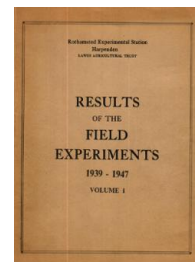


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# Yields of the Field Experiments 1939-1947 Volume 1

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## BA/3 Four-course Rotation

### Rothamsted Research

Rothamsted Research (1948) *BA/3 Four-course Rotation* ; Yields Of The Field Experiments 1939-1947 Volume 1, pp 78 - 89 - DOI: <https://doi.org/10.23637/ERADOC-1-145>

Ba/3.1

#### FOUR COURSE ROTATION EXPERIMENT

Great Hoos (begun in 1930)

#### Residual Values of Humic and Phosphatic Fertilizers

The five treatments compared in this experiment are dung, Adco compost, straw with artificials, superphosphate and rock phosphate (Gafsa), the cropping following a Norfolk Rotation (potatoes, barley, ryegrass, wheat). There are four series (one for each crop in any particular year), each consisting of twenty-five plots.

Dung and Adco each supply 50 cwt. per acre of organic matter. The quantity of straw applied is equal to that used in making the Adco. The nutrient content of the three humic fertilizers is equalized by adding sulphate of ammonia, muriate of potash and superphosphate, to raise the applications to 1.8 cwt. N per acre, 1.2 cwt.  $P_2O_5$  per acre and 3.0 cwt.  $K_2O$  per acre. The phosphatic fertilizers are applied at the rate of 1.2 cwt.  $P_2O_5$  per acre, together with sulphate of ammonia and muriate of potash at the above rates.

Any given plot receives always the same treatment, but the treatment is applied to the plot only once in five years (except that the sulphate of ammonia and muriate of potash accompanying the phosphatic fertilizers are applied one fifth annually.) Thus each treatment is applied to one plot of each series every year, according to a Latin square scheme. In this way the residual effects of fertilizers are measured in every crop, and the period of the manurial cycle differs from that of the crop rotation.

Area of each plot, 0.024 acre.

Details of the experiment are as given in the 1932 Report, pp. 127-8, with the following alterations:-

1. From 1935 onwards, clover ryegrass ley was replaced by ryegrass alone, sown in autumn after ploughing barley stubble, with fertilizers applied as on wheat.
2. From 1942 onwards, each plot of the potato crop was split, a random half of each receiving an additional 0.4.cwt. N per acre as sulphate of ammonia each year.

Ba/3.2

Nutrients provided by organic fertilizers: cwt. per acre

| Year | Manure as F.Y.M. |                               |                  | Manure as Adco |                               |                  | Manure as Straw |       |                               |                  |
|------|------------------|-------------------------------|------------------|----------------|-------------------------------|------------------|-----------------|-------|-------------------------------|------------------|
|      | N                | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | N              | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | Organic Matter  | N     | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O |
| 1939 | 1.782            | 1.344 <sup>‡</sup>            | 4.503            | 1.646          | 1.520 <sup>‡</sup>            | 1.189            | 123.75          | 0.862 | 0.480                         | 2.652            |
| 1940 | 1.520            | 0.830                         | 2.155            | 1.562          | 1.240 <sup>‡</sup>            | 1.330            | 139.88          | 1.008 | 0.520                         | 2.699            |
| 1941 | 1.775            | 0.471                         | 1.802            | 1.260          | 0.877                         | 0.538            | 106.74          | 0.573 | 0.183                         | 1.526            |
| 1942 | 1.410            | 0.700                         | 2.373            | 1.378          | 0.890                         | 0.506            | 118.96          | 0.615 | 0.208                         | 1.229            |
| 1943 | 1.526            | 0.645                         | 2.193            | 1.282          | 0.840                         | 0.474            | 133.23          | 0.832 | 0.270                         | 1.506            |
| 1944 | 1.202            | 0.409                         | 1.925            | 1.313          | 0.706                         | 0.572            | 100.00          | 0.657 | 0.178                         | 0.765            |
| 1945 | 1.524            | 0.492                         | 2.712            | 0.995          | 0.555                         | 0.622            | 82.00           | 0.297 | 0.088                         | 0.684            |
| 1946 | 1.802            | 0.710                         | 2.418            | 1.461          | 1.031                         | 0.892            | 124.90          | 0.683 | 0.379                         | 1.447            |
| 1947 | 1.588            | 0.748                         | 1.560            | 1.585          | 1.169                         | 0.911            | 123.00          | 0.849 | 0.261                         | 1.546            |

<sup>‡</sup> No application of artificials necessary.

## Crop Notes

| Crop year | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|-----------|------|------|------|------|------|------|------|------|------|
|-----------|------|------|------|------|------|------|------|------|------|

Potatoes. Variety: 1939-41, Ally; 1942-47, Majestic. Previous crop: Wheat

|           |          |          |         |         |          |          |          |         |          |
|-----------|----------|----------|---------|---------|----------|----------|----------|---------|----------|
| Planted   | Apr. 17  | Apr. 26  | Apr. 30 | Apr. 21 | Apr. 8   | Mar. 25  | Mar. 30  | Mar. 30 | Apr. 29  |
| Harvested | Sept. 19 | Sept. 24 | Oct. 3  | Oct. 3  | Sept. 15 | Sept. 28 | Sept. 25 | Oct. 4  | Sept. 30 |

Barley. Variety: Plumage Archer. Previous crop: Potatoes

|           |         |         |         |         |        |         |         |         |         |
|-----------|---------|---------|---------|---------|--------|---------|---------|---------|---------|
| Sown      | Mar. 7  | Mar. 11 | Mar. 18 | Mar. 25 | Mar. 2 | Mar. 6  | Mar. 27 | Mar. 20 | Apr. 12 |
| Harvested | Aug. 23 | Aug. 6  | Sept. 2 | Aug. 17 | Aug. 7 | Aug. 12 | Aug. 14 | Aug. 21 | Aug. 14 |

Ryegrass. Variety: Western Wolths. Previous crop: Barley

|           |          |                      |                     |         |          |          |          |          |                      |
|-----------|----------|----------------------|---------------------|---------|----------|----------|----------|----------|----------------------|
| Sown      | Sept. 13 | Apr. 13 <sup>1</sup> | Oct. 30             | Nov. 1  | Sept. 24 | Sept. 30 | Sept. 13 | Sept. 17 | Apr. 12 <sup>3</sup> |
| Harvested | June 6   | June 22              | Failed <sup>2</sup> | June 20 | June 14  | June 14  | June 13  | June 14  | Aug. 21              |

Wheat. Variety: 1939-45 Yeoman. 1946<sup>6</sup> Squareheads Master. Previous crop: Ryegrass

|           |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sown      | Oct. 24 | Oct. 21 | Oct. 29 | Oct. 27 | Oct. 10 | Oct. 4  | Oct. 26 | Oct. 15 | Oct. 24 |
| Harvested | Aug. 14 | Aug. 6  | Aug. 22 | Aug. 12 | Aug. 3  | Aug. 12 | Aug. 13 | Aug. 21 | Aug. 18 |

(1) First sowing of ryegrass failed.

(2) Barley sown to replace ryegrass, which failed.

Sown: Apr 22. Cut for hay: July 23. Variety: Kenia.

(3) Wet season prevented autumn sowing of ryegrass.

Four Course Rotation Experiment

Ba/3.3

Potatoes. Total tubers: tons per acre

| Manure               | Year of cycle | 1939 | 1940 | 1941 | 1942  | 1943 | 1944  | 1945  | 1946 | 1947 |
|----------------------|---------------|------|------|------|-------|------|-------|-------|------|------|
| Manure as F.Y.M.     | 1             | 5.28 | 4.95 | 3.02 | 9.08  | 6.90 | 10.68 | 9.60  | 7.29 | 6.13 |
|                      | 2             | 3.52 | 4.34 | 2.53 | 6.12  | 6.20 | 7.85  | 8.14  | 7.03 | 5.47 |
|                      | 3             | 4.03 | 3.01 | 2.69 | 6.56  | 5.48 | 11.69 | 7.27  | 5.54 | 5.84 |
|                      | 4             | 2.82 | 4.80 | 1.92 | 6.77  | 5.38 | 8.05  | 8.87  | 5.06 | 5.05 |
|                      | 5             | 4.16 | 3.79 | 2.42 | 3.82  | 5.46 | 8.97  | 6.11  | 6.38 | 4.30 |
| Manure as Adco       | 1             | 4.14 | 4.87 | 1.86 | 7.77  | 8.34 | 12.49 | 11.82 | 9.24 | 6.05 |
|                      | 2             | 3.70 | 2.91 | 2.38 | 5.39  | 4.77 | 9.66  | 7.72  | 7.26 | 5.59 |
|                      | 3             | 2.25 | 2.91 | 2.04 | 4.28  | 4.72 | 8.55  | 6.80  | 6.60 | 4.56 |
|                      | 4             | 3.12 | 2.93 | 1.30 | 4.57  | 5.13 | 7.97  | 7.01  | 7.04 | 5.21 |
|                      | 5             | 2.46 | 2.05 | 1.75 | 5.15  | 5.26 | 9.63  | 7.08  | 6.18 | 5.13 |
| Manure as Straw      | 1             | 3.59 | 7.18 | 4.42 | 10.22 | 7.13 | 12.60 | 12.83 | 9.13 | 6.57 |
|                      | 2             | 4.07 | 5.11 | 2.77 | 6.85  | 5.97 | 8.21  | 9.00  | 6.37 | 4.36 |
|                      | 3             | 4.23 | 3.45 | 3.00 | 7.93  | 6.62 | 6.88  | 8.43  | 7.20 | 4.55 |
|                      | 4             | 4.22 | 2.51 | 1.88 | 4.07  | 5.81 | 8.80  | 8.15  | 6.19 | 5.66 |
|                      | 5             | 3.48 | 3.50 | 2.76 | 6.73  | 4.92 | 10.02 | 7.79  | 6.64 | 5.07 |
| Super-Phosphate      | 1             | 5.63 | 5.66 | 4.03 | 6.90  | 8.51 | 9.98  | 9.27  | 9.19 | 6.48 |
|                      | 2             | 5.72 | 4.58 | 4.14 | 4.46  | 6.29 | 10.86 | 9.45  | 7.58 | 5.63 |
|                      | 3             | 4.45 | 4.67 | 2.24 | 9.14  | 7.28 | 9.53  | 9.27  | 7.39 | 6.36 |
|                      | 4             | 3.98 | 3.56 | 2.76 | 7.23  | 8.40 | 11.06 | 9.84  | 8.41 | 5.98 |
|                      | 5             | 4.76 | 4.98 | 2.64 | 7.31  | 6.85 | 8.03  | 10.01 | 8.02 | 6.17 |
| Gafsa Rock Phosphate | 1             | 3.37 | 2.44 | 2.41 | 4.06  | 5.30 | 8.62  | 9.31  | 7.18 | 4.04 |
|                      | 2             | 2.22 | 3.37 | 2.26 | 5.57  | 6.58 | 9.60  | 7.67  | 6.41 | 5.41 |
|                      | 3             | 3.59 | 4.58 | 2.45 | 5.83  | 7.01 | 6.63  | 8.13  | 6.85 | 5.26 |
|                      | 4             | 3.81 | 2.29 | 2.85 | 4.13  | 5.88 | 8.72  | 7.93  | 6.24 | 5.47 |
|                      | 5             | 2.90 | 3.28 | 1.93 | 7.52  | 5.55 | 5.27  | 8.48  | 8.35 | 4.90 |

Ba/3.4

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

| Manures              | Year of Cycle | 1942                 |       |       | N Effect | 1943                 |       |      | N Effect |
|----------------------|---------------|----------------------|-------|-------|----------|----------------------|-------|------|----------|
|                      |               | Additional N Without | With  | Mean  |          | Additional N Without | With  | Mean |          |
| Manure as F.Y.M.     | 1             | 9.08                 | 10.34 | 9.71  | 1.26     | 6.90                 | 7.28  | 7.09 | 0.38     |
|                      | 2             | 6.12                 | 8.31  | 7.22  | 2.19     | 6.20                 | 7.99  | 7.10 | 1.79     |
|                      | 3             | 6.56                 | 8.04  | 7.30  | 1.48     | 5.48                 | 6.15  | 5.82 | 0.67     |
|                      | 4             | 6.77                 | 7.08  | 6.92  | 0.31     | 5.38                 | 7.99  | 6.68 | 2.61     |
|                      | 5             | 3.82                 | 4.65  | 4.24  | 0.83     | 5.46                 | 7.72  | 6.59 | 2.26     |
| Manure as Adco       | 1             | 7.77                 | 7.16  | 7.46  | -0.61    | 8.34                 | 9.20  | 8.77 | 0.86     |
|                      | 2             | 5.39                 | 7.81  | 6.60  | 2.42     | 4.77                 | 6.59  | 5.68 | 1.82     |
|                      | 3             | 4.28                 | 4.61  | 4.44  | 0.33     | 4.72                 | 6.62  | 5.67 | 1.90     |
|                      | 4             | 4.57                 | 6.09  | 5.33  | 1.52     | 5.13                 | 4.83  | 4.98 | -0.30    |
|                      | 5             | 5.15                 | 5.24  | 5.20  | 0.09     | 5.26                 | 6.68  | 5.97 | 1.42     |
| Manure as Straw      | 1             | 10.22                | 11.73 | 10.98 | 1.51     | 7.13                 | 9.31  | 8.22 | 2.18     |
|                      | 2             | 6.85                 | 9.67  | 8.26  | 2.82     | 5.97                 | 7.63  | 6.80 | 1.66     |
|                      | 3             | 7.93                 | 7.52  | 7.72  | -0.41    | 6.62                 | 8.03  | 7.32 | 1.41     |
|                      | 4             | 4.07                 | 4.02  | 4.04  | -0.05    | 5.81                 | 7.95  | 6.88 | 2.14     |
|                      | 5             | 6.73                 | 7.16  | 6.94  | 0.43     | 4.92                 | 6.43  | 5.68 | 1.51     |
| Super-Phosphate      | 1             | 6.90                 | 8.31  | 7.60  | 1.41     | 8.51                 | 10.41 | 9.46 | 1.90     |
|                      | 2             | 4.46                 | 5.65  | 5.06  | 1.19     | 6.29                 | 8.22  | 7.26 | 1.93     |
|                      | 3             | 9.14                 | 10.04 | 9.59  | 0.90     | 7.28                 | 8.58  | 7.93 | 1.30     |
|                      | 4             | 7.23                 | 7.85  | 7.54  | 0.62     | 8.40                 | 9.10  | 8.75 | 0.70     |
|                      | 5             | 7.31                 | 7.19  | 7.25  | -0.12    | 6.85                 | 7.48  | 7.16 | 0.63     |
| Gafsa Rock Phosphate | 1             | 4.06                 | 3.74  | 3.90  | -0.32    | 5.30                 | 5.63  | 5.46 | 0.33     |
|                      | 2             | 5.57                 | 7.81  | 6.69  | 2.24     | 6.58                 | 5.80  | 6.19 | -0.78    |
|                      | 3             | 5.83                 | 4.98  | 5.40  | -0.85    | 7.01                 | 8.19  | 7.60 | 1.18     |
|                      | 4             | 4.13                 | 6.52  | 5.32  | 2.39     | 5.88                 | 6.14  | 6.01 | 0.26     |
|                      | 5             | 7.52                 | 5.64  | 6.58  | -1.88    | 5.55                 | 6.31  | 5.93 | 0.76     |

Ba/3.5

Four Course Rotation Experiment

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

| Manures              | Year of Cycle | 1944                 |       |       | N Effect | 1945                 |       |       | N Effect |
|----------------------|---------------|----------------------|-------|-------|----------|----------------------|-------|-------|----------|
|                      |               | Additional N Without | With  | Mean  |          | Additional N Without | With  | Mean  |          |
| Manure as F.Y.M.     | 1             | 10.68                | 12.72 | 11.70 | 2.04     | 9.60                 | 12.77 | 11.18 | 3.17     |
|                      | 2             | 7.85                 | 8.03  | 7.94  | 0.18     | 8.14                 | 12.27 | 10.20 | 4.13     |
|                      | 3             | 11.69                | 12.09 | 11.89 | 0.40     | 7.27                 | 10.50 | 8.88  | 3.23     |
|                      | 4             | 8.05                 | 8.80  | 8.42  | 0.75     | 8.87                 | 10.71 | 9.79  | 1.84     |
|                      | 5             | 8.97                 | 11.90 | 10.44 | 2.93     | 6.11                 | 8.03  | 7.07  | 1.92     |
| Manure as Adco       | 1             | 12.49                | 10.96 | 11.72 | -1.53    | 11.82                | 13.69 | 12.76 | 1.87     |
|                      | 2             | 9.66                 | 11.10 | 10.38 | 1.44     | 7.72                 | 9.62  | 8.67  | 1.90     |
|                      | 3             | 8.55                 | 9.54  | 9.04  | 0.99     | 6.80                 | 8.92  | 7.86  | 2.12     |
|                      | 4             | 7.07                 | 8.69  | 8.33  | 0.72     | 7.01                 | 9.27  | 8.14  | 2.26     |
|                      | 5             | 9.63                 | 10.13 | 9.88  | 0.50     | 7.08                 | 8.07  | 7.58  | 0.99     |
| Manure as Straw      | 1             | 12.60                | 13.90 | 13.25 | 1.30     | 12.83                | 9.95  | 11.39 | -2.88    |
|                      | 2             | 8.21                 | 9.25  | 8.73  | 1.04     | 9.00                 | 8.39  | 8.70  | -0.61    |
|                      | 3             | 6.88                 | 7.11  | 7.00  | 0.23     | 8.43                 | 11.60 | 10.02 | 3.17     |
|                      | 4             | 8.80                 | 9.14  | 8.97  | 0.34     | 8.15                 | 9.52  | 8.84  | 1.37     |
|                      | 5             | 10.02                | 10.29 | 10.16 | 0.27     | 7.79                 | 10.49 | 9.14  | 2.70     |
| Super-Phosphate      | 1             | 9.98                 | 10.99 | 10.48 | 1.01     | 9.27                 | 9.82  | 9.54  | 0.55     |
|                      | 2             | 10.86                | 11.90 | 11.38 | 1.04     | 9.45                 | 10.83 | 10.14 | 1.38     |
|                      | 3             | 9.53                 | 10.80 | 10.16 | 1.27     | 9.27                 | 10.49 | 9.88  | 1.22     |
|                      | 4             | 11.06                | 12.09 | 11.58 | 1.03     | 9.84                 | 10.52 | 10.18 | 0.68     |
|                      | 5             | 8.03                 | 9.03  | 8.53  | 1.00     | 10.01                | 10.56 | 10.28 | 0.55     |
| Gafsa Rock Phosphate | 1             | 8.62                 | 9.34  | 8.98  | 0.72     | 9.31                 | 8.46  | 8.88  | -0.85    |
|                      | 2             | 9.60                 | 12.05 | 10.82 | 2.45     | 7.67                 | 7.88  | 7.78  | 0.21     |
|                      | 3             | 6.63                 | 8.60  | 7.62  | 1.97     | 8.13                 | 8.99  | 8.56  | 0.86     |
|                      | 4             | 8.72                 | 8.13  | 8.42  | -0.59    | 7.93                 | 8.09  | 8.01  | 0.16     |
|                      | 5             | 5.27                 | 7.42  | 6.34  | 2.15     | 8.48                 | 6.98  | 7.73  | -1.50    |

Ba/3.6

Potatoes, Total tubers: tons per acre. Effect of additional nitrogen

| Manures              | Year of Cycle | 1946                 |                   |      | N Effect | 1947                 |                   |      | N Effect |
|----------------------|---------------|----------------------|-------------------|------|----------|----------------------|-------------------|------|----------|
|                      |               | Additional N Without | Additional N With | Mean |          | Additional N Without | Additional N With | Mean |          |
| Manure as F.Y.M.     | 1             | 7.29                 | 8.65              | 7.97 | 1.36     | 6.13                 | 8.06              | 7.10 | 1.93     |
|                      | 2             | 7.03                 | 8.80              | 7.92 | 1.77     | 5.47                 | 6.55              | 6.01 | 1.08     |
|                      | 3             | 5.54                 | 8.00              | 6.77 | 2.46     | 5.84                 | 6.36              | 6.10 | 0.52     |
|                      | 4             | 5.06                 | 8.63              | 6.84 | 3.57     | 5.05                 | 5.97              | 5.51 | 0.92     |
|                      | 5             | 6.38                 | 6.79              | 6.58 | 0.41     | 4.30                 | 5.39              | 4.84 | 1.09     |
| Manure as Adco       | 1             | 9.24                 | 9.18              | 9.21 | -0.06    | 6.05                 | 6.01              | 6.03 | -0.04    |
|                      | 2             | 7.26                 | 8.78              | 8.02 | 1.52     | 5.59                 | 5.42              | 5.50 | -0.17    |
|                      | 3             | 6.60                 | 8.58              | 7.59 | 1.98     | 4.56                 | 5.89              | 5.22 | 1.33     |
|                      | 4             | 7.04                 | 7.09              | 7.06 | 0.05     | 5.21                 | 5.94              | 5.58 | 0.73     |
|                      | 5             | 6.18                 | 7.53              | 6.86 | 1.35     | 5.13                 | 4.65              | 4.89 | -0.48    |
| Manure as Straw      | 1             | 9.13                 | 9.93              | 9.53 | 0.80     | 6.57                 | 6.35              | 6.46 | -0.22    |
|                      | 2             | 6.37                 | 10.66             | 8.52 | 4.29     | 4.36                 | 5.80              | 5.08 | 1.44     |
|                      | 3             | 7.20                 | 9.09              | 8.14 | 1.89     | 4.55                 | 6.74              | 5.64 | 2.19     |
|                      | 4             | 6.19                 | 7.26              | 6.72 | 1.07     | 5.66                 | 6.43              | 6.04 | 0.77     |
|                      | 5             | 6.64                 | 8.52              | 7.58 | 1.88     | 5.07                 | 6.34              | 5.70 | 1.27     |
| Super-Phosphate      | 1             | 9.19                 | 10.08             | 9.64 | 0.89     | 6.48                 | 7.41              | 6.94 | 0.93     |
|                      | 2             | 7.58                 | 9.78              | 8.68 | 2.20     | 5.63                 | 5.59              | 5.61 | -0.04    |
|                      | 3             | 7.39                 | 7.99              | 7.69 | 0.60     | 6.36                 | 6.40              | 6.38 | 0.04     |
|                      | 4             | 8.41                 | 8.18              | 8.30 | -0.23    | 5.98                 | 5.34              | 5.66 | -0.64    |
|                      | 5             | 8.02                 | 7.51              | 7.76 | -0.51    | 6.17                 | 5.62              | 5.90 | -0.55    |
| Gafsa Rock Phosphate | 1             | 7.18                 | 6.17              | 6.68 | -1.01    | 4.04                 | 4.70              | 4.37 | 0.66     |
|                      | 2             | 6.41                 | 6.01              | 6.21 | -0.40    | 5.41                 | 5.65              | 5.53 | 0.24     |
|                      | 3             | 6.85                 | 6.61              | 6.73 | -0.24    | 5.26                 | 5.21              | 5.24 | -0.05    |
|                      | 4             | 6.24                 | 6.20              | 6.22 | -0.04    | 5.47                 | 5.18              | 5.32 | -0.29    |
|                      | 5             | 8.35                 | 7.02              | 7.68 | -1.33    | 4.90                 | 4.79              | 4.84 | -0.11    |

Ba/3.7

Four Course Rotation Experiment

|                      |               | Barley Grain: cwt. per acre |      |      |      |      |      |      |      |      |
|----------------------|---------------|-----------------------------|------|------|------|------|------|------|------|------|
| Manure               | Year of Cycle | 1939                        | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
| Manure as F.Y.M      | 1             | 26.3                        | 27.6 | 18.4 | 35.0 | 27.4 | 35.8 | 29.8 | 26.9 | 22.6 |
|                      | 2             | 25.9                        | 32.5 | 14.6 | 24.1 | 23.3 | 29.4 | 21.8 | 24.2 | 16.2 |
|                      | 3             | 22.8                        | 24.2 | 12.5 | 21.6 | 17.9 | 25.2 | 19.0 | 25.1 | 15.3 |
|                      | 4             | 23.7                        | 20.7 | 15.3 | 22.0 | 19.6 | 23.0 | 19.2 | 22.5 | 13.3 |
|                      | 5             | 21.5                        | 22.6 | 12.2 | 16.3 | 16.1 | 27.2 | 17.6 | 23.8 | 14.6 |
| Manure as Adco       | 1             | 31.5                        | 36.5 | 17.3 | 28.4 | 32.4 | 31.6 | 31.5 | 30.2 | 19.0 |
|                      | 2             | 26.1                        | 28.1 | 13.8 | 18.6 | 22.7 | 30.3 | 22.4 | 25.2 | 13.8 |
|                      | 3             | 20.6                        | 24.3 | 12.6 | 18.9 | 16.4 | 24.9 | 18.1 | 21.6 | 15.3 |
|                      | 4             | 20.5                        | 18.5 | 10.4 | 17.0 | 20.9 | 27.6 | 16.6 | 24.5 | 13.4 |
|                      | 5             | 22.4                        | 27.5 | 11.0 | 13.9 | 16.3 | 27.5 | 14.8 | 21.8 | 14.5 |
| Manure as Straw      | 1             | 23.7                        | 34.5 | 25.5 | 32.0 | 32.2 | 34.8 | 38.4 | 34.3 | 24.0 |
|                      | 2             | 24.5                        | 27.3 | 15.1 | 26.6 | 23.1 | 28.2 | 24.8 | 27.2 | 16.5 |
|                      | 3             | 20.8                        | 27.1 | 12.0 | 19.2 | 20.8 | 28.1 | 19.6 | 25.6 | 19.1 |
|                      | 4             | 23.8                        | 26.0 | 12.6 | 17.2 | 21.6 | 26.0 | 16.8 | 24.3 | 14.1 |
|                      | 5             | 26.3                        | 24.2 | 12.6 | 21.4 | 13.4 | 25.1 | 20.0 | 24.8 | 15.8 |
| Super-phosphate      | 1             | 32.2                        | 30.2 | 25.1 | 25.4 | 27.8 | 29.2 | 26.2 | 28.6 | 23.7 |
|                      | 2             | 32.3                        | 30.8 | 24.8 | 27.2 | 25.3 | 28.6 | 26.3 | 22.8 | 22.6 |
|                      | 3             | 31.7                        | 31.1 | 25.9 | 26.4 | 30.0 | 26.7 | 24.2 | 27.2 | 22.6 |
|                      | 4             | 31.7                        | 31.3 | 22.0 | 28.6 | 28.3 | 27.5 | 22.7 | 29.1 | 22.0 |
|                      | 5             | 33.0                        | 29.7 | 21.7 | 29.2 | 22.7 | 29.4 | 26.6 | 29.2 | 20.4 |
| Gafsa Rock Phosphate | 1             | 29.0                        | 33.2 | 18.7 | 13.1 | 23.7 | 28.8 | 20.0 | 29.3 | 20.6 |
|                      | 2             | 29.8                        | 34.5 | 15.0 | 27.7 | 24.6 | 28.0 | 21.4 | 28.9 | 17.4 |
|                      | 3             | 32.9                        | 31.0 | 17.3 | 27.9 | 24.1 | 28.8 | 26.2 | 23.3 | 20.6 |
|                      | 4             | 31.5                        | 30.4 | 22.3 | 22.8 | 20.9 | 28.1 | 21.2 | 30.3 | 19.9 |
|                      | 5             | 26.5                        | 32.1 | 16.9 | 30.4 | 26.1 | 29.9 | 23.4 | 27.4 | 19.4 |

Ba/3.8

## Barley Straw: cwt. per acre

| Manure               | Year of Cycle | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|----------------------|---------------|------|------|------|------|------|------|------|------|------|
| Manure as F.Y.M.     | 1             | 32.2 | 28.5 | 23.0 | 37.5 | 30.1 | 33.3 | 33.8 | 29.6 | 21.9 |
|                      | 2             | 28.8 | 25.3 | 23.2 | 22.2 | 23.8 | 29.1 | 23.7 | 28.4 | 17.5 |
|                      | 3             | 26.1 | 24.7 | 19.8 | 20.4 | 19.4 | 23.5 | 21.0 | 26.4 | 16.0 |
|                      | 4             | 27.6 | 22.0 | 20.8 | 20.7 | 19.0 | 22.8 | 20.9 | 28.4 | 13.5 |
|                      | 5             | 28.2 | 24.7 | 18.4 | 16.5 | 15.8 | 25.0 | 17.2 | 29.5 | 16.6 |
| Manure as Adco       | 1             | 39.7 | 35.7 | 27.0 | 31.0 | 34.0 | 31.4 | 37.4 | 40.0 | 20.5 |
|                      | 2             | 32.0 | 29.2 | 21.2 | 23.9 | 21.8 | 26.4 | 25.6 | 29.4 | 14.3 |
|                      | 3             | 24.6 | 24.5 | 23.0 | 22.3 | 16.7 | 23.5 | 21.1 | 22.8 | 15.6 |
|                      | 4             | 26.5 | 27.7 | 17.0 | 23.6 | 21.8 | 26.4 | 21.8 | 33.2 | 14.3 |
|                      | 5             | 24.7 | 28.2 | 20.5 | 15.8 | 17.6 | 23.1 | 18.7 | 28.2 | 16.3 |
| Manure as Straw      | 1             | 27.2 | 37.8 | 32.1 | 35.8 | 33.9 | 34.1 | 34.4 | 42.0 | 23.8 |
|                      | 2             | 29.0 | 27.7 | 21.6 | 25.6 | 22.6 | 26.8 | 27.8 | 34.0 | 17.7 |
|                      | 3             | 24.4 | 27.8 | 20.0 | 19.7 | 22.4 | 25.9 | 28.4 | 30.5 | 18.7 |
|                      | 4             | 27.8 | 26.4 | 18.9 | 21.1 | 20.7 | 23.6 | 25.4 | 30.0 | 15.7 |
|                      | 5             | 27.6 | 24.7 | 21.3 | 16.9 | 14.9 | 22.1 | 20.7 | 26.9 | 16.3 |
| Super-phosphate      | 1             | 35.9 | 35.2 | 30.6 | 30.6 | 28.3 | 26.9 | 31.6 | 36.4 | 24.7 |
|                      | 2             | 39.6 | 32.3 | 30.8 | 26.5 | 28.0 | 28.2 | 25.4 | 28.2 | 22.6 |
|                      | 3             | 34.1 | 33.4 | 29.8 | 20.4 | 28.7 | 25.5 | 29.4 | 34.4 | 23.7 |
|                      | 4             | 33.7 | 32.9 | 29.7 | 28.0 | 27.6 | 24.0 | 29.4 | 32.5 | 22.7 |
|                      | 5             | 34.7 | 30.3 | 31.8 | 27.3 | 26.0 | 24.9 | 29.3 | 38.2 | 21.1 |
| Gafsa Rock Phosphate | 1             | 33.3 | 37.9 | 29.1 | 22.8 | 26.0 | 25.6 | 26.5 | 36.5 | 24.0 |
|                      | 2             | 36.8 | 39.8 | 29.2 | 31.3 | 27.4 | 26.2 | 25.1 | 34.7 | 18.9 |
|                      | 3             | 37.1 | 37.5 | 28.5 | 29.5 | 26.3 | 26.5 | 27.8 | 29.1 | 22.8 |
|                      | 4             | 37.3 | 32.3 | *    | 23.4 | 24.1 | 25.1 | 29.4 | 35.5 | 22.6 |
|                      | 5             | 36.2 | 34.8 | 32.0 | 29.9 | 26.7 | 28.2 | 25.1 | 36.4 | 23.0 |

\* Recorded yield obviously incorrect.

Ba/3.9

Four Course Rotation Experiment

Ryegrass: cwt. per acre dry matter

| Manure                     | Year of Cycle | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|----------------------------|---------------|------|------|------|------|------|------|------|------|------|
| Manure<br>as<br>F.Y.M.     | 1             | 20.4 | 19.4 | 7.0  | 18.8 | 16.5 | 19.4 | 17.3 | 33.3 | 6.7  |
|                            | 2             | 10.9 | 11.4 | 9.7  | 9.5  | 12.7 | 10.2 | 13.1 | 22.8 | 3.2  |
|                            | 3             | 10.8 | 7.1  | 5.5  | 7.3  | 10.5 | 11.4 | 11.5 | 20.8 | 3.3  |
|                            | 4             | 8.5  | 9.1  | 6.5  | 9.0  | 8.9  | 8.2  | 11.8 | 12.3 | 3.2  |
|                            | 5             | 9.5  | 9.1  | 5.8  | 5.6  | 8.6  | 9.6  | 9.6  | 16.2 | 3.2  |
| Manure<br>as<br>Adco       | 1             | 14.4 | 16.9 | 10.1 | 9.4  | 17.8 | 18.7 | 25.3 | 31.9 | 6.7  |
|                            | 2             | 10.2 | 9.9  | 6.7  | 5.8  | 10.6 | 13.3 | 14.0 | 27.6 | 3.5  |
|                            | 3             | 8.8  | 7.6  | 5.6  | 9.0  | 9.6  | 9.0  | 11.5 | 18.9 | 3.5  |
|                            | 4             | 7.2  | 8.9  | 5.4  | 6.1  | 8.3  | 9.1  | 8.1  | 16.5 | 1.2  |
|                            | 5             | 8.1  | 8.5  | 3.6  | 6.2  | 8.8  | 9.8  | 10.4 | 15.5 | 3.9  |
| Manure<br>as<br>Straw      | 1             | 40.5 | 28.1 | 14.3 | 21.5 | 29.3 | 16.4 | 39.2 | 59.1 | 12.4 |
|                            | 2             | 11.0 | 8.8  | 4.4  | 8.6  | 9.4  | 10.7 | 13.2 | 21.7 | 3.7  |
|                            | 3             | 9.2  | 12.1 | 6.6  | 11.4 | 11.4 | 10.6 | 12.5 | 23.5 | 5.0  |
|                            | 4             | 9.3  | 9.8  | 7.0  | 9.6  | 8.3  | 11.8 | 10.6 | 15.5 | 4.4  |
|                            | 5             | 9.2  | 9.3  | 6.9  | 7.1  | 8.1  | 9.6  | 8.5  | 14.0 | 3.1  |
| Super-<br>phosphate        | 1             | 22.5 | 18.4 | 10.0 | 13.5 | 14.2 | 12.6 | 22.0 | 39.7 | 11.2 |
|                            | 2             | 23.3 | 12.9 | 10.0 | 15.6 | 18.1 | 12.0 | 20.0 | 33.7 | 7.8  |
|                            | 3             | 17.0 | 14.8 | 9.4  | 10.8 | 15.1 | 14.3 | 22.3 | 34.0 | 4.3  |
|                            | 4             | 20.2 | 10.9 | 11.6 | 7.1  | 13.7 | 15.4 | 19.2 | 36.7 | 6.9  |
|                            | 5             | 20.5 | 13.3 | 7.5  | 11.0 | 17.1 | 12.6 | 18.3 | 35.9 | 6.6  |
| Gafsa<br>Rock<br>Phosphate | 1             | 17.7 | 7.8  | 9.0  | 6.2  | 16.6 | 12.8 | 20.8 | 31.6 | 7.2  |
|                            | 2             | 16.1 | 12.0 | 9.3  | 9.7  | 17.7 | 8.5  | 18.7 | 31.4 | 5.8  |
|                            | 3             | 16.1 | 10.7 | 8.4  | 3.6  | 14.8 | 10.4 | 19.2 | 32.3 | 8.4  |
|                            | 4             | 18.5 | 11.5 | 6.7  | 10.2 | 15.4 | 11.2 | 16.9 | 37.1 | 5.4  |
|                            | 5             | 24.9 | 10.4 | 5.4  | 15.6 | 11.8 | 8.9  | 18.3 | 29.0 | 7.2  |

In 1941 the ryegrass failed and the plots were resown with barley, which was cut for hay.

Ba/3.10

## Wheat Grain: cwt. per acre

| Manure                 | Year of Cycle | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|------------------------|---------------|------|------|------|------|------|------|------|------|------|
| Manure<br>as<br>F.Y.M. | 1             | 23.9 | 26.0 | 18.0 | 19.9 | 24.9 | 14.1 | 24.6 | 22.5 | 12.7 |
|                        | 2             | 19.3 | 20.1 | 16.4 | 17.8 | 20.0 | 7.8  | 22.2 | 17.3 | 11.2 |
|                        | 3             | 15.4 | 16.3 | 15.4 | 19.0 | 15.6 | 12.1 | 17.9 | 12.0 | 10.4 |
|                        | 4             | 16.2 | 17.4 | 12.5 | 14.6 | 15.0 | 8.2  | 19.4 | 14.6 | 7.8  |
|                        | 5             | 14.6 | 18.1 | 14.1 | 14.9 | 14.0 | 7.9  | 18.1 | 17.3 | 8.9  |
| Manure<br>as<br>Adco   | 1             | 19.3 | 26.3 | 17.7 | 22.9 | 24.0 | 14.1 | 27.5 | 22.7 | 12.8 |
|                        | 2             | 17.0 | 18.9 | 15.1 | 18.5 | 14.9 | 10.4 | 19.4 | 19.1 | 11.1 |
|                        | 3             | 16.4 | 16.3 | 15.6 | 17.4 | 15.9 | 9.2  | 19.3 | 14.4 | 9.1  |
|                        | 4             | 12.6 | 16.3 | 13.7 | 23.4 | 15.8 | 11.6 | 16.9 | 12.2 | 9.2  |
|                        | 5             | 17.4 | 16.8 | 12.1 | 15.1 | 12.7 | 9.9  | 15.6 | 12.6 | 7.3  |
| Manure<br>as<br>Straw  | 1             | 23.9 | 28.7 | 24.4 | 16.9 | 28.4 | 18.9 | 30.3 | 28.7 | 11.3 |
|                        | 2             | 17.4 | 19.1 | 13.7 | 13.9 | 17.0 | 6.4  | 20.0 | 14.1 | 11.2 |
|                        | 3             | 15.8 | 18.2 | 14.0 | 18.2 | 16.1 | 12.1 | 20.8 | 16.4 | 10.6 |
|                        | 4             | 17.4 | 25.7 | 16.2 | 18.1 | 16.2 | 7.3  | 17.7 | 12.6 | 10.3 |
|                        | 5             | 14.3 | 18.8 | 11.9 | 18.4 | 14.0 | 7.6  | 17.4 | 14.7 | 8.9  |
| Super-<br>Phosphate    | 1             | 22.7 | 18.8 | 16.5 | 20.6 | 21.4 | 9.4  | 22.1 | 15.9 | 8.6  |
|                        | 2             | 21.4 | 19.3 | 17.4 | 17.8 | 17.9 | 10.2 | 21.0 | 12.0 | 11.3 |
|                        | 3             | 19.4 | 21.8 | 17.9 | 20.1 | 22.2 | 11.0 | 22.1 | 16.0 | 9.0  |
|                        | 4             | 19.2 | 21.9 | 18.1 | 19.5 | 21.6 | 11.3 | 22.6 | 16.2 | 10.9 |
|                        | 5             | 21.3 | 21.4 | 18.9 | 21.0 | 21.4 | 9.5  | 23.4 | 17.9 | 10.2 |
| Gafsa<br>Rock          | 1             | 19.6 | 24.7 | 16.1 | 18.9 | 20.4 | 12.8 | 19.2 | 15.7 | 9.0  |
|                        | 2             | 22.5 | 21.6 | 14.5 | 19.9 | 20.2 | 17.1 | 21.2 | 17.7 | 7.5  |
|                        | 3             | 16.9 | 23.6 | 19.1 | 19.9 | 19.6 | 15.5 | 21.1 | 20.5 | 6.7  |
|                        | 4             | 21.7 | 21.6 | 18.0 | 22.0 | 21.0 | 15.9 | 21.9 | 16.1 | 2.4  |
|                        | 5             | 19.8 | 22.2 | 18.2 | 18.8 | 18.2 | 12.6 | 16.9 | 15.8 | 9.2  |

Ba/3.11

Four Course Rotation Experiment

| Manure                     | Year of Cycle | Wheat Straw: cwt. per acre |      |      |      |      |      |      |      |      |
|----------------------------|---------------|----------------------------|------|------|------|------|------|------|------|------|
|                            |               | 1939                       | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
| Manure<br>as<br>F. Y. M.   | 1             | 33.6                       | 36.7 | 22.2 | 32.7 | 38.0 | 27.5 | 35.9 | 43.1 | 16.8 |
|                            | 2             | 26.9                       | 25.7 | 20.1 | 24.6 | 28.5 | 12.1 | 31.2 | 35.3 | 13.4 |
|                            | 3             | 20.9                       | 21.5 | 17.3 | 26.5 | 20.3 | 16.5 | 24.7 | 27.4 | 15.8 |
|                            | 4             | 26.3                       | 24.9 | 14.4 | 20.9 | 26.1 | 11.7 | 25.7 | 34.3 | 10.0 |
|                            | 5             | 27.2                       | 21.0 | 15.8 | 23.2 | 18.3 | 10.8 | 25.7 | 32.4 | 10.8 |
| Manure<br>as<br>Adco       | 1             | 36.4                       | 36.2 | 24.4 | 32.1 | 36.6 | 23.6 | 41.4 | 43.5 | 22.2 |
|                            | 2             | 23.3                       | 22.4 | 17.4 | 25.0 | 25.3 | 14.7 | 27.1 | 36.4 | 17.7 |
|                            | 3             | 25.0                       | 21.4 | 19.5 | 22.6 | 29.7 | 13.2 | 26.2 | 28.7 | 12.2 |
|                            | 4             | 26.6                       | 21.3 | 16.9 | 32.5 | 22.2 | 13.7 | 22.1 | 24.9 | 13.3 |
|                            | 5             | 25.8                       | 21.1 | 13.9 | 21.9 | 22.5 | 13.9 | 20.2 | 25.5 | 10.0 |
| Manure<br>as<br>Straw      | 1             | 35.8                       | 40.9 | 34.7 | 25.1 | 44.6 | 29.8 | 49.8 | 50.7 | 24.6 |
|                            | 2             | 23.7                       | 21.6 | 16.9 | 20.4 | 29.9 | 8.8  | 27.4 | 28.2 | 13.2 |
|                            | 3             | 35.6                       | 23.2 | 17.0 | 24.9 | 22.4 | 16.5 | 29.7 | 32.3 | 13.4 |
|                            | 4             | 24.4                       | 31.7 | 18.1 | 24.4 | 22.5 | 10.3 | 26.1 | 27.0 | 14.5 |
|                            | 5             | 20.9                       | 22.0 | 15.2 | 24.5 | 19.3 | 10.8 | 23.9 | 28.9 | 11.3 |
| Super-<br>phosphate        | 1             | 33.0                       | 24.3 | 20.4 | 27.8 | 33.2 | 12.9 | 30.3 | 30.1 | 15.1 |
|                            | 2             | 33.2                       | 25.8 | 22.2 | 26.0 | 31.0 | 12.7 | 30.3 | 23.9 | 16.4 |
|                            | 3             | 34.5                       | 28.2 | 21.1 | 32.3 | 30.4 | 14.7 | 30.6 | 31.3 | 13.0 |
|                            | 4             | 27.7                       | 30.5 | 22.0 | 26.6 | 32.7 | 13.9 | 33.2 | 30.7 | 14.4 |
|                            | 5             | 32.3                       | 27.1 | 22.6 | 31.8 | 28.7 | 12.7 | 32.1 | 37.2 | 14.9 |
| Gafsa<br>Rock<br>Phosphate | 1             | 27.3                       | 31.3 | 20.7 | 23.6 | 30.3 | 16.9 | 30.1 | 30.5 | 16.1 |
|                            | 2             | 29.9                       | 27.3 | 18.0 | 28.1 | 35.7 | 20.8 | 29.6 | 35.4 | 9.5  |
|                            | 3             | 35.9                       | 29.5 | 22.8 | 26.3 | 28.7 | 16.7 | 31.3 | 39.3 | 9.8  |
|                            | 4             | 30.3                       | 28.7 | 21.4 | 28.8 | 33.4 | 18.4 | 32.4 | 32.5 | 4.5  |
|                            | 5             | 32.6                       | 31.7 | 21.2 | 25.8 | 26.7 | 14.7 | 24.0 | 31.1 | 12.8 |

