    |
| St 1 O I<br>382  | St 2 R II<br>308 | St 1 O II<br>248 | Ar V II<br>211   | Ad O II<br>245  | St 2 O I<br>302  |
| Ar R II<br>248   | St 2 V II<br>256 | Ar V I<br>348    | St 1 R I<br>384  | Ad R I<br>280   | St 1 V II<br>243 |
| Ad V II<br>330   | Ar O I<br>322    | Ad V I<br>239    | St 2 V I<br>324  | St 1 V I<br>342 | Ad R II<br>251   |

## SUMMARY OF RESULTS

|                                                               |             | Manured 1934-35   |        |                 |                 |       | Manured 1933-34   |       |                 |                 |       |
|---------------------------------------------------------------|-------------|-------------------|--------|-----------------|-----------------|-------|-------------------|-------|-----------------|-----------------|-------|
|                                                               |             | Artifi-<br>cials. | Adco.* | Straw.<br>St. 1 | Straw.<br>St. 2 | Mean. | Artifi-<br>cials. | Adco. | Straw.<br>St. 1 | Straw.<br>St. 2 | Mean. |
| <b>Barley</b><br>Grain<br>cwt. p.a.                           | None        | 37.6              | 36.7   | 39.9            | 39.6            | 38.4  | 35.9              | 35.6  | 37.7            | 35.8            | 36.2  |
|                                                               | Vetches     | 29.1              | 37.2   | 39.2            | 38.1            | 35.9  | 36.6              | 39.1  | 39.7            | 38.8            | 38.6  |
|                                                               | Rye         | 37.4              | 37.8   | 38.8            | 37.6            | 37.9  | 34.4              | 32.6  | 32.6            | 32.7            | 33.1  |
|                                                               | <i>Mean</i> | 34.7              | 37.2   | 39.3            | 38.4            | 37.4  | 35.6              | 35.8  | 36.7            | 35.8            | 36.0  |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Straw</b><br>cwt. p.a.                                     | None        | 49.1              | 40.8   | 47.8            | 42.2            | 45.0  | 43.0              | 40.6  | 43.3            | 42.4            | 42.3  |
|                                                               | Vetches     | 52.6              | 44.4   | 47.0            | 49.0            | 48.2  | 46.0              | 47.6  | 46.3            | 49.1            | 47.2  |
|                                                               | Rye         | 46.1              | 44.7   | 49.2            | 39.7            | 44.9  | 36.6              | 35.1  | 37.9            | 36.5            | 36.5  |
|                                                               | <i>Mean</i> | 49.3              | 43.3   | 48.0            | 43.6            | 46.0  | 41.9              | 41.1  | 42.5            | 42.7            | 42.0  |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Sugar</b><br><b>Beet</b><br>Roots<br>(Washed)<br>Tons p.a. | None        | 11.22             | 10.44  | 8.84            | 11.20           | 10.42 | 8.58              | 10.56 | 11.02           | 10.14           | 10.08 |
|                                                               | Vetches     | 8.94              | 9.92   | 11.88           | 12.29           | 10.76 | 11.28             | 10.76 | 8.56            | 8.98            | 9.90  |
|                                                               | Rye         | 11.38             | 9.78   | 10.80           | 11.44           | 10.85 | 8.92              | 10.14 | 10.80           | 10.44           | 10.08 |
|                                                               | <i>Mean</i> | 10.51             | 10.05  | 10.51           | 11.64           | 10.68 | 9.59              | 10.49 | 10.13           | 9.85            | 10.02 |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Tops</b><br>Tons p.a.                                      | None        | 10.71             | 8.84   | 9.73            | 9.78            | 9.76  | 7.59              | 12.10 | 9.20            | 11.54           | 10.11 |
|                                                               | Vetches     | 10.54             | 7.59   | 10.40           | 10.85           | 9.84  | 8.70              | 11.65 | 7.86            | 8.44            | 9.16  |
|                                                               | Rye         | 10.62             | 7.37   | 8.35            | 9.66            | 9.00  | 10.07             | 7.68  | 7.81            | 7.83            | 8.35  |
|                                                               | <i>Mean</i> | 10.62             | 7.93   | 9.49            | 10.10           | 9.53  | 8.79              | 10.48 | 8.29            | 9.27            | 9.21  |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Sugar</b><br>percentage                                    | None        | 17.77             | 18.18  | 17.72           | 18.01           | 17.92 | 18.29             | 17.92 | 17.46           | 17.37           | 17.76 |
|                                                               | Vetches     | 17.23             | 18.24  | 18.35           | 18.35           | 18.04 | 18.35             | 17.63 | 18.15           | 18.15           | 18.07 |
|                                                               | Rye         | 17.95             | 17.98  | 18.69           | 19.24           | 18.46 | 17.98             | 18.32 | 18.64           | 18.58           | 18.38 |
|                                                               | <i>Mean</i> | 17.65             | 18.13  | 18.25           | 18.53           | 18.14 | 18.21             | 17.96 | 18.08           | 18.03           | 18.07 |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Total sugar</b><br>cwt. p.a.                               | None        | 39.9              | 38.0   | 31.3            | 40.3            | 37.4  | 31.4              | 37.8  | 38.5            | 35.2            | 35.7  |
|                                                               | Vetches     | 30.8              | 36.2   | 43.6            | 45.1            | 38.9  | 41.4              | 37.9  | 31.1            | 32.6            | 35.8  |
|                                                               | Rye         | 40.8              | 35.2   | 40.4            | 44.0            | 40.1  | 32.1              | 37.2  | 40.3            | 38.8            | 37.1  |
|                                                               | <i>Mean</i> | 37.2              | 36.5   | 38.4            | 43.1            | 38.8  | 35.0              | 37.6  | 36.6            | 35.5            | 36.2  |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |
| <b>Potatoes</b><br>Tons p.a.                                  | None        | 7.19              | 7.52   | 8.53            | 6.74            | 7.50  | 4.46              | 5.47  | 5.54            | 5.49            | 5.24  |
|                                                               | Vetches     | 7.77              | 5.33   | 7.63            | 7.23            | 6.99  | 4.71              | 7.37  | 5.42            | 5.71            | 5.80  |
|                                                               | Rye         | 6.70              | 6.25   | 8.57            | 7.50            | 7.26  | 5.54              | 5.60  | 6.12            | 6.87            | 6.03  |
|                                                               | <i>Mean</i> | 7.22              | 6.37   | 8.24            | 7.16            | 7.25  | 4.90              | 6.15  | 5.69            | 6.02            | 5.69  |
|                                                               |             |                   |        |                 |                 |       |                   |       |                 |                 |       |

\*The Adco treated straw was dried out in June and had to be completely re-wetted. The analysis given on page 146 shows that the compost was particularly deficient in nitrogen (0.33% N). A reasonable figure would be 0.5% N.

## LONG PERIOD CULTIVATION EXPERIMENT, 1935

## LONG HOOS V

(For details see 1934 Report, p. 175)

## CULTIVATIONS, ETC.

|                    | Wheat            | Mangolds               | Barley              |
|--------------------|------------------|------------------------|---------------------|
| Variety            | Victor           | Yellow Globe           | Plumage Archer      |
| Date of sowing     | Oct. 19          | May 1                  | Mar. 23             |
| Manures applied—   |                  |                        |                     |
| Cyanamide          | Mar. 20          | April 30               | Mar. 13             |
| Nitro-chalk        | Mar. 20          | July 4                 | Mar. 13             |
| Super. & mur. pot. | —                | April 30               | —                   |
| Date of harvesting | Aug. 10          | Oct. 29                | Aug. 12             |
| Previous crop      | Barley           | Wheat                  | Mangolds            |
| Cultivations—      |                  |                        |                     |
| Ploughing          | Sept. 26         | Mar. 25                | Nov. 27, Mar. 12    |
| Simaring           | Sept. 26         | Mar. 25                | Mar. 12             |
| Cultivating        | Sept. 26         | Mar. 25                | Nov. 27, Mar. 12    |
| Harrowing          | Oct. 19, Mar. 21 | April 3, 18, May 1     | Mar. 18, 20, 22, 23 |
| Hoeing             | —                | June 3, 11, July 4, 18 | —                   |
| Rolling            | Mar. 26          | May 1                  | Mar. 22, 25         |
| Singling           | —                | June 25, 26            | —                   |

## PLAN AND YIELDS IN LB.

## Barley

Grain left, straw right

|        |   |         |      |      |         |      |      |    |
|--------|---|---------|------|------|---------|------|------|----|
| N<br>↑ | B | P D Cy  | 57.2 | 65.3 | C D N   | 61.9 | 74.6 | 73 |
|        |   | P Sh Cy | 52.9 | 59.6 | S D N   | 62.7 | 71.3 |    |
|        |   | S D N   | 60.5 | 66.5 | S Sh Cy | 57.3 | 62.7 |    |
|        |   | C Sh N  | 58.6 | 66.4 | P D Cy  | 60.3 | 66.2 |    |
|        |   | S Sh Cy | 51.7 | 55.8 | S Sh N  | 59.2 | 67.3 |    |
|        |   | C D N   | 56.5 | 64.5 | P D N   | 61.5 | 73.0 |    |
|        |   | S D Cy  | 57.1 | 59.9 | P Sh N  | 58.3 | 68.2 |    |
|        |   | C Sh Cy | 57.4 | 63.1 | S D Cy  | 59.7 | 64.3 |    |
|        |   | C D Cy  | 61.1 | 67.9 | C D Cy  | 62.1 | 66.9 |    |
|        |   | S Sh N  | 61.2 | 66.8 | C Sh N  | 60.5 | 68.5 |    |
| C      | A | P Sh N  | 60.6 | 67.9 | C Sh Cy | 55.7 | 61.3 | C  |
|        |   | P D N   | 58.9 | 69.6 | P Sh Cy | 59.2 | 68.8 |    |
|        |   | C Sh N  | 60.1 | 67.4 | C D Cy  | 56.2 | 63.8 |    |
|        |   | P Sh Cy | 60.9 | 67.1 | P Sh Cy | 68.3 | 75.7 |    |
|        |   | P D Cy  | 63.9 | 74.6 | S D Cy  | 67.5 | 80.0 |    |
|        |   | C D Cy  | 65.5 | 73.0 | P D Cy  | 64.9 | 78.6 |    |
|        |   | C Sh Cy | 58.9 | 66.6 | S Sh N  | 64.6 | 74.4 |    |
|        |   | P Sh Cy | 62.0 | 65.5 | C Sh Cy | 65.8 | 72.7 |    |
|        |   | S Sh N  | 60.4 | 67.6 | S D N   | 65.4 | 71.6 |    |
|        |   | C D N   | 59.3 | 62.7 | C D N   | 63.2 | 67.3 |    |
|        |   | S D N   | 57.7 | 63.8 | P Sh N  | 63.6 | 71.9 |    |
|        |   | P Sh N  | 62.7 | 71.3 | P D N   | 68.1 | 80.4 |    |
|        |   | S D Cy  | 57.2 | 60.3 | S Sh Cy | 61.4 | 68.1 |    |
|        |   | P D N   | 48.6 | 56.4 | C Sh N  | 47.9 | 51.6 |    |
|        |   |         |      |      |         |      |      |    |

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## Mangolds

Roots left, tops right

|   |         |     |     |   |         |     |     |
|---|---------|-----|-----|---|---------|-----|-----|
| C | S Sh N  | 253 | 84  | C | S Sh N  | 296 | 82  |
|   | C Sh N  | 334 | 92  |   | S D Cy  | 326 | 72  |
|   | C Sh Cy | 260 | 71  |   | P Sh Cy | 349 | 84  |
|   | P D N   | 424 | 90  |   | P Sh N  | 404 | 101 |
|   | C D N   | 416 | 88  |   | P D Cy  | 462 | 96  |
|   | P Sh Cy | 429 | 98  |   | C D Cy  | 354 | 70  |
|   | C D Cy  | 411 | 83  |   | S D N   | 394 | 89  |
|   | S D Cy  | 420 | 85  |   | P D N   | 408 | 81  |
|   | P Sh N  | 422 | 102 |   | S Sh Cy | 294 | 66  |
|   | S Sh Cy | 376 | 76  |   | C Sh N  | 96  | 50  |
|   | S D N   | 431 | 88  |   | C D N   | 320 | 86  |
|   | P D Cy  | 428 | 94  |   | C Sh Cy | 209 | 76  |
| A | S Sh Cy | 398 | 92  | B | S Sh N  | 270 | 80  |
|   | P D N   | 420 | 94  |   | S D N   | 330 | 88  |
|   | P D Cy  | 355 | 78  |   | P Sh Cy | 365 | 86  |
|   | C Sh Cy | 365 | 81  |   | C Sh N  | 372 | 92  |
|   | C D Cy  | 379 | 88  |   | P Sh N  | 346 | 94  |
|   | S D Cy  | 406 | 85  |   | P D Cy  | 272 | 69  |
|   | C D N   | 386 | 92  |   | S D Cy  | 343 | 80  |
|   | C Sh Cy | 350 | 72  |   | C D N   | 291 | 82  |
|   | P Sh N  | 400 | 94  |   | C Sh Cy | 278 | 70  |
|   | C Sh N  | 337 | 92  |   | C D Cy  | 288 | 76  |
|   | S D N   | 366 | 91  |   | S Sh Cy | 326 | 82  |
|   | S Sh N  | 334 | 99  |   | P D N   | 373 | 96  |

## Wheat

Grain left, straw right.

|   |         |      |      |   |         |      |      |
|---|---------|------|------|---|---------|------|------|
| C | C Sh N  | 19.9 | 37.1 | A | C Sh Cy | 26.9 | 38.1 |
|   | S Sh N  | 36.8 | 64.2 |   | C D Cy  | 33.0 | 52.0 |
|   | P Sh Cy | 41.5 | 62.0 |   | C Sh N  | 29.7 | 54.6 |
|   | C D Cy  | 36.8 | 57.2 |   | P D N   | 35.7 | 55.6 |
|   | C Sh Cy | 33.0 | 58.5 |   | C D N   | 36.6 | 54.9 |
|   | C D N   | 29.5 | 66.0 |   | S Sh Cy | 33.0 | 47.0 |
|   | S Sh Cy | 33.9 | 57.1 |   | S D N   | 39.3 | 62.7 |
|   | S D Cy  | 31.0 | 52.0 |   | P Sh Cy | 33.9 | 54.1 |
|   | P D Cy  | 35.0 | 55.0 |   | S D Cy  | 31.8 | 53.7 |
|   | P Sh N  | 35.5 | 58.0 |   | P D Cy  | 35.1 | 53.4 |
|   | P D N   | 35.5 | 56.5 |   | P Sh N  | 35.8 | 59.7 |
|   | S D N   | 30.1 | 61.4 |   | S Sh N  | 33.1 | 55.9 |
| B | S Sh Cy | 32.0 | 56.0 | C | S D Cy  | 38.4 | 57.1 |
|   | C D Cy  | 27.5 | 54.0 |   | C D Cy  | 38.0 | 55.8 |
|   | C Sh Cy | 27.3 | 52.2 |   | C Sh Cy | 38.2 | 53.3 |
|   | P Sh Cy | 32.3 | 51.7 |   | P Sh N  | 41.1 | 78.9 |
|   | C Sh N  | 32.1 | 57.2 |   | C D N   | 38.0 | 53.5 |
|   | S Sh N  | 39.3 | 62.2 |   | S Sh N  | 38.6 | 58.4 |
|   | C D N   | 37.1 | 67.9 |   | S D N   | 35.0 | 57.5 |
|   | P D Cy  | 41.4 | 57.1 |   | S Sh Cy | 39.2 | 60.3 |
|   | S D N   | 41.3 | 65.7 |   | P D Cy  | 40.4 | 58.1 |
|   | P D N   | 46.1 | 72.9 |   | P D N   | 41.3 | 67.2 |
|   | S D Cy  | 40.6 | 65.9 |   | C Sh N  | 43.6 | 72.4 |
|   | P Sh N  | 49.3 | 76.2 |   | P Sh Cy | 48.3 | 71.7 |

## Summary of Results

|                       | Continuous |        |        |        | Cycle A |        |        | Cycle B |        |        |       |
|-----------------------|------------|--------|--------|--------|---------|--------|--------|---------|--------|--------|-------|
| Last year             | P<br>P     | S<br>S | C<br>C | Mean   | C<br>P  | P<br>S | S<br>C | S<br>P  | C<br>S | P<br>C | Mean  |
| WHEAT                 |            |        |        |        |         |        |        |         |        |        |       |
| GRAIN : cwt. per acre |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 22.3       | 18.9   | 19.6   | 20.3   | 20.7    | 22.8   | 21.2   | 26.8    | 24.0   | 21.5   | 22.8  |
| Sh                    | 22.2       | 21.9   | 18.4   | 20.8   | 20.8    | 19.2   | 17.2   | 28.6    | 22.8   | 18.6   | 21.2  |
| Cy { D                | 21.9       | 20.1   | 21.7   | 21.2   | 20.4    | 18.4   | 19.2   | 24.0    | 23.6   | 16.0   | 20.3  |
| Sh                    | 26.0       | 21.2   | 20.7   | 22.6   | 19.7    | 19.2   | 15.6   | 18.7    | 18.6   | 15.8   | 17.9  |
| St. errors            | ±1.65      |        |        | ±0.953 |         |        |        |         |        |        |       |
| STRAW : cwt. per acre |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 35.9       | 34.5   | 34.7   | 35.0   | 32.2    | 36.4   | 31.9   | 42.3    | 38.1   | 39.4   | 36.7  |
| Sh                    | 39.7       | 35.6   | 31.8   | 35.7   | 34.6    | 32.4   | 31.6   | 44.2    | 36.1   | 33.2   | 35.4  |
| Cy { D                | 32.8       | 31.6   | 32.8   | 32.4   | 31.0    | 31.2   | 30.2   | 33.1    | 38.2   | 31.3   | 32.5  |
| Sh                    | 38.8       | 34.1   | 32.4   | 35.1   | 31.4    | 27.3   | 22.1   | 30.0    | 32.5   | 30.3   | 28.9  |
| St. errors            | ±3.79      |        |        | ±2.19  |         |        |        |         |        |        |       |
| MANGOLDS              |            |        |        |        |         |        |        |         |        |        |       |
| ROOTS : tons per acre |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 24.14      | 23.94  | 21.36  | 23.15  | 24.37   | 21.24  | 22.40  | 21.65   | 19.15  | 16.89  | 20.95 |
| Sh                    | 23.97      | 15.93  | 12.48  | 17.46  | 23.21   | 19.38  | 19.56  | 20.08   | 15.67  | 21.59  | 19.92 |
| Cy { D                | 25.82      | 21.65  | 22.20  | 23.22  | 20.60   | 23.56  | 22.00  | 15.78   | 19.91  | 16.71  | 19.76 |
| Sh                    | 22.58      | 19.44  | 13.61  | 18.54  | 21.18   | 23.10  | 20.31  | 21.18   | 18.92  | 16.13  | 20.14 |
| St. errors            | ±2.12      |        |        | ±1.22  |         |        |        |         |        |        |       |
| TOPS : tons per acre  |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 4.96       | 5.14   | 5.03   | 5.04   | 5.48    | 5.28   | 5.37   | 5.54    | 5.08   | 4.76   | 5.25  |
| Sh                    | 5.90       | 4.83   | 4.11   | 4.95   | 5.43    | 5.74   | 5.31   | 5.46    | 4.61   | 5.34   | 5.32  |
| Cy { D                | 5.50       | 4.57   | 4.45   | 4.84   | 4.53    | 4.93   | 5.08   | 4.00    | 4.64   | 4.41   | 4.60  |
| Sh                    | 5.28       | 4.12   | 4.28   | 4.56   | 4.70    | 5.34   | 4.18   | 5.02    | 4.76   | 4.09   | 4.68  |
| St. errors            | ±0.366     |        |        | ±0.211 |         |        |        |         |        |        |       |
| BARLEY                |            |        |        |        |         |        |        |         |        |        |       |
| GRAIN : cwt. per acre |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 33.9       | 35.7   | 35.5   | 35.0   | 35.7    | 36.4   | 35.9   | 34.2    | 35.1   | 32.8   | 35.0  |
| Sh                    | 36.6       | 36.3   | 31.3   | 34.7   | 33.8    | 34.4   | 35.1   | 35.2    | 35.5   | 34.0   | 34.7  |
| Cy { D                | 37.4       | 36.2   | 35.3   | 36.3   | 35.0    | 34.6   | 36.0   | 33.2    | 33.1   | 35.4   | 34.6  |
| Sh                    | 37.8       | 35.5   | 36.2   | 36.5   | 34.4    | 33.2   | 32.3   | 30.7    | 30.0   | 33.3   | 32.3  |
| St. errors            | ±2.43      |        |        | ±1.40  |         |        |        |         |        |        |       |
| STRAW : cwt. per acre |            |        |        |        |         |        |        |         |        |        |       |
| N { D                 | 39.7       | 39.3   | 37.7   | 38.9   | 42.4    | 41.4   | 43.3   | 40.4    | 38.6   | 37.4   | 40.6  |
| Sh                    | 41.6       | 41.2   | 34.5   | 39.1   | 39.6    | 39.0   | 39.8   | 39.4    | 38.8   | 38.5   | 39.2  |
| Cy { D                | 44.4       | 40.7   | 39.7   | 41.6   | 38.4    | 37.3   | 38.8   | 37.9    | 34.8   | 39.4   | 37.8  |
| Sh                    | 41.0       | 39.2   | 40.4   | 40.2   | 39.9    | 36.4   | 35.6   | 34.6    | 32.4   | 36.6   | 35.9  |
| St. errors            | ±3.14      |        |        | ±1.81  |         |        |        |         |        |        |       |

## Mean of Nitro-Chalk and Cyanamide

|                                                                | Continuous         |                    |                    |                    | Cycle A |        |        | Cycle B |        |        |       |
|----------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|---------|--------|--------|---------|--------|--------|-------|
| Last Year<br>This year                                         | P<br>P             | S<br>S             | C<br>C             | Mean               | C<br>P  | P<br>S | S<br>C | S<br>P  | C<br>S | P<br>C | Mean  |
| <b>WHEAT</b>                                                   |                    |                    |                    |                    |         |        |        |         |        |        |       |
| GRAIN : cwt. per acre                                          |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D ..                                                           | 22.1 <sup>1</sup>  | 19.5 <sup>1</sup>  | 20.6 <sup>1</sup>  | 20.7 <sup>3</sup>  | 20.6    | 20.6   | 20.2   | 25.4    | 23.8   | 18.8   | 21.6  |
| Sh ..                                                          | 24.1 <sup>1</sup>  | 21.6 <sup>1</sup>  | 19.6 <sup>1</sup>  | 21.8 <sup>3</sup>  | 20.2    | 19.2   | 16.4   | 23.6    | 20.7   | 17.2   | 19.6  |
| Mean                                                           | 23.1 <sup>2</sup>  | 20.6 <sup>2</sup>  | 20.1 <sup>2</sup>  | 21.3               | 20.4    | 19.9   | 18.3   | 24.5    | 22.2   | 18.0   | 20.6  |
| St. errors (1) $\pm 1.17$ , (2) $\pm 0.827$ , (3) $\pm 0.676$  |                    |                    |                    |                    |         |        |        |         |        |        |       |
| STRAW : cwt. per acre                                          |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D                                                              | 34.4 <sup>1</sup>  | 33.0 <sup>1</sup>  | 33.8 <sup>1</sup>  | 33.7 <sup>3</sup>  | 31.6    | 33.8   | 31.0   | 37.7    | 38.2   | 35.4   | 34.6  |
| Sh                                                             | 39.2 <sup>1</sup>  | 34.8 <sup>1</sup>  | 32.1 <sup>1</sup>  | 35.4 <sup>3</sup>  | 33.0    | 29.8   | 26.8   | 37.1    | 34.3   | 31.8   | 32.1  |
| Mean                                                           | 36.8 <sup>2</sup>  | 33.9 <sup>2</sup>  | 33.0 <sup>2</sup>  | 34.6               | 32.3    | 31.8   | 28.9   | 37.4    | 36.2   | 33.6   | 33.4  |
| St. errors (1) $\pm 2.68$ , (2) $\pm 1.90$ , (3) $\pm 1.55$    |                    |                    |                    |                    |         |        |        |         |        |        |       |
| <b>MANGOLDS</b>                                                |                    |                    |                    |                    |         |        |        |         |        |        |       |
| ROOTS : tons per acre                                          |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D                                                              | 24.98 <sup>1</sup> | 22.80 <sup>1</sup> | 21.78 <sup>1</sup> | 23.19 <sup>3</sup> | 22.48   | 22.40  | 22.20  | 18.72   | 19.53  | 16.80  | 20.36 |
| Sh                                                             | 23.28 <sup>1</sup> | 17.68 <sup>1</sup> | 13.04 <sup>1</sup> | 18.00 <sup>3</sup> | 22.20   | 21.24  | 19.94  | 20.63   | 17.30  | 18.86  | 20.03 |
| Mean                                                           | 24.13 <sup>2</sup> | 20.24 <sup>2</sup> | 17.41 <sup>2</sup> | 20.59              | 22.34   | 21.82  | 21.07  | 19.68   | 18.42  | 17.83  | 20.19 |
| St. errors (1) $\pm 1.50$ , (2) $\pm 1.06$ , (3) $\pm 0.866$   |                    |                    |                    |                    |         |        |        |         |        |        |       |
| TOPS : tons per acre                                           |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D                                                              | 5.23 <sup>1</sup>  | 4.86 <sup>1</sup>  | 4.74 <sup>1</sup>  | 4.94 <sup>3</sup>  | 5.00    | 5.10   | 5.22   | 4.77    | 4.86   | 4.58   | 4.92  |
| Sh                                                             | 5.59 <sup>1</sup>  | 4.48 <sup>1</sup>  | 4.20 <sup>1</sup>  | 4.76 <sup>3</sup>  | 5.06    | 5.54   | 4.74   | 5.24    | 4.68   | 4.72   | 5.00  |
| Mean                                                           | 5.41 <sup>2</sup>  | 4.67 <sup>2</sup>  | 4.47 <sup>2</sup>  | 4.85               | 5.03    | 5.32   | 4.98   | 5.00    | 4.77   | 4.65   | 4.96  |
| St. errors (1) $\pm 0.259$ , (2) $\pm 0.183$ , (3) $\pm 0.150$ |                    |                    |                    |                    |         |        |        |         |        |        |       |
| <b>BARLEY</b>                                                  |                    |                    |                    |                    |         |        |        |         |        |        |       |
| GRAIN : cwt. per acre                                          |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D                                                              | 35.6 <sup>1</sup>  | 36.0 <sup>1</sup>  | 35.4 <sup>1</sup>  | 35.7 <sup>3</sup>  | 35.4    | 35.5   | 36.0   | 33.7    | 34.1   | 34.1   | 34.8  |
| Sh                                                             | 37.2 <sup>1</sup>  | 35.9 <sup>1</sup>  | 33.8 <sup>1</sup>  | 35.6 <sup>3</sup>  | 34.1    | 33.8   | 33.7   | 33.0    | 32.8   | 33.6   | 33.5  |
| Mean                                                           | 36.4 <sup>2</sup>  | 36.0 <sup>2</sup>  | 34.6 <sup>2</sup>  | 35.6               | 34.8    | 34.6   | 34.8   | 33.4    | 33.4   | 33.8   | 34.1  |
| St. errors (1) $\pm 1.72$ , (2) $\pm 1.22$ , (3) $\pm 0.993$   |                    |                    |                    |                    |         |        |        |         |        |        |       |
| STRAW : cwt. per acre                                          |                    |                    |                    |                    |         |        |        |         |        |        |       |
| D                                                              | 42.0 <sup>1</sup>  | 40.0 <sup>1</sup>  | 38.7 <sup>1</sup>  | 40.2 <sup>3</sup>  | 40.4    | 39.4   | 41.0   | 39.2    | 36.7   | 38.4   | 39.2  |
| Sh                                                             | 41.3 <sup>1</sup>  | 40.2 <sup>1</sup>  | 37.4 <sup>1</sup>  | 39.6 <sup>3</sup>  | 39.8    | 37.7   | 37.7   | 37.0    | 35.6   | 37.6   | 37.6  |
| Mean                                                           | 41.6 <sup>2</sup>  | 40.1 <sup>2</sup>  | 38.0 <sup>2</sup>  | 39.9               | 40.1    | 38.6   | 39.4   | 38.1    | 36.2   | 38.0   | 38.4  |
| St. errors (1) $\pm 2.22$ , (2) $\pm 1.57$ , (3) $\pm 1.28$    |                    |                    |                    |                    |         |        |        |         |        |        |       |

### Conclusions

On both mangolds and wheat the plots ploughed this year and last yielded significantly higher than the cultivated plots, the simared plots being intermediate. On the wheat similar differences appeared on the plots with rotating cultivations, but in the case of the mangolds the differences, though in the same direction, were much smaller.

In addition the shallow cultivations of the continuous part of the experiment gave lower yields than the deep cultivations, this difference being most marked on the cultivated plots and only small on the ploughed plots. No such difference appeared on the plots with rotating cultivations.

The yields of barley did not appear to be affected by the cultivations.

There were no observable differences between nitro-chalk and cyanamide.

### THREE COURSE ROTATION EXPERIMENT, ROTHAMSTED, 1933

#### GREEN MANURE CROPS—GREEN WEIGHTS—TONS PER ACRE

| Preceding  |         | Manured 1932-33 |      |        |       |      | Not yet manured |      |       |       |      |
|------------|---------|-----------------|------|--------|-------|------|-----------------|------|-------|-------|------|
|            |         | Art'ls.         | Adco | St. 1. | St. 2 | Mean | Art'ls.         | Adco | St. 1 | St. 2 | Mean |
| Sugar Beet | Vetches | 0.55            | 0.65 | 0.56   | 0.70  | 0.62 | 0.49            | 0.84 | 0.62  | 0.58  | 0.63 |
|            | Rye     | 1.02            | 0.78 | 0.75   | 0.92  | 0.87 | 1.29            | 1.08 | 0.78  | 1.11  | 1.06 |
| Potatoes   | Vetches | 0.32            | 0.27 | 0.34   | 0.41  | 0.34 | 0.38            | 0.35 | 0.28  | 0.33  | 0.34 |
|            | Rye     | 0.54            | 0.76 | 0.30   | 0.67  | 0.57 | 0.63            | 0.47 | 0.62  | 0.52  | 0.56 |
| Barley ..  | Vetches | 0.26            | 0.20 | 0.14   | 0.20  | 0.20 | 0.19            | 0.24 | 0.16  | 0.24  | 0.21 |
|            | Rye     | 0.37            | 0.40 | 0.22   | 0.40  | 0.34 | 0.74            | 0.30 | 0.44  | 0.44  | 0.48 |

NOTE: These figures were omitted from the 1933 report and are included here for the sake of completeness.