

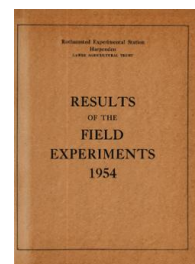
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# Yields of the Field Experiments 1954

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## Long-term Experiments

### Rothamsted Research

Rothamsted Research (1955) *Long-term Experiments* ; Yields Of The Field Experiments 1954, pp 13 - 62 - DOI: <https://doi.org/10.23637/ERADOC-1-184>

54/Ba/1.1

### THREE COURSE ROTATION EXPERIMENT

3rd year of revised scheme

For details of treatments and rotation see "Results of the Field Experiments 1952", Section Ba/1.

Area of each plot: Potatoes (sub-plot) - 0.0092 acre;  
Barley - 0.0200 acre; Sugar beet - 0.0204 acre.

Cultivations, etc.:

Potatoes. Straw applied, ploughed all plots: Dec 28, 1953.  
Fertilizers applied: Apr 8, 1954. Ridged: Apr 9. Potatoes planted: Apr 12. Earthed up: July 6. Sprayed (low volume) with copper fungicide at 5 lb powder per acre: July 27. Sprayed (low volume) with copper fungicide at  $\frac{1}{2}$  gallon paste per acre: Aug 23. Sprayed with 15% sulphuric acid: Sept 28. Lifted: Oct 2. Variety: Majestic.

Barley. Straw applied, ploughed all plots: Dec 28, 1953.  
Ground chalk applied at 22 cwt per acre: Jan 5, 1954. Fertilizers applied, seed drilled at 3 bushels per acre: Mar 15. Harvested: Aug 26. Variety: Plumage Archer.

Sugar beet. Straw applied, ploughed all plots: Dec 28, 1953.  
Fertilizers applied: Mar 29, 1954. Seed drilled at 18 lb per acre: Apr 5. Sprayed (at low volume) with D.D.T. emulsion at  $\frac{1}{2}$  lb per acre: May 12. Singled: June 1. Sprayed again as above: June 24. Lifted: Nov 16. Variety: Klein E.

#### Treatment symbols

Ar Complete artificials only  
St1 Straw ploughed in in autumn, artificials applied in spring  
St2 Straw ploughed in in autumn, artificials applied half in autumn, half in spring  
Ad Adco ploughed in in autumn with supplementary artificials  
St  $5\frac{1}{3}$  cwt cut straw in autumn  
Nitrogen dressing: 0.2; 0.4; 0.6 cwt N as sulphate of ammonia  
K<sub>3</sub> Muriate of potash equivalent to K<sub>2</sub>O in straw  
K 0.5 cwt K<sub>2</sub>O as muriate of potash.

## Potatoes

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| Treatments applied |         | Totatoes       |          |      |      |             |             |      |              |      |      |
|--------------------|---------|----------------|----------|------|------|-------------|-------------|------|--------------|------|------|
|                    |         | 1953           | 1954     | 0    | 0.4N | St+<br>0.2N | St+<br>0.6N | Ks   | Ks +<br>0.4N |      |      |
| 1950               | 1951    | 1952 &<br>1954 |          | -    | -    | -           | -           | -    | -            | -    | -    |
| Ar                 | Ar      | 0              | 0.4N     | 82.4 | 76.8 | 76.8        | 76.8        | 76.8 | 79.4         |      |      |
|                    | Ar      | 0              | 0.4N     | 78.8 | 72.3 | 76.8        |             |      |              |      |      |
| St1 St2            | St1 St2 | 0              | 0.4N     | 85.2 | 82.8 | 81.7        | 82.2        | 74.1 | 79.0         | 78.5 | 82.4 |
|                    | St1 St2 | 0              | 0.4N     | 80.0 | 77.1 | 82.7        | 83.0        | 83.0 |              |      |      |
| Ad                 | Ad      | St+ 0.2N       | St+ 0.6N | 81.7 | 79.9 | 83.0        |             |      |              |      |      |
|                    | Ad      | Ks             | Ks+0.4N  | 82.0 | 84.0 | 79.4        |             |      |              |      |      |
| Ad                 | Ad      | 0              |          |      | 80.7 | 81.7        | 87.3        | 78.8 | 86.4         | 80.1 |      |
|                    | Ad      | 0.4N           | St+ 0.6N | 76.8 |      |             |             |      |              |      |      |
| Ad                 | Ad      | St+ 0.6N       | Ks+0.4N  | 80.3 |      |             |             |      |              |      |      |
|                    | Ad      | Ks+0.4N        |          | 84.9 |      |             |             |      |              |      |      |

Percentage Ware

|                    |         |                      | Barley              |   |      |              |              |                |                          |
|--------------------|---------|----------------------|---------------------|---|------|--------------|--------------|----------------|--------------------------|
|                    |         |                      | 54/Ba/1.4           |   |      |              |              |                |                          |
| Treatments applied |         |                      | 1953                | 0 | 0.4N | St +<br>0.2N | St +<br>0.6N | K <sub>s</sub> | K <sub>s</sub> +<br>0.4N |
| 1950               | 1951    | 1952 &<br>1954       |                     |   |      |              |              |                |                          |
|                    |         |                      | Grain: cwt per acre |   |      |              |              |                |                          |
|                    | Ar      | 0                    | 30.1                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 29.9                |   |      |              |              |                |                          |
| Ar                 |         | 0                    | 30.8                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 30.5                |   |      |              |              |                |                          |
|                    | St1 St2 | 0                    | 24.3                |   |      |              | 30.5         |                | 28.3                     |
|                    |         | 0.4N                 | 34.7                |   |      | 31.4         |              | 34.3           |                          |
| St1 St2            |         | 0                    | 29.9                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 30.7                |   |      |              |              |                |                          |
|                    |         | St+0.2N              | 23.5                |   |      |              |              |                |                          |
|                    |         | St+0.6N              | 33.0                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub>       | 28.5                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub> +0.4N | 34.3                |   |      |              |              |                |                          |
|                    | Ad      | 0                    | 28.9                |   |      |              | 27.0         |                | 32.6                     |
| Ad                 |         | 0.4N                 | 32.0                |   |      |              |              |                |                          |
|                    |         | St+0.6N              | 29.7                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub> +0.4N | 35.3                |   |      |              |              |                |                          |
|                    |         |                      | Straw: cwt per acre |   |      |              |              |                |                          |
|                    | Ar      | 0                    | 33.5                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 41.8                |   |      |              |              |                |                          |
| Ar                 |         | 0                    | 35.1                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 40.2                |   |      |              |              |                |                          |
|                    | St1 St2 | 0                    | 27.6                |   |      |              | 42.0         |                | 32.8                     |
|                    |         | 0.4N                 | 42.7                |   |      | 43.6         |              | 39.6           |                          |
| St1 St2            |         | 0                    | 43.8                |   |      |              |              |                |                          |
|                    |         | 0.4N                 | 34.3                |   |      |              |              |                |                          |
|                    |         | St+0.2N              | 26.5                |   |      |              |              |                |                          |
|                    |         | St+0.6N              | 44.6                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub>       | 31.8                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub> +0.4N | 44.1                |   |      |              |              |                |                          |
|                    | Ad      | 0                    | 33.5                |   |      |              | 30.9         |                | 34.9                     |
| Ad                 |         | 0.4N                 | 43.2                |   |      |              |              |                |                          |
|                    |         | St+0.6N              | 37.7                |   |      |              |              |                |                          |
|                    |         | K <sub>s</sub> +0.4N | 43.9                |   |      |              |              |                |                          |

54/Ba/1.5

|                         |         |                      | Sugar Beet                    |      |           |           |                       |
|-------------------------|---------|----------------------|-------------------------------|------|-----------|-----------|-----------------------|
| Treatments applied 1953 |         |                      | 0                             | 0.4N | St + 0.2N | St + 0.6N | K <sub>s</sub> + 0.4N |
| 1950                    | 1951    | 1952 & 1954          |                               |      |           |           |                       |
|                         |         |                      | Roots (washed): tons per acre |      |           |           |                       |
| Ar                      | Ar      | 0                    |                               | 7.90 |           |           |                       |
|                         |         | 0.4N                 | 8.90                          |      |           |           |                       |
|                         | Ar      | 0                    |                               | 6.46 |           |           |                       |
|                         |         | 0.4N                 | 9.42                          |      |           |           |                       |
| St1 St2                 | St1 St2 | 0                    |                               | 7.40 |           | 8.21      | 8.23                  |
|                         |         | 0.4N                 | 9.45                          |      | 9.32      | 10.30     |                       |
|                         | St1 St2 | 0                    |                               | 8.29 |           |           |                       |
|                         |         | 0.4N                 | 9.93                          |      |           |           |                       |
|                         |         | St+ 0.2N             |                               | 8.75 |           |           |                       |
|                         |         | St+ 0.6N             | 9.78                          |      |           |           |                       |
|                         |         | K <sub>s</sub>       |                               | 8.29 |           |           |                       |
|                         |         | K <sub>s</sub> +0.4N | 10.93                         |      |           |           |                       |
| Ad                      | Ad      | 0                    |                               | 7.77 |           | 6.66      | 8.07                  |
|                         |         | 0.4N                 | 8.95                          |      |           |           |                       |
|                         | Ad      | St+ 0.6N             | 9.65                          |      |           |           |                       |
|                         |         | K <sub>s</sub> +0.4N | 8.34                          |      |           |           |                       |

|         |         |                      | Sugar Percentage |       |       |       |       |
|---------|---------|----------------------|------------------|-------|-------|-------|-------|
| Ar      | Ar      | 0                    |                  | 17.00 |       |       |       |
|         |         | 0.4N                 | 17.08            |       |       |       |       |
|         | Ar      | 0                    |                  | 17.51 |       |       |       |
|         |         | 0.4N                 | 17.25            |       |       |       |       |
| St1 St2 | St1 St2 | 0                    |                  | 16.82 |       | 17.48 | 17.08 |
|         |         | 0.4N                 | 17.19            |       | 17.22 | 17.34 |       |
|         | St1 St2 | 0                    |                  | 17.14 |       |       |       |
|         |         | 0.4N                 | 17.08            |       |       |       |       |
|         |         | St+ 0.2N             |                  | 17.19 |       |       |       |
|         |         | St+ 0.6N             | 17.16            |       |       |       |       |
|         |         | K <sub>s</sub>       |                  | 16.88 |       |       |       |
|         |         | K <sub>s</sub> +0.4N | 17.16            |       |       |       |       |
| Ad      | Ad      | 0                    |                  | 16.85 |       | 17.14 | 17.44 |
|         |         | 0.4N                 | 16.93            |       |       |       |       |
|         | Ad      | St+ 0.6N             | 17.77            |       |       |       |       |
|         |         | K <sub>s</sub> +0.4N | 17.14            |       |       |       |       |

|                    |         |                       | Sugar Beet                |      |      |              |              | 54/Ba/1.6      |                          |
|--------------------|---------|-----------------------|---------------------------|------|------|--------------|--------------|----------------|--------------------------|
| Treatments applied |         |                       | 1953                      | 0    | 0.4N | St +<br>0.2N | St +<br>0.6N | K <sub>s</sub> | K <sub>s</sub> +<br>0.4N |
| 1950               | 1951    | 1952 &<br>1954        |                           |      |      |              |              |                |                          |
|                    |         |                       | Total sugar: cwt per acre |      |      |              |              |                |                          |
|                    | Ar      | 0                     | 26.8                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 30.4                      |      |      |              |              |                |                          |
| Ar                 |         | 0                     | 22.6                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 32.5                      |      |      |              |              |                |                          |
|                    | St1 St2 | 0                     | 24.9                      |      | 28.7 |              | 28.1         |                |                          |
|                    |         | 0.4N                  | 32.5                      | 32.1 |      | 35.7         |              |                |                          |
| St1 St2            |         | 0                     | 28.4                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 33.9                      |      |      |              |              |                |                          |
|                    |         | St + 0.2N             | 30.1                      |      |      |              |              |                |                          |
|                    |         | St + 0.6N             | 33.6                      |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub>        | 28.0                      |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub> + 0.4N | 37.5                      |      |      |              |              |                |                          |
|                    | Ad      | 0                     | 26.2                      |      | 22.8 |              | 28.2         |                |                          |
|                    |         | 0.4N                  | 30.3                      |      |      |              |              |                |                          |
| Ad                 |         | St + 0.6N             | 34.3                      |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub> + 0.4N | 28.6                      |      |      |              |              |                |                          |
|                    |         |                       | Tops: tons per acre       |      |      |              |              |                |                          |
|                    | Ar      | 0                     | 8.28                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 8.90                      |      |      |              |              |                |                          |
| Ar                 |         | 0                     | 6.07                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 10.14                     |      |      |              |              |                |                          |
|                    | St1 St2 | 0                     | 6.70                      |      | 7.14 |              | 7.46         |                |                          |
|                    |         | 0.4N                  | 7.51                      | 7.81 |      | 8.71         |              |                |                          |
| St1 St2            |         | 0                     | 9.62                      |      |      |              |              |                |                          |
|                    |         | 0.4N                  | 10.61                     |      |      |              |              |                |                          |
|                    |         | St + 0.2N             | 8.47                      |      |      |              |              |                |                          |
|                    |         | St + 0.6N             | 10.72                     |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub>        | 7.22                      |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub> + 0.4N | 13.33                     |      |      |              |              |                |                          |
|                    | Ad      | 0                     | 6.35                      |      | 9.47 |              | 7.59         |                |                          |
|                    |         | 0.4N                  | 9.76                      |      |      |              |              |                |                          |
| Ad                 |         | St + 0.6N             | 8.47                      |      |      |              |              |                |                          |
|                    |         | K <sub>s</sub> + 0.4N | 6.72                      |      |      |              |              |                |                          |

|                                  |         |                       | Sugar Beet |      |              |              |                | 54/Ba/1.7                |
|----------------------------------|---------|-----------------------|------------|------|--------------|--------------|----------------|--------------------------|
| Treatments applied 1953          |         |                       | 0          | 0.4N | St +<br>0.2N | St +<br>0.6N | K <sub>s</sub> | K <sub>s</sub> +<br>0.4N |
| 1950                             | 1951    | 1952 &<br>1954        |            |      |              |              |                |                          |
| Plant number: thousands per acre |         |                       |            |      |              |              |                |                          |
| Ar                               | Ar      | 0                     | 27.1       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 27.4       |      |              |              |                |                          |
|                                  |         | 0                     | 27.0       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 27.0       |      |              |              |                |                          |
| St1 St2                          | St1 St2 | 0                     | 27.2       |      | 27.9         |              |                | 27.0                     |
|                                  |         | 0.4N                  | 25.8       |      | 26.8         |              | 27.6           |                          |
|                                  |         | 0                     | 27.7       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 26.7       |      |              |              |                |                          |
|                                  |         | St + 0.2N             | 26.6       |      |              |              |                |                          |
|                                  |         | St + 0.6N             | 27.4       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub>        | 27.1       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub> +0.4N  | 27.5       |      |              |              |                |                          |
| Ad                               | Ad      | 0                     | 26.3       |      | 27.6         |              |                | 26.6                     |
|                                  |         | 0.4N                  | 26.5       |      |              |              |                |                          |
|                                  |         | St + 0.6N             | 26.2       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub> +0.4N  | 27.0       |      |              |              |                |                          |
| Noxious nitrogen:mg per 100g.    |         |                       |            |      |              |              |                |                          |
| Ar                               | Ar      | 0                     | 20.0       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 15.0       |      |              |              |                |                          |
|                                  |         | 0                     | 15.0       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 17.5       |      |              |              |                |                          |
| St1 St2                          | St1 St2 | 0                     | 15.0       |      | 20.0         |              |                | 15.0                     |
|                                  |         | 0.4N                  | 15.0       |      | 15.0         |              | 15.0           |                          |
|                                  |         | 0                     | 20.0       |      |              |              |                |                          |
|                                  |         | 0.4N                  | 15.0       |      |              |              |                |                          |
|                                  |         | St + 0.2N             | 20.0       |      |              |              |                |                          |
|                                  |         | St + 0.6N             | 25.0       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub>        | 15.0       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub> + 0.4N | 20.0       |      |              |              |                |                          |
| Ad                               | Ad      | 0                     | 15.0       |      | 15.0         |              |                | 15.0                     |
|                                  |         | 0.4N                  | 20.0       |      |              |              |                |                          |
|                                  |         | St + 0.6N             | 15.0       |      |              |              |                |                          |
|                                  |         | K <sub>s</sub> +0.4N  | 15.0       |      |              |              |                |                          |

54/Ba/2.1

## FOUR COURSE ROTATION EXPERIMENT

The 25th year

Direct and residual effects of organic manures and phosphatic fertilizers - Hoosfield 1954.

For details of treatments and rotation see "Results of the Field Experiments 1939-47" Vol.I, Section Ba/3.

Area of each plot: Potatoes (whole plot): 0.0228 acre. Barley, ryegrass and wheat: 0.0244 acre.

Manures (cwt per acre) applied 1953-54

| Treatment      | Organic manures and phosphates |       |                               |                  | Supplementary fertilizers |                                        |                                    |
|----------------|--------------------------------|-------|-------------------------------|------------------|---------------------------|----------------------------------------|------------------------------------|
|                | Organic matter                 | N     | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | N as Sulph. of amm.       | P <sub>2</sub> O <sub>5</sub> as Super | K <sub>2</sub> O as Mur. of potash |
| Dung (a)       | 50                             | 1.236 | 0.534                         | 2.331            | 0.564                     | 0.666                                  | 0.669                              |
| Dung (b)       | 50                             | 1.189 | 0.514                         | 2.406            | 0.611                     | 0.686                                  | 0.594                              |
| Adco           | 50                             | 1.302 | 0.754                         | 0.822            | 0.498                     | 0.446                                  | 2.178                              |
| Straw (a)      | 167                            | 0.533 | 0.100                         | 0.550            | 1.267                     | 1.100                                  | 2.450                              |
| Straw (b)      | 167                            | 0.833 | 0.250                         | 1.250            | 0.967                     | 0.950                                  | 1.750                              |
| Super          |                                |       | 1.2                           |                  | 0.36*                     |                                        | 0.6*                               |
| Rock phosphate |                                |       | 1.2                           |                  | 0.36*                     |                                        | 0.6*                               |

Dung and straw: (a) applied to wheat and ryegrass; (b) to barley and potatoes.

\*Yearly dressings totalling to the standard rates in the 5 year period.

## Cultivations, etc.:

## Potatoes.

Ploughed: Sept 2, 1953. Dung and adco applied: Nov 26. Straw, first dressing of fertilizers to straw plot and supplementary fertilizers to dung and adco plots applied, all plots ploughed: Nov 30. Second dressing of fertilizers to straw plot applied: Jan 18, 1954. Ridged, spring fertilizers including third dressing to straw plot and sulphate of ammonia to half plots applied, potatoes planted: Apr 20. Earthed up: July 21. Sprayed with copper fungicide,  $\frac{1}{2}$  gallon paste in 10 gals. water per acre: July 27. Sprayed with copper fungicide, 5 lb per acre: Aug 13. Sprayed with sulphuric acid, 15% B.O.V. 100 gallons per acre: Sept 28. Lifted: Oct 9. Variety: Majestic.

## Barley.

Dung and adco applied: Nov 26, 1953. Straw, first dressing of fertilizers to straw plot and supplementary fertilizers to dung and adco plots applied, all plots ploughed: Dec 1. Ground chalk applied at 21 cwt per acre: Dec 5. Second dressing of fertilizer to straw plot: Jan 18, 1954. Spring fertilizers

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including third dressing to straw plot applied: Mar 12. Seed drilled at 3 bushels per acre: Mar 15. Harvested: Aug 27.

Variety: Plumage Archer.

Ryegrass.

Dung and adco with supplementary fertilizers, straw with first dressing of fertilizers applied, all plots ploughed: Sept 23, 1953.

Autumn fertilizers applied: Oct 8. Seed sown at 112 lb per acre:

Oct 9. Second dressing of fertilizers to straw plot applied:

Jan 18, 1954. Sulphate of ammonia, and third dressing of fertilizers to straw plot applied: Apr 29. Harvested: June 29.

Variety: Western Wolths.

Wheat.

Dung and adco with supplementary fertilizers, straw with first dressing of fertilizers applied, all plots ploughed: Sept 23, 1953.

Autumn fertilizers applied: Oct 9. Seed drilled at 3 bushels per acre: Oct 22. Second dressing of fertilizers to straw plot

applied: Jan 18, 1954. Sulphate of ammonia and third dressing of fertilizers to straw plot applied: May 1. Harvested: Sept 6.

Variety: Squareheads Master 13/4.

## Summary of Results

| Manure +             | Year of Cycle | Potatoes                    |      |               |              | Percentage Ware |      |               | Barley Grain Straw # cwt per acre | Ryegrass Dry matter cwt per acre | Wheat                        |      |      |
|----------------------|---------------|-----------------------------|------|---------------|--------------|-----------------|------|---------------|-----------------------------------|----------------------------------|------------------------------|------|------|
|                      |               | Total tubers, tons per acre |      | Response to N | Additional N |                 | Mean | Response to N |                                   |                                  | Grain # Straw * cwt per acre |      |      |
|                      |               | Without                     | With |               | Without      | With            |      |               |                                   |                                  |                              |      |      |
| Dung                 | I             | 5.02                        | 5.81 | 5.42          | +0.79        | 78.6            | 74.3 | 76.4          | -4.3                              | 32.2                             | 43.3                         | 28.0 | 42.2 |
|                      | II            | 4.77                        | 5.46 | 5.12          | +0.69        | 86.0            | 78.1 | 82.0          | -7.9                              | 19.2                             | 24.7                         | 17.3 | 27.5 |
|                      | III           | 4.24                        | 4.32 | 4.28          | +0.08        | 73.8            | 77.4 | 75.6          | +3.6                              | 24.8                             | 27.9                         | 16.6 | 21.6 |
|                      | IV            | 3.45                        | 4.80 | 4.12          | +1.35        | 78.3            | 73.3 | 75.8          | -5.0                              | 15.0                             | 18.4                         | 16.5 | 20.6 |
|                      | V             | 3.24                        | 4.06 | 3.65          | +0.82        | 76.9            | 81.7 | 79.3          | +4.8                              | 17.0                             | 20.0                         | 18.9 | 29.1 |
| Adco (Straw compost) | I             | 4.17                        | 5.07 | 4.62          | +0.90        | 76.8            | 83.6 | 80.2          | +6.8                              | 28.9                             | 32.9                         | 27.0 | 41.1 |
|                      | II            | 2.78                        | 3.51 | 3.14          | +0.73        | 69.5            | 72.0 | 70.8          | +2.5                              | 25.7                             | 33.8                         | 15.4 | 18.9 |
|                      | III           | 2.29                        | 2.78 | 2.54          | +0.49        | 69.5            | 78.5 | 74.0          | +9.0                              | 22.1                             | 28.7                         | 16.8 | 20.6 |
|                      | IV            | 2.53                        | 2.36 | 2.44          | -0.17        | 72.9            | 74.7 | 73.8          | +1.8                              | 20.8                             | 24.9                         | 18.0 | 26.4 |
|                      | V             | 3.21                        | 3.24 | 3.22          | +0.03        | 69.7            | 77.6 | 73.6          | +7.9                              | 20.6                             | 22.8                         | 18.3 | 21.4 |
| Straw                | I             | 4.58                        | 5.48 | 5.03          | +0.90        | 76.7            | 76.2 | 76.4          | -0.5                              | 26.0                             | 32.3                         | 29.4 | 50.9 |
|                      | II            | 2.86                        | 4.06 | 3.46          | +1.20        | 74.0            | 83.4 | 78.7          | +9.4                              | 20.0                             | 25.5                         | 13.2 | 15.3 |
|                      | III           | 3.73                        | 4.82 | 4.28          | +1.09        | 74.1            | 85.5 | 79.8          | +11.4                             | 23.5                             | 28.1                         | 17.8 | 23.2 |
|                      | IV            | 3.65                        | 4.02 | 3.84          | +0.37        | 78.8            | 77.4 | 78.1          | -1.4                              | 20.5                             | 23.5                         | 15.3 | 20.3 |
|                      | V             | 5.46                        | 5.40 | 5.43          | -0.06        | 77.0            | 82.5 | 79.8          | +5.5                              | 20.0                             | 24.4                         | 15.5 | 18.4 |
| Super-phosphate      | I             | 4.36                        | 5.56 | 4.96          | +1.20        | 78.1            | 76.1 | 77.1          | -2.0                              | 23.0                             | 29.9                         | 20.2 | 26.3 |
|                      | II            | 3.62                        | 3.53 | 3.58          | -0.09        | 78.2            | 74.3 | 76.2          | -3.9                              | 24.8                             | 27.7                         | 21.8 | 29.0 |
|                      | III           | 4.24                        | 2.70 | 3.47          | -1.54        | 72.6            | 74.8 | 73.7          | +2.2                              | 25.4                             | 29.9                         | 22.3 | 30.3 |
|                      | IV            | 3.54                        | 4.11 | 3.82          | +0.57        | 80.5            | 79.9 | 80.2          | -0.6                              | 23.8                             | 27.0                         | 18.2 | 24.7 |
|                      | V             | 3.43                        | 3.99 | 3.71          | +0.56        | 74.0            | 82.1 | 78.0          | +8.1                              | 24.8                             | 28.5                         | 21.8 | 28.6 |
| Rock phosphate       | I             | 1.70                        | 2.18 | 1.94          | +0.43        | 62.4            | 67.6 | 65.0          | +5.2                              | 25.9                             | 28.7                         | 24.3 | 32.6 |
|                      | II            | 2.14                        | 2.66 | 2.40          | +0.52        | 76.1            | 73.7 | 74.9          | -2.4                              | 23.2                             | 32.1                         | 22.3 | 31.1 |
|                      | III           | 2.41                        | 2.51 | 2.46          | +0.10        | 79.5            | 70.0 | 74.8          | -9.5                              | 25.9                             | 31.7                         | 19.6 | 29.5 |
|                      | IV            | 1.92                        | 1.95 | 1.94          | +0.03        | 70.1            | 69.5 | 69.8          | -0.6                              | 26.1                             | 32.2                         | 20.3 | 26.2 |
|                      | V             | 2.33                        | 1.83 | 2.08          | -0.50        | 76.3            | 65.8 | 71.0          | -10.5                             | 24.9                             | 31.1                         | 22.8 | 31.6 |
| Mean Dry Matter %    |               |                             |      |               |              |                 |      |               |                                   | 74.7                             | 79.5                         | 75.6 |      |
| At 85% Dry Matter    |               |                             |      |               |              |                 |      |               |                                   |                                  |                              |      |      |

54/Ba/2.3

54/Ba/2.1

are supplemented by fertilizers as shown in table on page 54/Ba/2.1

All manures

\* At 65% Dry Matter

+ Note: All manures are supplemented by fertilizers as shown in table on page 54/Ba/2.1

54/Ba/2.3

54/Ba/3.1

## SIX COURSE ROTATION EXPERIMENT

The 25th year

Seasonal effects of fertilizers - Rothamsted Long Hoos IV and Woburn Stackyard 1954.

For details of treatments, rotation etc., see "Results of the Field Experiments 1939-47" Vol.I, Section Ba/4.

Area of each plot: Rothamsted - 0.0250 acre. Woburn - 0.0266 acre.

Cultivations, etc.:

### Rothamsted

Sugar beet.

Ploughed: Aug 21, 1953, Oct 20 and Dec 1. Fertilizers applied: Mar 26, 1954. Seed drilled at 18 lb per acre: Mar 30. Singled: May 31. Lifted: Nov 17. Variety: Klein E.

Barley.

Ploughed: Nov 27, 1953. Ground chalk applied at 22 cwt per acre: Dec 4. Fertilizers applied, seed drilled at 3 bushels per acre: Mar 15, 1954. Harvested: Aug 25. Variety: Plumage Archer.

Clover.

Seed undersown in barley at 40 lb per acre: Apr 23, 1953. Autumn fertilizers applied: Nov 2. Sulphate of ammonia applied: Apr 30, 1954. Cut: July 13. Variety: Late flowering Montgomery Red.

Wheat.

Ploughed: July 10, 1953 and again Sept 17. Autumn fertilizers applied: Oct 9. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30, 1954. Harvested: Aug 26. Variety: Yeoman.

Potatoes.

Ploughed: Aug 29, 1953, Oct 20 and Nov 30. Ridged: Apr 13, 1954. Fertilizers applied, potatoes planted: Apr 14. Earthed up: July 6. Sprayed (low volume) with copper fungicide paste  $\frac{1}{2}$  gallon per acre: July 27 and again Aug 18. Sprayed with sulphuric acid 15% B.O.V: Sept 28. Lifted: Oct 2. Variety: Majestic.

Rye.

Ploughed: Sept 30, 1953. Ground chalk applied at 22 cwt per acre: Oct 3. Autumn fertilizers applied: Oct 10. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30, 1954. Harvested: Aug 25. Variety: King II.

Note:- Clover: 6 plots were carted off in error when green. No summary of results can be shown.

54/Ba/3.2

Woburn

Sugar beet.

Ploughed: Aug 20, 1953, Nov 3 and Jan 20, 1954. Fertilizers applied: Mar 29. Seed drilled at 18 lb per acre: Mar 30. Dusted with D.D.T: May 12. Singled: May 31. Sprayed with parathion  $\frac{1}{2}$  pint per acre: June 21. Lifted: Nov 2. Variety: Klein E. Previous crop: Rye. N.B. The crop was attacked by flea beetle and mangold fly.

Barley.

Ploughed: Nov 4, 1953. 2nd ploughing: Jan 20, 1954. Fertilizers applied: Mar 11. Seed drilled at  $2\frac{1}{2}$  bushels per acre: Mar 17. Harvested: Aug 28. Variety: Plumage Archer. Previous crop: Sugar beet.

Clover.

Seed undersown in barley at 40 lb per acre: Mar 26, 1953. Autumn fertilizers applied: Oct 23. Sulphate of ammonia applied: Apr 27, 1954. Cut: June 30. Variety: Montgomery Red. Previous crop: Barley. N.B. The crop was damaged by Sclerotinia and was very weedy.

Wheat.

Ploughed: July 3, 1953. 2nd ploughing: Sept 16. Autumn fertilizers applied: Oct 22. Drilled at  $2\frac{1}{2}$  bushels per acre: Oct 23. Sprayed with D.N.O.C. at 6 lb per acre in 80 gallons: Apr 27. Sulphate of ammonia applied: Apr 29. Harvested: Sept 7. Variety: Squareheads Master 13/4. Previous crop: Clover. N.B. The crop was very weedy.

Potatoes.

Ploughed: Sept 15, 1953, Nov 3 and Jan 20, 1954. Ridged, fertilizers applied, seed planted: Apr 18. Sprayed with copper fungicide: July 30. Sprayed with 15% sulphuric acid: Sept 23. Lifted: Oct 8. Variety: Majestic. Previous crop: Wheat.

Rye.

Ploughed: Oct 1, 1953. Autumn fertilizer applied, drilled seed at  $2\frac{1}{2}$  bushels per acre: Oct 22. Sulphate of ammonia applied: Apr 29. Harvested: Aug 28. Variety: King II. Previous crop: Potatoes.

54/Ba/3.3

Summary of ResultsMean yields per acre and responses in yield per cwt of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O

|                                                 | Rothamsted | Woburn | Rothamsted                              | Woburn |
|-------------------------------------------------|------------|--------|-----------------------------------------|--------|
| Sugar Beet, roots (washed):<br>tons per acre    |            |        | Barley, grain:<br>cwt per acre          |        |
| Mean                                            | 8.55       | 4.57   | 31.7                                    | 29.1   |
| Response to: N                                  | +2.88      | +1.14  | +4.6                                    | +25.6  |
| P                                               | +3.05      | +4.46  | +0.4                                    | -1.9   |
| K                                               | -0.08      | -0.07  | -1.2                                    | -1.0   |
| Sugar Beet, sugar percentage                    |            |        | Barley, straw:<br>cwt per acre          |        |
| Mean                                            | 16.30      | 16.29  | 36.0                                    | 29.9   |
| Response to: N                                  | +0.22      | +0.56  | +12.8                                   | +40.3  |
| P                                               | -1.21      | +1.03  | +1.1                                    | -7.1   |
| K                                               | +0.28      | +0.58  | -1.9                                    | +2.8   |
| Sugar Beet, total sugar:<br>cwt per acre        |            |        | Clover, hay: dry matter<br>cwt per acre |        |
| Mean                                            | 27.9       | 14.9   |                                         | 37.6   |
| Response to: N                                  | +9.9       | +4.2   |                                         | -29.0  |
| P                                               | +8.1       | +15.7  |                                         | +11.3  |
| K                                               | +0.2       | +0.2   |                                         | +8.6   |
| Sugar Beet, tops:<br>tons per acre              |            |        | Wheat, grain:<br>cwt per acre           |        |
| Mean                                            | 10.93      | 4.88   | 26.5                                    | 14.8   |
| Response to: N                                  | +5.88      | +0.69  | +8.0                                    | +19.3  |
| P                                               | +1.93      | +5.21  | -10.7                                   | -9.6   |
| K                                               | +0.02      | -0.55  | +5.2                                    | +10.1  |
| Sugar Beet, plant number:<br>thousands per acre |            |        | Wheat, straw:<br>cwt per acre           |        |
| Mean                                            | 26.0       |        | 48.2                                    | 18.6   |
| Response to: N                                  | -1.1       | †      | +22.1                                   | +22.7  |
| P                                               | +3.1       |        | -2.1                                    | -9.8   |
| K                                               | +1.7       |        | -0.8                                    | +12.7  |
| Potatoes, total tubers:<br>tons per acre        |            |        | Rye, grain:<br>cwt per acre             |        |
| Mean                                            | 6.08       | 4.21   | 32.8                                    | 26.4   |
| Response to: N                                  | +3.07      | +4.49  | +32.2                                   | +24.6  |
| P                                               | +0.57      | +1.39  | -3.7                                    | +3.3   |
| K                                               | +1.32      | +0.30  | +0.1                                    | -1.1   |
| Potatoes, percentage<br>ware                    |            |        | Rye, straw:<br>cwt per acre             |        |
| Mean                                            | 78.9       | 80.5   | 40.2                                    | 30.9   |
| Response to: N                                  | -10.7      | +10.8  | +23.6                                   | +23.5  |
| P                                               | -10.7      | +6.6   | -3.9                                    | +8.9   |
| K                                               | +6.5       | +12.7  | +2.0                                    | -0.5   |

\* corrected to 85% Dry Matter. Mean Dry Matter %: 83.6 † not recorded.

54/Bb/1.1

## DEEP CULTIVATION ROTATION EXPERIMENT

The 11th year

Deep ploughing, fertilizers and dung - Long Hoos I and II 1954.

For details of rotation and treatments etc. see "Results of the Field Experiments 1939-47" Vol. I, Section Bc/1.

Area of each plot: 0.0312 acre. Area harvested: Sugar beet (half plot), 0.0119 acre; barley, wheat, spring oats, 0.0265 acre; ley, 0.0275 acre; potatoes (half plot), 0.0107 acre.

Cultivations, etc.:

Sugar beet (Series 4)

Dung and fertilizers for ploughing in "deep" applied: Sept 25, 1953. "Deep" plots ploughed: Sept 29. Dung and fertilizers for ploughing in "shallow" applied, "shallow" plots ploughed: Sept 30. Fertilizers for surface application applied: Mar 29, 1954. Seed drilled at 18 lb per acre: Mar 30. Sprayed with DDT oil emulsion (15% DDT) at 3 pints per acre: May 12 and again June 24. Singled: June 3. Lifted: Nov 25. Variety: Klein E.

Barley (Series 5)

Ploughed: Dec 16, 1953. Ground chalk at 21 cwt per acre applied: Dec 21. Basic slag and sulphate of ammonia applied: Mar 12, 1954. Seed drilled at  $2\frac{3}{4}$  bushels per acre: Mar 13. Harvested: Aug 27. Variety: Plumage Archer.

Ley (Series 1)

Seeds undersown in barley: Apr 23, 1953. Cut: July 23, 1954. Seeds mixture (per acre): 18 lb S.24 perennial ryegrass, 8 lb Montgomery red clover, 2 lb American Alsike clover.

Wheat (Series 6)

"Deep" and "shallow" plots ploughed: Sept 30, 1953. Seed drilled at 3 bushels per acre: Oct 17. Sulphate of ammonia applied: Apr 30, 1954. Sprayed with MCPA, 2 pints per acre at medium volume: May 27. Harvested: Aug 27. Variety: Yeoman.

Potatoes (Series 2)

Dung and fertilizers for ploughing in "deep" applied: Sept 24, 1953. "Deep" plots ploughed: Sept 25. Dung and fertilizers for ploughing in "shallow" applied, "shallow" plots ploughed: Sept 26. Ridged: Apr 13, 1954. Fertilizers for surface application applied, potatoes planted: Apr 14. Earthed up: July 5. Sprayed with copper fungicide,  $\frac{1}{2}$  gallon paste in 10 gallons water per acre: July 27 and again Aug 18. Sprayed with sulphuric acid, 15% BOV: Sept 28. Lifted: Oct 25. Variety: Majestic.

54/Bb/1.2

Spring oats (Series 3)

Ploughed: Sept 28, 1953. Ground chalk at 21 cwt per acre applied:  
Dec 4. Sulphate of ammonia applied: Mar 12, 1954. Seed drilled  
at 4 bushels per acre: Mar 13. Harvested: Aug 27. Variety:  
Star.

Standard errors per plot:

|                          |                                                   |
|--------------------------|---------------------------------------------------|
| Sugar beet, Total sugar. | Whole plot: 3.08 cwt per acre or 8.2% (4 d.f.)    |
|                          | Sub plot: 2.88 cwt per acre or 7.7% (7 d.f.)      |
| Tops.                    | Whole plot: 0.658 tons per acre or 6.0% (4 d.f.)  |
|                          | Sub plot: 2.50 tons per acre or 22.6% (7 d.f.)    |
| Barley, Grain:           | 1.82 cwt per acre or 5.5% (4 d.f.)                |
| Ley, Hay:                | 5.31 cwt per acre or 6.4% (4 d.f.)                |
| Wheat, Grain:            | 2.34 cwt per acre or 6.1% (4 d.f.)                |
| Potatoes, Total tubers,  | Whole plot: 0.919 tons per acre or 10.6% (4 d.f.) |
|                          | Sub plot: 0.991 tons per acre or 11.4% (7 d.f.)   |
| Spring Oats, Grain:      | 3.82 cwt per acre or 11.0% (4 d.f.)               |

54/Bb/1.3

Summary of Results

## Series 4: Sugar Beet

## Responses to treatments

| Response to | Mean | Ploughing |      | Dung |       | Phosphate |       | Potash |       |
|-------------|------|-----------|------|------|-------|-----------|-------|--------|-------|
|             |      | Shallow   | Deep | Abs. | Pres. | Abs.      | Pres. | Abs.   | Pres. |

Roots (washed): Mean yield 11.16 tons per acre

|              |       |       |       |       |       |       |       |       |       |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ploughing    |       |       |       |       |       |       |       |       |       |
| deep-shallow | -0.31 | -     | -     | +0.05 | -0.67 | -1.05 | +0.43 | -0.03 | -0.59 |
| Dung         | +1.48 | +1.84 | +1.12 | -     | -     | +0.76 | +2.20 | +2.19 | +0.77 |
| Phosphate    | +0.68 | -0.06 | +1.42 | -0.04 | +1.40 | -     | -     | +0.02 | +1.34 |
| Potash       | +0.67 | +0.95 | +0.39 | +1.38 | -0.04 | +0.01 | +1.33 | -     | -     |

Sugar Percentage: Mean 16.85

|              |       |       |       |       |       |       |       |       |       |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ploughing    |       |       |       |       |       |       |       |       |       |
| deep-shallow | -0.25 | -     | -     | +0.14 | -0.64 | -0.29 | -0.21 | -0.31 | -0.19 |
| Dung         | -0.29 | +0.10 | -0.68 | -     | -     | -0.24 | -0.34 | -0.04 | -0.54 |
| Phosphate    | +0.04 | 0.00  | +0.08 | +0.09 | -0.01 | -     | -     | +0.35 | -0.27 |
| Potash       | -0.02 | -0.08 | +0.04 | +0.23 | -0.27 | +0.29 | -0.33 | -     | -     |

Total Sugar: Mean yield 37.6 cwt per acre

( $\pm 1.54$ )( $\pm 2.18$ )

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | -1.6 | -    | -    | +0.6 | -3.8 | -4.1 | +0.9 | -0.8 | -2.4 |
| Dung         | +4.4 | +6.6 | +2.2 | -    | -    | +2.1 | +6.7 | +7.4 | +1.4 |
| Phosphate    | +2.3 | -0.2 | +4.8 | 0.0  | +4.6 | -    | -    | +0.7 | +3.9 |
| Potash       | +2.2 | +3.0 | +1.4 | +5.2 | -0.8 | +0.6 | +3.8 | -    | -    |

Tops: Mean yield 11.03 tons per acre

( $\pm 0.329$ )( $\pm 0.465$ )

|              |       |       |       |       |       |       |       |       |       |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ploughing    |       |       |       |       |       |       |       |       |       |
| deep-shallow | +0.92 | -     | -     | +0.57 | +1.27 | +1.17 | +0.67 | +0.05 | +1.79 |
| Dung         | +1.18 | +0.83 | +1.53 | -     | -     | +0.99 | +1.37 | -0.05 | +2.41 |
| Phosphate    | -0.27 | -0.02 | -0.52 | -0.46 | -0.08 | -     | -     | -0.72 | +0.18 |
| Potash       | -0.19 | -1.06 | +0.68 | -1.42 | +1.04 | -0.64 | +0.26 | -     | -     |

Plant Number: Mean 27.1 thousands per acre

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | -0.3 | -    | -    | 0.0  | -0.6 | 0.0  | -0.6 | +0.3 | -0.9 |
| Dung         | -0.4 | -0.1 | -0.7 | -    | -    | -0.1 | -0.7 | -0.4 | -0.4 |
| Phosphate    | +0.2 | +0.5 | -0.1 | +0.5 | -0.1 | -    | -    | +0.2 | +0.2 |
| Potash       | -0.1 | +0.5 | -0.7 | -0.1 | -0.1 | -0.1 | -0.1 | -    | -    |

Noxious Nitrogen: Mean 33.1 mg. per 100 g.

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | +5.0 | -    | -    | +5.0 | +5.0 | +6.2 | +3.8 | +5.6 | +4.4 |
| Dung         | 0.0  | 0.0  | 0.0  | -    | -    | -2.5 | +2.5 | +1.9 | -1.9 |
| Phosphate    | +1.2 | +2.4 | 0.0  | -1.3 | +3.7 | -    | -    | -0.7 | +3.1 |
| Potash       | -5.6 | -5.0 | -6.2 | -3.7 | -7.5 | -7.5 | -3.7 | -    | -    |

54/Bb/1.4

## Series 4: Sugar Beet

|                                  | Phosphate |                |                | Potash |                |                |       |
|----------------------------------|-----------|----------------|----------------|--------|----------------|----------------|-------|
|                                  | None      | Ploughed<br>in | In seed<br>bed | None   | Ploughed<br>in | In seed<br>bed | Mean  |
| Roots (washed): tons per acre    |           |                |                |        |                |                |       |
| Shallow                          | 11.34     | 11.43          | 11.12          | 10.84  | 11.37          | 12.20          | 11.31 |
| Deep                             | 10.29     | 12.39          | 11.04          | 10.81  | 11.20          | 11.21          | 11.00 |
| No dung                          | 10.44     | 10.70          | 10.09          | 9.72   | 11.11          | 11.10          | 10.42 |
| Dung                             | 11.20     | 13.13          | 12.07          | 11.92  | 11.45          | 12.31          | 11.90 |
| Mean                             | 10.82     | 11.91          | 11.08          | 10.82  | 11.28          | 11.71          | 11.16 |
| Sugar Percentage                 |           |                |                |        |                |                |       |
| Shallow                          | 16.97     | 17.03          | 16.92          | 17.01  | 17.02          | 16.84          | 16.97 |
| Deep                             | 16.68     | 16.65          | 16.87          | 16.70  | 16.68          | 16.80          | 16.72 |
| No dung                          | 16.95     | 17.10          | 16.98          | 16.38  | 17.13          | 17.08          | 16.99 |
| Dung                             | 16.71     | 16.58          | 16.81          | 16.84  | 16.57          | 16.56          | 16.70 |
| Mean                             | 16.83     | 16.84          | 16.90          | 16.86  | 16.85          | 16.82          | 16.85 |
| Total Sugar: cwt per acre        |           |                |                |        |                |                |       |
|                                  | (a)       | (b) and (c)    |                | (a)    | (b) and (c)    |                |       |
| Shallow                          | 38.4      | 39.0           | 37.5           | 36.9   | 38.7           | 41.0           | 38.3  |
| Deep                             | 34.4      | 41.1           | 37.2           | 36.1   | 37.2           | 37.7           | 36.8  |
| No dung                          | 35.4      | 36.6           | 34.1           | 32.8   | 38.0           | 37.8           | 35.4  |
| Dung                             | 37.5      | 43.5           | 40.6           | 40.2   | 37.9           | 40.8           | 39.8  |
| Mean                             | 36.4      | 40.0           | 37.4           | 36.5   | 38.0           | 39.3           | 37.6  |
| Tops: tons per acre              |           |                |                |        |                |                |       |
|                                  | (a)       | (b) and (c)    |                | (a)    | (b) and (c)    |                |       |
| Shallow                          | 10.58     | 9.84           | 11.23          | 11.10  | 9.54           | 10.55          | 10.57 |
| Deep                             | 11.75     | 11.07          | 11.41          | 11.15  | 11.87          | 11.80          | 11.50 |
| No dung                          | 10.67     | 9.22           | 11.22          | 11.15  | 9.25           | 10.22          | 10.44 |
| Dung                             | 11.66     | 11.69          | 11.48          | 11.10  | 12.17          | 12.13          | 11.62 |
| Mean                             | 11.17     | 10.45          | 11.35          | 11.13  | 10.71          | 11.17          | 11.03 |
| Plant Number: thousands per acre |           |                |                |        |                |                |       |
| Shallow                          | 27.1      | 27.5           | 27.5           | 27.0   | 27.5           | 27.6           | 27.3  |
| Deep                             | 27.0      | 27.1           | 26.7           | 27.3   | 26.6           | 26.6           | 27.0  |
| No dung                          | 27.1      | 27.5           | 27.6           | 27.3   | 27.1           | 27.5           | 27.3  |
| Dung                             | 27.0      | 27.1           | 26.6           | 27.0   | 27.0           | 26.7           | 26.9  |
| Mean                             | 27.0      | 27.3           | 27.1           | 27.2   | 27.1           | 27.1           | 27.1  |

|     |             |        |                                              |
|-----|-------------|--------|----------------------------------------------|
|     | Total Sugar | Tops   |                                              |
| (a) | ±1.54       | ±0.329 | for use in comparisons other than horizontal |
| (b) | ±1.44       | ±1.243 | for use in horizontal comparisons            |
| (c) | ±1.85       | ±0.942 | as (a).                                      |

54/Bb/1.5

## Series 4: Sugar Beet

|                                   | Phosphate |                |                | Potash |                |                | Mean |
|-----------------------------------|-----------|----------------|----------------|--------|----------------|----------------|------|
|                                   | None      | Ploughed<br>in | In seed<br>bed | None   | Ploughed<br>in | In seed<br>bed |      |
| Noxious Nitrogen: mg. per 100 mg. |           |                |                |        |                |                |      |
| Shallow                           | 29.4      | 27.5           | 36.2           | 33.1   | 26.2           | 30.0           | 30.6 |
| Deep                              | 35.6      | 35.0           | 36.2           | 38.8   | 32.5           | 32.5           | 35.6 |
| No dung                           | 33.8      | 26.2           | 38.8           | 35.0   | 27.5           | 35.0           | 33.1 |
| Dung                              | 31.2      | 36.2           | 33.8           | 36.9   | 31.2           | 27.5           | 33.1 |
| Mean                              | 32.5      | 31.2           | 36.2           | 35.9   | 29.4           | 31.2           | 33.1 |

Responses to treatments to previous Sugar Beet

## Series 5: Barley

| Response to | Mean | Ploughing |      | Dung |       | Phosphate |       | Potash |       |
|-------------|------|-----------|------|------|-------|-----------|-------|--------|-------|
|             |      | Shallow   | Deep | Abs. | Pres. | Abs.      | Pres. | Abs.   | Pres. |

Grain: Mean yield 33.1 cwt per acre

|              | (±0.91) |      |      |      |      |      |      |      |      |
|--------------|---------|------|------|------|------|------|------|------|------|
| Ploughing    |         |      |      |      |      |      |      |      |      |
| deep-shallow | +0.2    | -    | -    | +0.9 | -0.5 | -0.7 | +1.1 | +0.5 | -0.1 |
| Dung         | +2.5    | +3.2 | +1.8 | -    | -    | +2.4 | +2.6 | +2.6 | +2.4 |
| Phosphate    | +0.4    | -0.5 | +1.3 | +0.3 | +0.5 | -    | -    | +0.1 | +0.7 |
| Potash       | +0.8    | +1.1 | +0.5 | +0.9 | +0.7 | +0.5 | +1.1 | -    | -    |

Straw: Mean yield 38.0 cwt per acre

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | +1.1 | -    | -    | +1.6 | +0.6 | +1.4 | +0.8 | +3.3 | -1.1 |
| Dung         | +6.6 | +7.1 | +6.1 | -    | -    | +6.0 | +7.2 | +6.1 | +7.1 |
| Phosphate    | +1.1 | +1.4 | +0.8 | +0.5 | +1.7 | -    | -    | +0.7 | +1.5 |
| Potash       | +2.2 | +4.4 | 0.0  | +1.7 | +2.7 | +1.8 | +2.6 | -    | -    |

## Series 1: Ley

Hay: Mean yield 83.2 cwt per acre

|              | (±2.66) |      |      |      |      |      |      |      |      |
|--------------|---------|------|------|------|------|------|------|------|------|
| Ploughing    |         |      |      |      |      |      |      |      |      |
| deep-shallow | +1.9    | -    | -    | +5.6 | -1.3 | -1.0 | +4.3 | +1.9 | +1.9 |
| Dung         | +3.6    | +7.3 | -0.1 | -    | -    | +3.4 | +3.8 | +7.7 | -0.5 |
| Phosphate    | +3.4    | +0.5 | +6.3 | +3.2 | +3.6 | -    | -    | +6.4 | +0.4 |
| Potash       | +2.1    | +2.1 | +2.1 | +6.2 | -2.0 | +5.1 | -0.9 | -    | -    |

54/Bb/1.6

## Series 6: Wheat\*

| Response to | Mean | Ploughing |      | Dung |       | Phosphate |       | Potash |       |
|-------------|------|-----------|------|------|-------|-----------|-------|--------|-------|
|             |      | Shallow   | Deep | Abs. | Pres. | Abs.      | Pres. | Abs.   | Pres. |

Grain: Mean yield 38.4 cwt per acre

( $\pm 1.17$ )( $\pm 1.66$ )

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | +2.1 | -    | -    | +0.8 | +3.4 | +4.8 | -0.6 | +1.7 | +2.5 |
| Dung         | +5.6 | +4.3 | +6.9 | -    | -    | +5.7 | +5.5 | +3.6 | +2.6 |
| Phosphate    | -1.4 | +1.3 | -4.1 | -1.3 | +1.5 | -    | -    | -2.1 | -0.7 |
| Potash       | +1.7 | +1.3 | +2.1 | +4.7 | -1.3 | +1.0 | +2.4 | -    | -    |

Straw: Mean yield 51.4 cwt per acre

|              |      |      |      |      |      |      |      |       |      |
|--------------|------|------|------|------|------|------|------|-------|------|
| Ploughing    |      |      |      |      |      |      |      |       |      |
| deep-shallow | +2.7 | -    | -    | +2.6 | +2.8 | +4.7 | +0.7 | +4.9  | +0.5 |
| Dung         | +8.3 | +8.2 | +8.4 | -    | -    | +9.7 | +6.9 | +11.4 | +5.2 |
| Phosphate    | +0.3 | +2.3 | -1.7 | +1.7 | -1.1 | -    | -    | +1.1  | -0.5 |
| Potash       | -0.4 | +1.8 | -2.6 | +2.7 | -3.5 | +0.4 | -1.2 | -     | -    |

## Series 2: Potatoes

Total tubers: Mean yield 8.70 tons per acre

( $\pm 0.459$ )( $\pm 0.650$ )

|              |       |       |       |       |       |       |       |       |       |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ploughing    |       |       |       |       |       |       |       |       |       |
| deep-shallow | -1.11 | -     | -     | -0.86 | -1.36 | -0.76 | -1.46 | -0.42 | -1.80 |
| Dung         | +2.45 | +2.70 | +2.20 | -     | -     | +3.35 | +1.55 | +3.36 | +1.54 |
| Phosphate    | +0.62 | +0.97 | +0.27 | +1.52 | -0.28 | -     | -     | +1.31 | -0.07 |
| Potash       | +1.79 | +2.48 | +1.10 | +2.70 | +0.88 | +2.48 | +1.10 | -     | -     |

Percentage Ware ( $1\frac{1}{2}$ " riddle): Mean 84.1

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| Ploughing    |      |      |      |      |      |      |      |      |      |
| deep-shallow | -1.0 | -    | -    | +0.2 | -2.2 | +2.9 | -4.9 | +0.1 | -2.1 |
| Dung         | +0.8 | +2.0 | -0.4 | -    | -    | +2.8 | -1.2 | +1.9 | -0.3 |
| Phosphate    | -3.2 | +0.7 | -7.1 | -1.2 | -5.2 | -    | -    | -0.8 | -5.6 |
| Potash       | +3.5 | +4.6 | +2.4 | +4.6 | +2.4 | +5.9 | +1.1 | -    | -    |

\*Cultivation treatments direct to wheat, manures to previous sugar beet.

54/Bb/1.7

## Series 2: Potatoes

|                                            | None  | Phosphate<br>Ploughed<br>in | In<br>ridges | None | Potash<br>Ploughed<br>in | In<br>ridges | Mean |
|--------------------------------------------|-------|-----------------------------|--------------|------|--------------------------|--------------|------|
| Total tubers: tons per acre                |       |                             |              |      |                          |              |      |
|                                            | (a)   | (b) and (c)                 |              | (a)  | (b) and (c)              |              |      |
| Shallow                                    | 8.78  | 9.45                        | 10.03        | 8.02 | 10.39                    | 10.60        | 9.26 |
| Deep                                       | 8.01  | 8.52                        | 8.05         | 7.60 | 8.67                     | 8.73         | 8.15 |
| No dung                                    | 6.72  | 7.75                        | 8.73         | 6.13 | 8.48                     | 9.18         | 7.48 |
| Dung                                       | 10.07 | 10.22                       | 9.35         | 9.49 | 10.58                    | 10.15        | 9.93 |
| Mean                                       | 8.40  | 8.99                        | 9.04         | 7.81 | 9.53                     | 9.67         | 8.70 |
| Percentage Ware ( $1\frac{1}{2}$ " riddle) |       |                             |              |      |                          |              |      |
| Shallow                                    | 84.2  | 84.4                        | 85.4         | 82.3 | 86.9                     | 86.9         | 84.6 |
| Deep                                       | 87.1  | 81.0                        | 79.0         | 82.4 | 85.8                     | 83.7         | 83.6 |
| No dung                                    | 84.3  | 83.2                        | 82.9         | 81.4 | 85.1                     | 86.8         | 83.7 |
| Dung                                       | 87.0  | 82.3                        | 81.5         | 83.3 | 87.6                     | 83.7         | 84.5 |
| Mean                                       | 85.7  | 82.7                        | 82.2         | 82.3 | 86.4                     | 85.3         | 84.1 |

Responses to treatments to previous potatoes

## Series 3: Spring Oats

| Response to                         | Mean           | Ploughing |      | Dung |       | Phosphate |       | Potash |       |
|-------------------------------------|----------------|-----------|------|------|-------|-----------|-------|--------|-------|
|                                     |                | Shallow   | Deep | Abs. | Pres. | Abs.      | Pres. | Abs.   | Pres. |
| Grain: Mean yield 34.8 cwt per acre |                |           |      |      |       |           |       |        |       |
|                                     | ( $\pm 1.91$ ) | (±2.70)   |      |      |       |           |       |        |       |
| Ploughing                           |                |           |      |      |       |           |       |        |       |
| deep-shallow                        | -2.0           | -         | -    | -1.2 | -2.8  | -3.2      | -0.8  | -3.2   | -0.8  |
| Dung                                | +1.9           | +2.7      | +1.1 | -    | -     | +0.6      | +3.2  | -0.3   | +4.1  |
| Phosphate                           | +2.1           | +0.9      | +3.3 | +0.8 | +3.4  | -         | -     | +2.6   | +1.6  |
| Potash                              | -0.5           | -1.7      | +0.7 | -2.7 | +1.7  | 0.0       | -1.0  | -      | -     |
| Straw: Mean yield 47.2 cwt per acre |                |           |      |      |       |           |       |        |       |
| Ploughing                           |                |           |      |      |       |           |       |        |       |
| deep-shallow                        | -1.7           | -         | -    | -2.0 | -1.4  | -3.8      | +0.4  | -2.6   | -0.8  |
| Dung                                | +4.3           | +4.0      | +4.6 | -    | -     | +4.2      | +4.4  | +3.7   | +4.9  |
| Phosphate                           | +0.3           | -1.8      | +2.4 | +0.2 | +0.4  | -         | -     | +2.7   | -2.1  |
| Potash                              | -0.5           | -1.4      | +0.4 | -1.1 | +0.1  | +1.9      | -2.9  | -      | -     |

Total tubers

(a)  $\pm 0.459$  for use in comparisons other than horizontal.(b)  $\pm 0.495$  for use in horizontal comparisons.(c)  $\pm 0.578$  as (a).

54/Bc/1.1

## LEY AND ARABLE ROTATIONS

Highfield and Fosters Field 1954 - the 6th year.

For details of treatments, rotations, etc., see "Results of the Field Experiments 1952", Section Bc/1.

Cultivations, etc.:

### HIGHFIELD

#### 1st year Treatment Crops

Cut grass, Grazed ley, Lucerne, Hay. Ploughed: Aug 31 and for leys again, Oct 3, 1953. Basal fertilizer applied: Hay plots - Dec 2, remainder - Apr 7, 1954.

Cut grass: Nitrochalk applied, seeds sown at 38 lb per acre: Apr 7, 1954. Cut: 4 times - June 21, July 21, Aug 11, Oct 11.

Nitrochalk applied after each cut except the last.

Grazed ley: Nitrochalk applied, seeds sown at 55 lb per acre: Apr 7.

Nitrochalk applied: June 28. Grazed: 9 circuits, June 13-Oct 20.

Lucerne: Seed drilled at 28 lb per acre: Apr 9. Cut twice: Aug 11 and Nov 18. Variety: Du Puits.

Hay: Undersown seeds failed. Resown at 38 lb per acre: Sept 18, 1953.

Nitrochalk applied: Apr 2, 1954. Cut: June 22.

#### 2nd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Potatoes. Basal fertilizer to leys applied: Dec 2, 1953.

Cut grass: Nitrochalk applied: Apr 2, 1954 and after each cut except the last. Cut: 5 times, May 20, June 21, July 22, Aug 17, Oct 11.

Grazed ley: Nitrochalk applied: Apr 6 and July 7. Grazed: 10 circuits, Apr 13 - Oct 20.

Lucerne: Cut: 3 times, June 23, Aug 11, Nov 18.

Potatoes: For cultivations see Potato Test Crop.

#### 3rd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Barley. Basal fertilizer to leys applied: Dec 2, 1953.

Cut grass: Nitrochalk applied: Apr 2, 1954 and after each cut except the last. Cut: 5 times, May 20, June 21, July 23, Aug 17, Oct 8.

Grazed ley: Nitrochalk applied: Apr 2 and June 28. Grazed: 10 circuits, Apr 17 - Oct 20.

Lucerne: Cut: 3 times, June 22, Aug 11, Oct 8.

Barley: For cultivations see Barley Test Crop.

54/Bc/1.2

1st Test Crop, Wheat

Ploughed after barley: Aug 31 and again Oct 3, 1953. Ploughed  
leys: Oct 16. Seed drilled at 3 bushels per acre with basal  
fertilizer: Oct 22. Nitrochalk applied: Apr 27, 1954. Combine  
harvested: Sept 2 and 7. Variety: Yeoman.

2nd Test Crop, Potatoes

Ploughed: Aug 24 and again Oct 26, 1953. Ridged, basal fertilizers  
applied: Apr 20, 1954. Dung and sulphate of ammonia applied,  
potatoes planted: Apr 22. Earthed up: July 9. Sprayed with copper  
fungicide, low volume, 5 lb in 10 gallons per acre: July 28 and again  
Aug 23. Sprayed with 20% sulphuric acid: Sept 30. Lifted: Oct 26.  
Variety: Majestic.

3rd Test Crop, Barley

Ploughed: Oct 3, 1953. Ground chalk applied to blocks 2 and 3:  
Dec 3. Seed drilled at 2 bushels per acre with basal fertilizer,  
nitrochalk applied: Mar 17, 1954. Combine harvested: Sept 3.  
Variety: Proctor. Note. Crop yields were not taken owing to the  
condition of the crop after being laid since early July.

Permanent Grasses

4th year Reseeded. Permanent grass, Blocks 9-12.  
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied:  
Apr 7, 1954 and July 7. Grazed: 8 circuits, Apr 21 - Oct 28.

5th year Reseeded. Permanent grass, Blocks 5-8.  
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied: Apr 6  
and June 28. Reseeded, grazed: 9 circuits, Apr 13 - Oct 28.  
Permanent, grazed: 8 circuits, Apr 13 - Oct 20.

6th year Reseeded. Permanent grass, Blocks 1-4.  
Basal fertilizers applied: Dec 2, 1953. Nitrochalk applied: Apr 2.  
Cut: June 22. Nitrochalk applied: June 25. Grazed: 4 circuits,  
July 16 - Oct 28.

FOSTERS

1st year Treatment Crops

Cut grass, Grazed ley, Lucerne, Hay. Ploughed (not hay plots):  
Aug 20, 1953 and again Sept 24. Basal fertilizer applied:  
Hay plots - Dec 1, remainder - Apr 7.

Cut grass: Nitrochalk applied, seeds sown at 38 lb per acre: Apr 7,  
1954. Cut: 4 times, June 29, July 20, Aug 13, Oct 11. Nitro-  
chalk applied after each cut except the last.

Grazed ley: Nitrochalk applied, seeds sown at 55 lb per acre: Apr 7.  
Nitrochalk applied: June 29. Grazed: 7 circuits, May 7 - Oct 21.  
Lucerne: Seed drilled at 28 lb per acre: Apr 9. Cut twice: Aug 16,  
Nov 18. Variety: Du Puits.

Hay: Seeds undersown in barley at 38 lb per acre: May 4, 1953.  
Nitrochalk applied: Apr 1, 1954. Cut: June 23.

54/Bc/1.3

### 2nd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Potatoes. Basal fertilizers to leys applied: Dec 1, 1953.

Cut grass: Nitrochalk applied: Apr 1, 1954 and after each cut except the last. Cut: 5 times, May 21, June 21, July 20, Aug 16, Oct 11.

Grazed ley: Nitrochalk applied: Apr 5 and July 9. Grazed: 10 circuits, May 7 - Oct 21.

Lucerne: Cut: 3 times, June 23, Aug 16, Nov 18.

Potatoes: For cultivations see Potato Test Crop.

### 3rd year Treatment Crops

Cut grass, Grazed ley, Lucerne, Barley. Basal fertilizer to leys applied: Dec 1, 1953.

Cut grass: Nitrochalk applied: Apr 1, 1954 and after each cut except the last. Cut: 5 times, May 21, June 21, July 20, Aug 16, Oct 8.

Grazed ley: Nitrochalk applied: Apr 5 and June 29. Grazed: 8 circuits, May 7 - Oct 21.

Lucerne: Cut: 3 times, June 24, Aug 16, Oct 8.

Barley: For cultivations see Barley Test Crop.

### 1st Test Crop, Wheat

Ploughed after barley: Aug 20, 1953 and again Sept 29. Ploughed leys: Oct 17. Seed drilled at 3 bushels per acre with basal fertilizer: Oct 22. Nitrochalk applied: Apr 28, 1954. Combine harvested: Sept 1. Variety: Yeoman.

### 2nd Test Crop, Potatoes

Ploughed: Aug 21, 1953 and again Oct 24. Ridged, basal fertilizers applied: Apr 20, 1954. Dung and sulphate of ammonia applied, potatoes planted: Apr 21. Earthed up: July 6. Sprayed with copper fungicide, low volume, 5 lb in 10 gallons: July 28 and again Aug 23. Sprayed with 1% sulphuric acid: Sept 29. Lifted: Oct 9 and Oct 16. Variety: Majestic.

### 3rd Test Crop, Barley

Ploughed: Oct 2, 1953. Nitrochalk applied: Mar 16, 1954. Seed sown at 2 bushels per acre with basal fertilizer: Mar 17. Combine harvested: Sept 2. Variety: Proctor.

### Permanent grasses

#### 4th year reseeded grass

Basal fertilizer applied: Dec 1, 1953. Nitrochalk applied: Apr 7, 1954 and July 9. Grazed: 7 circuits, May 7 - Oct 21.

#### 5th year reseeded grass

Basal fertilizer applied: Dec 1, 1953. Nitrochalk applied: Apr 5, 1954 and June 29. Grazed: 7 circuits, May 7 - Oct 21.

#### 6th year reseeded grass

Basal fertilizer applied: Dec 2, 1953. Nitrochalk applied: Apr 1, 1954. Cut: June 23. Nitrochalk applied: June 25. Grazed: 4 circuits, July 25 - Oct 21.

54/Bc/1.4

Standard errors per  $\frac{1}{4}$  plot. Test crops.

Wheat, grain (at 85% dry matter). Highfield: 2.48 cwt per acre or 8.9% (13 d.f.)

Fosters: 1.82 cwt per acre or 5.2% (13 d.f.)

Potatoes, total tubers.

Highfield: 1.073 tons per acre or 10.1% (15 d.f.)

Fosters: 0.876 tons per acre or 8.6% (15 d.f.)

Barley, grain (at 85% dry matter). Highfield: Crop failed

Fosters: 1.87 cwt per acre or 4.2% (15 d.f.)

Summary of Results

|                                         | Wheat 1st test crop                |      |       |          |                        |
|-----------------------------------------|------------------------------------|------|-------|----------|------------------------|
|                                         | Previous rotation 1951, 1952, 1953 |      |       |          |                        |
|                                         |                                    |      | Cut   | Arable   |                        |
| cwt N per acre                          | Lucerne                            | Ley  | Grass | with hay | Mean                   |
| Grain (at 85% Dry Matter): cwt per acre |                                    |      |       |          |                        |
| <u>Highfield</u>                        |                                    |      |       |          |                        |
| Mean                                    | 28.6                               | 32.7 | 22.7  | 27.9     | 28.0                   |
| To test crop                            |                                    |      |       |          |                        |
| 0.3                                     | 29.5                               | 34.8 | 24.8  | 28.6     | 29.4                   |
| 0.6                                     | 27.8                               | 30.6 | 20.6  | 27.1     | 26.5                   |
| Difference ( $\pm 1.75$ )               | -1.7                               | -4.2 | -4.2  | -1.5     | -2.9<br>( $\pm 0.88$ ) |
| To treatment crops                      |                                    |      |       |          |                        |
| Single rate                             |                                    | 35.5 | 25.7  | 24.8     | 28.7                   |
| Double rate                             |                                    | 29.9 | 19.7  | 30.9     | 26.8                   |
| Difference ( $\pm 1.75$ )               |                                    | -5.6 | -6.0  | +6.1     | -1.9<br>( $\pm 1.01$ ) |
| <u>Fosters</u>                          |                                    |      |       |          |                        |
| Mean                                    | 37.4                               | 39.5 | 38.2  | 24.7     | 35.0                   |
| To test crop                            |                                    |      |       |          |                        |
| 0.3                                     | 36.0                               | 37.6 | 38.4  | 23.9     | 34.0                   |
| 0.6                                     | 38.7                               | 41.5 | 38.0  | 25.6     | 36.0                   |
| Difference ( $\pm 1.28$ )               | +2.7                               | +3.9 | -0.4  | +1.7     | +2.0<br>( $\pm 0.64$ ) |
| To treatment crops                      |                                    |      |       |          |                        |
| Single rate                             |                                    | 39.4 | 39.1  | 22.3     | 33.6                   |
| Double rate                             |                                    | 39.7 | 37.4  | 27.1     | 34.7                   |
| Difference ( $\pm 1.28$ )               |                                    | +0.3 | -1.7  | +4.8     | +1.1<br>( $\pm 0.74$ ) |

| Wheat 1st test crop |                                                      |                |      |                                                                    |    | 54/Bc/1.5 |
|---------------------|------------------------------------------------------|----------------|------|--------------------------------------------------------------------|----|-----------|
| cwt N per acre      | Excluding Lucerne<br>N to previous<br>treatment crop |                |      | Arable with hay only<br>Dung: tons per<br>acre to<br>potatoes 1952 |    |           |
|                     | Single<br>rate                                       | Double<br>rate | Mean | None                                                               | 12 | Mean      |

Grain (at 85% Dry Matter): cwt per acre

| Highfield                      |                |      |                |                |      |                |
|--------------------------------|----------------|------|----------------|----------------|------|----------------|
| To test crop                   | ( $\pm 1.01$ ) |      | ( $\pm 0.71$ ) | ( $\pm 1.75$ ) |      | ( $\pm 1.24$ ) |
| 0.3                            | 30.6           | 28.2 | 29.4           | 29.2           | 28.0 | 28.6           |
| 0.6                            | 26.8           | 25.4 | 26.1           | 22.6           | 31.7 | 27.1           |
| Mean                           | 28.7           | 26.8 | 27.8           | 25.9           | 29.9 | 27.9           |
|                                | ( $\pm 0.71$ ) |      |                | ( $\pm 1.24$ ) |      |                |
| To previous<br>treatment crops |                |      |                | ( $\pm 1.75$ ) |      | ( $\pm 1.24$ ) |
| Single rate                    |                |      |                | 25.8           | 23.9 | 24.8           |
| Double rate                    |                |      |                | 26.0           | 35.8 | 30.9           |
| Mean                           |                |      |                | 25.9           | 29.9 | 27.9           |
|                                |                |      |                | ( $\pm 1.24$ ) |      |                |

| Fosters                        |                |      |                |                |      |                |
|--------------------------------|----------------|------|----------------|----------------|------|----------------|
| To test crop                   | ( $\pm 0.74$ ) |      | ( $\pm 0.52$ ) | ( $\pm 1.28$ ) |      | ( $\pm 0.91$ ) |
| 0.3                            | 32.7           | 33.9 | 33.3           | 24.0           | 23.8 | 23.9           |
| 0.6                            | 34.5           | 35.5 | 35.0           | 28.1           | 23.1 | 25.6           |
| Mean                           | 33.6           | 34.7 | 34.2           | 26.1           | 23.4 | 24.7           |
|                                | ( $\pm 0.52$ ) |      |                | ( $\pm 0.91$ ) |      |                |
| To previous<br>treatment crops |                |      |                | ( $\pm 1.28$ ) |      | ( $\pm 0.91$ ) |
| Single rate                    |                |      |                | 25.0           | 19.7 | 22.3           |
| Double rate                    |                |      |                | 27.1           | 27.1 | 27.1           |
| Mean                           |                |      |                | 26.1           | 23.4 | 24.7           |
|                                |                |      |                | ( $\pm 0.91$ ) |      |                |

|                |                                    |     |           |                 |           |
|----------------|------------------------------------|-----|-----------|-----------------|-----------|
|                | <u>Wheat 1st test crop</u>         |     |           |                 | 54/Bc/1.6 |
|                | Previous rotation 1951, 1952, 1953 |     |           |                 |           |
| cwt N per acre | Lucerne                            | Ley | Cut Grass | Arable with hay | Mean      |

Straw (at 85% Dry Matter): cwt per acre

|                    |                  |       |      |      |      |
|--------------------|------------------|-------|------|------|------|
|                    | <u>Highfield</u> |       |      |      |      |
| Mean               | 48.1             | 45.9  | 32.8 | 43.8 | 42.7 |
| To test crop       |                  |       |      |      |      |
| 0.3                | 47.3             | 44.0  | 34.1 | 46.4 | 42.9 |
| 0.6                | 49.0             | 47.8  | 31.5 | 41.2 | 42.4 |
| Difference         | +1.7             | +3.8  | -2.6 | -5.2 | -0.5 |
| To treatment crops |                  |       |      |      |      |
| Single rate        |                  | 53.7  | 35.6 | 45.5 | 45.0 |
| Double rate        |                  | 38.1  | 29.9 | 42.1 | 36.7 |
| Difference         |                  | -15.6 | -5.7 | -3.4 | -8.3 |
|                    | <u>Fosters</u>   |       |      |      |      |
| Mean               | 61.6             | 55.9  | 50.6 | 47.9 | 54.0 |
| To test crop       |                  |       |      |      |      |
| 0.3                | 61.2             | 53.0  | 48.9 | 43.7 | 51.7 |
| 0.6                | 62.1             | 58.8  | 52.3 | 52.2 | 56.3 |
| Difference         | +0.9             | +5.8  | +3.4 | +8.5 | +4.6 |
| To treatment crops |                  |       |      |      |      |
| Single rate        |                  | 56.9  | 51.2 | 46.8 | 51.6 |
| Double rate        |                  | 54.9  | 50.1 | 49.1 | 51.4 |
| Difference         |                  | -2.0  | -1.1 | +2.3 | -0.2 |

Wheat 1st test crop

54/Bc/1.7

| cwt N per acre | Excluding Lucerne<br>N to previous<br>treatment crop |                |      | Arable with hay only<br>Dung: tons per<br>acre to<br>potatoes 1952 |    |      |
|----------------|------------------------------------------------------|----------------|------|--------------------------------------------------------------------|----|------|
|                | Single<br>rate                                       | Double<br>rate | Mean | None                                                               | 12 | Mean |

Straw (at 85% Dry Matter): cwt per acre

Highfield

|                                |      |      |      |      |      |      |
|--------------------------------|------|------|------|------|------|------|
| To test crop                   |      |      |      |      |      |      |
| 0.3                            | 46.0 | 37.0 | 41.5 | 46.2 | 46.7 | 46.4 |
| 0.6                            | 43.9 | 36.5 | 40.2 | 41.5 | 40.9 | 41.2 |
| Mean                           | 45.0 | 36.7 | 40.8 | 43.8 | 43.8 | 43.8 |
| To previous<br>treatment crops |      |      |      |      |      |      |
| Single rate                    |      |      |      | 46.9 | 44.2 | 45.5 |
| Double rate                    |      |      |      | 40.8 | 43.4 | 42.1 |
| Mean                           |      |      |      | 43.8 | 43.8 | 43.8 |

Fosters

|                                |      |      |      |      |      |      |
|--------------------------------|------|------|------|------|------|------|
| To test crop                   |      |      |      |      |      |      |
| 0.3                            | 49.1 | 48.0 | 48.5 | 40.5 | 46.9 | 43.7 |
| 0.6                            | 54.1 | 54.7 | 54.4 | 51.6 | 52.7 | 52.2 |
| Mean                           | 51.6 | 51.4 | 51.5 | 46.0 | 49.8 | 47.9 |
| To previous<br>treatment crops |      |      |      |      |      |      |
| Single rate                    |      |      |      | 45.6 | 47.9 | 46.8 |
| Double rate                    |      |      |      | 46.5 | 51.7 | 49.1 |
| Mean                           |      |      |      | 46.0 | 49.8 | 47.9 |

54/Bc/1.8

Potatoes 2nd test crop. Total tubers: tons per acre

|                            | Previous rotation 1950, 1951, 1952 |       |                 |                    |                          |
|----------------------------|------------------------------------|-------|-----------------|--------------------|--------------------------|
|                            | Lucerne                            | Ley   | Cut<br>Grass    | Arable<br>with hay | Mean                     |
| <hr/>                      |                                    |       |                 |                    |                          |
|                            | <u>Highfield</u>                   |       |                 |                    |                          |
| N: cwt per acre            |                                    |       |                 |                    |                          |
| 0.5                        | 9.88                               | 10.90 | 10.42           | 10.41              | 10.40                    |
| 1.0                        | 11.04                              | 11.15 | 10.41           | 10.94              | 10.89                    |
| Difference ( $\pm 0.759$ ) | +1.16                              | +0.25 | -0.01           | +0.53              | +0.49<br>( $\pm 0.379$ ) |
| Dung: tons per acre        |                                    |       |                 |                    |                          |
| None                       | 8.89                               | 9.18  | 8.87            | 8.59               | 8.88                     |
| 12                         | 12.03                              | 12.88 | 11.95           | 12.76              | 12.40                    |
| Difference ( $\pm 0.759$ ) | +3.14                              | +3.70 | +3.08           | +4.17              | +3.52<br>( $\pm 0.379$ ) |
| Mean                       | 10.46                              | 11.03 | 10.41           | 10.68              | 10.64                    |
| <hr/>                      |                                    |       |                 |                    |                          |
|                            | <u>Fosters</u>                     |       |                 |                    |                          |
| N: cwt per acre            |                                    |       |                 |                    |                          |
| 0.5                        | 9.58                               | 9.63  | 9.22            | 10.17              | 9.65                     |
| 1.0                        | 10.82                              | 10.73 | 9.80            | 11.52              | 10.72                    |
| Difference ( $\pm 0.619$ ) | +1.24                              | +1.10 | +0.58           | +1.35              | +1.07<br>( $\pm 0.310$ ) |
| Dung: tons per acre        |                                    |       |                 |                    |                          |
| None                       | 7.59                               | 9.23  | 7.74            | 9.75               | 8.58                     |
| 12                         | 12.81                              | 11.12 | 11.28           | 11.95              | 11.79                    |
| Difference ( $\pm 0.619$ ) | +5.22                              | +1.89 | +3.54           | +2.20              | +3.21<br>( $\pm 0.310$ ) |
| Mean                       | 10.20                              | 10.18 | 9.51            | 10.85              | 10.18                    |
| <hr/>                      |                                    |       |                 |                    |                          |
|                            | <u>Highfield</u>                   |       | <u>Fosters</u>  |                    |                          |
|                            | N: cwt per acre                    |       | N: cwt per acre |                    |                          |
|                            | 0.5                                | 1.0   | 0.5             | 1.0                |                          |
| <hr/>                      |                                    |       |                 |                    |                          |
|                            | ( $\pm 0.379$ )                    |       | ( $\pm 0.310$ ) |                    |                          |
| Dung: tons per acre        |                                    |       |                 |                    |                          |
| None                       | 8.63                               | 9.14  | 7.99            | 9.17               |                          |
| 12                         | 12.18                              | 12.63 | 11.31           | 12.27              |                          |

54/Bc/1.9

Potatoes 2nd test crop. Percentage ware

|  | Previous rotation 1950, 1951, 1952 |     |              |                    |      |
|--|------------------------------------|-----|--------------|--------------------|------|
|  | Lucerne                            | Ley | Cut<br>Grass | Arable<br>with hay | Mean |

|                     | <u>Highfield</u> |      |      |      |      |
|---------------------|------------------|------|------|------|------|
| N: cwt per acre     |                  |      |      |      |      |
| 0.5                 | 82.6             | 81.2 | 81.0 | 82.1 | 81.7 |
| 1.0                 | 84.4             | 81.2 | 77.8 | 82.8 | 81.6 |
| Difference          | +1.8             | 0.0  | -3.2 | +0.7 | -0.1 |
| Dung: tons per acre |                  |      |      |      |      |
| None                | 79.3             | 79.6 | 80.0 | 78.9 | 79.5 |
| 12                  | 87.6             | 82.8 | 78.7 | 86.0 | 83.8 |
| Difference          | +8.3             | +3.2 | -1.3 | +7.1 | +4.3 |
| Mean                | 83.5             | 81.2 | 79.4 | 82.5 | 81.6 |

|                     | <u>Fosters</u> |      |      |      |      |
|---------------------|----------------|------|------|------|------|
| N: cwt per acre     |                |      |      |      |      |
| 0.5                 | 83.6           | 83.2 | 84.3 | 84.5 | 83.9 |
| 1.0                 | 84.4           | 78.5 | 83.0 | 86.4 | 83.1 |
| Difference          | +0.8           | -4.7 | -1.3 | +1.9 | -0.8 |
| Dung: tons per acre |                |      |      |      |      |
| None                | 82.7           | 80.1 | 82.8 | 84.8 | 82.6 |
| 12                  | 85.4           | 81.6 | 84.5 | 86.1 | 84.4 |
| Difference          | +2.7           | +1.5 | +1.7 | +1.3 | +1.8 |
| Mean                | 84.0           | 80.9 | 83.6 | 85.5 | 83.5 |

|                     | <u>Highfield</u> |      | <u>Fosters</u>  |      |
|---------------------|------------------|------|-----------------|------|
|                     | N: cwt per acre  |      | N: cwt per acre |      |
|                     | 0.5              | 1.0  | 0.5             | 1.0  |
| Dung: tons per acre |                  |      |                 |      |
| None                | 79.3             | 79.6 | 83.1            | 82.1 |
| 12                  | 84.1             | 83.5 | 84.7            | 84.1 |

54/Bc/1.10

Barley 3rd test crop. Grain (at 85% Dry Matter): cwt per acre

|                                         | Previous rotation 1949, 1950, 1951 |      |              |                    |                        |
|-----------------------------------------|------------------------------------|------|--------------|--------------------|------------------------|
|                                         | Lucerne                            | Ley  | Cut<br>Grass | Arable<br>with hay | Mean                   |
| <u>Fosters</u>                          |                                    |      |              |                    |                        |
| N: cwt per acre                         |                                    |      |              |                    |                        |
| 0.2                                     | 46.6                               | 43.5 | 44.4         | 44.3               | 44.7                   |
| 0.4                                     | 44.8                               | 44.5 | 44.7         | 45.2               | 44.8                   |
| Difference ( $\pm 1.32$ )               | -1.8                               | +1.0 | +0.3         | +0.9               | +0.1<br>( $\pm 0.66$ ) |
| Dung to potatoes<br>1953: tons per acre |                                    |      |              |                    |                        |
| None                                    | 45.8                               | 43.9 | 44.7         | 44.6               | 44.8                   |
| 12                                      | 45.7                               | 44.1 | 44.4         | 44.9               | 44.7                   |
| Difference ( $\pm 1.32$ )               | -0.1                               | +0.2 | -0.3         | +0.3               | -0.1<br>( $\pm 0.66$ ) |
| Mean                                    | 45.7                               | 44.0 | 44.6         | 44.7               | 44.8                   |

|                                            |                 |      |
|--------------------------------------------|-----------------|------|
| <u>Fosters</u>                             |                 |      |
|                                            | N: cwt per acre |      |
|                                            | 0.2             | 0.4  |
|                                            | ( $\pm 0.66$ )  |      |
| Dung to Potatoes<br>1953: tons per<br>acre |                 |      |
| None                                       | 44.7            | 44.8 |
| 12                                         | 44.7            | 44.8 |

Note: Highfield: No yields of grain and straw recorded.  
Fosters: No straw yields recorded.

54/Bc/1.11

Treatment crops Arable and Hay rotation

(values based on Mean of 2 sub plots only)

|                                                 | Highfield                          |                |       | Fosters                            |                |       |
|-------------------------------------------------|------------------------------------|----------------|-------|------------------------------------|----------------|-------|
|                                                 | N: cwt per acre<br>applied in 1954 |                |       | N: cwt per acre<br>applied in 1954 |                |       |
|                                                 | Single<br>rate                     | Double<br>rate | Mean  | Single<br>rate                     | Double<br>rate | Mean  |
| Hay (dry matter): cwt per acre                  |                                    |                |       |                                    |                |       |
| No dung                                         | 59.1                               | 68.8           | 63.9  | 55.1                               | 65.8           | 60.5  |
| Dung in 1952                                    | 62.4                               | 62.3           | 62.4  | 58.0                               | 64.5           | 61.3  |
| Mean                                            | 60.7                               | 65.6           | 63.1  | 56.6                               | 65.2           | 60.9  |
| Potatoes, total tubers: tons per acre           |                                    |                |       |                                    |                |       |
| No dung                                         | 8.03                               | 8.61           | 8.32  | 9.25                               | 10.85          | 10.05 |
| Dung in 1954                                    | 12.11                              | 12.42          | 12.27 | 10.59                              | 11.77          | 11.18 |
| Mean                                            | 10.07                              | 10.51          | 10.29 | 9.92                               | 11.31          | 10.61 |
| Potatoes, percentage ware                       |                                    |                |       |                                    |                |       |
| No dung                                         | 77.8                               | 81.0           | 79.4  | 82.6                               | 84.4           | 83.5  |
| Dung in 1954                                    | 79.6                               | 83.1           | 81.4  | 88.1                               | 85.6           | 86.8  |
| Mean                                            | 78.7                               | 82.1           | 80.4  | 85.4                               | 85.0           | 85.2  |
| Barley, grain (at 85% dry matter): cwt per acre |                                    |                |       |                                    |                |       |
| No dung                                         | No yields of grain<br>recorded     |                |       | 41.6                               | 44.2           | 42.9  |
| Dung in 1953                                    |                                    |                |       | 43.6                               | 43.3           | 43.4  |
| Mean                                            |                                    |                |       | 42.6                               | 43.8           | 43.2  |
|                                                 | No yields of straw<br>recorded     |                |       | No yields of straw<br>recorded     |                |       |

## Cut grass. Dry Matter: cwt per acre

54/Bc/1.12

| 1st year             | Highfield                         |                |                                              |      |      | Fosters                           |                |                                              |      |      |
|----------------------|-----------------------------------|----------------|----------------------------------------------|------|------|-----------------------------------|----------------|----------------------------------------------|------|------|
|                      | N:<br>to previous<br>3 test crops |                | Dung to<br>potatoes<br>1952 tons<br>per acre |      | Mean | N:<br>to previous<br>3 test crops |                | Dung to<br>potatoes<br>1952 tons<br>per acre |      | Mean |
|                      | Single<br>rate                    | Double<br>rate | None                                         | 12   |      | Single<br>rate                    | Double<br>rate | None                                         | 12   |      |
| N(1) to<br>cut grass |                                   |                |                                              |      |      |                                   |                |                                              |      |      |
| Single rate          | 77.4                              | 80.7           | 77.8                                         | 80.3 | 79.1 | 60.6                              | 60.0           | 63.5                                         | 57.1 | 60.3 |
| Double rate          | 81.6                              | 89.4           | 89.0                                         | 82.1 | 85.5 | 73.9                              | 76.4           | 73.6                                         | 76.7 | 75.1 |
| N to test<br>crops   |                                   |                |                                              |      |      |                                   |                |                                              |      |      |
| Single rate          |                                   |                | 80.1                                         | 78.9 | 79.5 |                                   |                | 67.2                                         | 67.3 | 67.3 |
| Double rate          |                                   |                | 86.6                                         | 83.5 | 85.0 |                                   |                | 69.8                                         | 66.6 | 68.2 |
| Mean                 |                                   |                | 83.4                                         | 81.2 | 82.3 |                                   |                | 68.5                                         | 66.9 | 67.7 |

| Highfield          |                |      |      | Fosters            |                |      |  |
|--------------------|----------------|------|------|--------------------|----------------|------|--|
| N to cut grass (1) |                | Mean |      | N to cut grass (1) |                | Mean |  |
| Single<br>rate     | Double<br>rate |      |      | Single<br>rate     | Double<br>rate |      |  |
| 2nd year (5 cuts)  | 59.1           | 75.3 | 67.2 | 71.1               | 76.6           | 73.8 |  |
| 3rd year (5 cuts)  | 57.5           | 72.7 | 65.1 | 65.5               | 74.4           | 70.0 |  |

(1) 0.15 v. 0.3 cwt N as Nitrochalk for every cut.

## Lucerne. Dry Matter: cwt per acre

| 1st year<br>(2 cuts)  | Highfield                     |                |      | Fosters                       |                |      |
|-----------------------|-------------------------------|----------------|------|-------------------------------|----------------|------|
|                       | N to 3 previous<br>test crops |                | Mean | N to 3 previous<br>test crops |                | Mean |
|                       | Single<br>rate                | Double<br>rate |      | Single<br>rate                | Double<br>rate |      |
| Dung to potatoes 1952 |                               |                |      |                               |                |      |
| None                  | 62.0                          | 58.4           | 60.2 | 56.3                          | 56.9           | 56.6 |
| 12 tons               | 57.6                          | 57.3           | 57.4 | 56.3                          | 60.6           | 58.4 |
| Mean                  | 59.8                          | 57.9           | 58.8 | 56.3                          | 58.7           | 57.5 |

|                   | Highfield  | Fosters   |
|-------------------|------------|-----------|
| 2nd year (3 cuts) | Mean 103.8 | Mean 97.5 |
| 3rd year (3 cuts) | Mean 100.0 | Mean 94.4 |

54/Bc/1.13

Grazed Ley. Dry Matter: cwt per acre (estimated from sampling cuts)

|          | Highfield                |                     |      | Fosters                  |                     |      |
|----------|--------------------------|---------------------|------|--------------------------|---------------------|------|
|          | N: cwt per acre (yearly) |                     | Mean | N: cwt per acre (yearly) |                     | Mean |
|          | Single rate<br>0.15      | Double rate<br>0.30 |      | Single rate<br>0.15      | Double rate<br>0.30 |      |
| 1st year | 40.8                     | 45.9                | 43.3 | 31.2                     | 30.4                | 30.8 |
| 2nd year | 39.2                     | 52.2                | 45.7 | 40.5                     | 53.4                | 46.9 |
| 3rd year | 43.6                     | 48.9                | 46.2 | 33.5                     | 36.7                | 35.1 |

Reseeded Grass. Dry Matter: cwt per acre

|                   | Cut for hay    |                |                | Mean | Grazed<br>Estimated from<br>sampling cuts |       |  | Mean |
|-------------------|----------------|----------------|----------------|------|-------------------------------------------|-------|--|------|
|                   | N              |                | N              |      |                                           |       |  |      |
|                   | Single<br>rate | Double<br>rate | Single<br>rate |      | Double<br>rate                            |       |  |      |
| <u>Highfield</u>  |                |                |                |      |                                           |       |  |      |
| 4th year, grazing |                |                |                |      | 49.9                                      | 47.6  |  | 48.7 |
| 5th year, grazing |                |                |                |      | 42.5                                      | 45.7  |  | 44.1 |
| 6th year, hay     | 55.4           | 55.5           | 55.5           |      | 17.2*                                     | 21.2* |  | 19.2 |
| <u>Fosters</u>    |                |                |                |      |                                           |       |  |      |
| 4th year, grazing |                |                |                |      | 41.4                                      | 41.6  |  | 41.5 |
| 5th year, grazing |                |                |                |      | 44.1                                      | 43.3  |  | 43.7 |
| 6th year, hay     | 46.8           | 51.8           | 49.3           |      | 20.0*                                     | 20.4* |  | 20.2 |

Permanent Grass. Dry Matter: cwt per acre

| <u>Highfield</u>     |      |      |      |       |       |       |
|----------------------|------|------|------|-------|-------|-------|
| Grazing, Blocks 9-12 |      |      |      | 40.0  | 39.9  | 39.9  |
| Grazing, Blocks 5-8  |      |      |      | 36.6  | 36.6  | 36.6  |
| Hay, Blocks 1-4      | 44.8 | 47.1 | 45.9 | 19.7* | 20.7* | 20.2* |

\*Aftermath grazing.

54/Bd/1.1

# GREEN MANURING EXPERIMENT

Woburn Stackyard - 1954, the 1st year of revised scheme

Original scheme: Details are given in "Results of the Field Experiments 1939-47", Vol I, Section Be/1. In 1950 the fallow, lupins and rye-grass plots were split for early and late planting of cabbages. The original scheme ended with the harvesting of barley in 1953 and the cabbages in 1953-4.

Revised scheme: From 1954 onwards the rotation is: early potatoes, barley. As before each of these two crops is grown in every year on one of two randomized blocks of 40 plots each. The green manuring crops are grown according to the following scheme which is repeated every two years:

|                  | Early    | Early                         | Early    | Early                        | Early    |
|------------------|----------|-------------------------------|----------|------------------------------|----------|
| 1st main crop    | Potatoes | Potatoes                      | Potatoes | Potatoes                     | Potatoes |
| Green manure     | -        | Ryegrass                      | Ryegrass | Trefoil                      | Trefoil  |
| 2nd main crop    | Barley   | Barley                        | Barley   | Barley                       | Barley   |
| and green manure | -        | undersown<br>with<br>Ryegrass | -        | undersown<br>with<br>Trefoil | -        |

8 plots of each block are allocated to each of these sequences. Half the plots of each group carrying ryegrass or trefoil after early potatoes are ploughed in autumn and the remainder are ploughed in the spring before the barley seedbed is prepared. The undersown green manures are ploughed in after February 1st for early potatoes.

In addition chaffed barley straw at the rate of 30 cwt per acre is applied after harvesting the barley to the plots receiving straw in the original scheme. Two levels of nitrogen are tested on each of the two main crops.

0.23 v. 0.46 cwt N per acre as nitrochalk to barley  
0.6 v. 1.2 cwt N per acre as nitrochalk to potatoes

the higher level in each case being applied to the same plots.

The fallow plots of the original scheme remain fallow between each main crop in the revised scheme. The new green manuring treatments are superimposed on the plots carrying the original treatments in such a way that one comparison of the latter (lupins and rape v. clover and ryegrass) can be examined for possible residual effects. Residual effects of the original dung treatment, now discontinued, can also be determined, but any residual effects of the nitrogen treatments applied prior to 1954 have been eliminated by randomization. The green manuring and subsidiary treatments are arranged on the 32 non-fallow plots of each block in a quarter replicate with identities:

54/Bd/1.2

$$I \equiv (D) \text{ SPUGN} \equiv (D)(X) \text{ UN} \equiv S(X) \text{ PG}$$

where (D) = (residual) dung.

(X) = (residual) rape and lupins v. clover and ryegrass.

S = straw.

P = time of ploughing green manures after early potatoes.

U = green manures undersown (in addition to those sown after early potatoes).

G = trefoil v. ryegrass.

N = nitrogen levels to both crops.

Basal dressing: Early potatoes, 0.75 cwt  $P_2O_5$ , 1.5 cwt  $K_2O$  per acre as granular compound fertilizer, broadcast on the flat before machine planting. Barley and green manures, nil.

Varieties: Early potatoes: Ulster Chieftain

Barley: Herta

Trefoil: English

Ryegrass: English Leafy Italian.

Plot area: 0.0395 acre.

#### Transition Period:

The barley of 1954 received two levels of nitrogen and was undersown according to the new scheme.

The early potatoes of 1954 received two levels of nitrogen according to the new scheme. It is not possible to make full comparisons of the old treatments in either of these crops. A full analysis of the new scheme will first be possible in 1955.

#### Cultivations, etc.:

Green manures: Clover and ryegrass undersown in barley: Apr 24, 1953.

Barley: Ploughed: Mar 5, 1954. Ground chalk applied: Mar 11.

Nitrochalk applied: Mar 16. Seed drilled at 3 bushels per acre: Mar 17. Trefoil and Italian ryegrass undersown: Apr 27.

Harvested: Aug 30. Variety: Herta.

Early potatoes: Ploughed (except for green manured plots):

Aug 21, 1953, Oct 2, Dec 2, and Mar 1, 1954. Ploughed (all plots): Mar 10. Nitrochalk and basal fertilizers applied:

Mar 24. Potatoes mechanically planted: Mar 26. Earthed up: June 15 and again June 25. Lifted: July 28. Variety: Ulster Chieftain.

#### Standard errors per plot:

Early potatoes, Total tubers: 0.973 tons per acre or 21.8% (22 d.f.)

Barley, Grain: 3.04 cwt per acre or 7.8% (18 d.f.)

54/Bd/1.3

Summary of Results

Early potatoes, total tubers: tons per acre

| N in<br>1954:<br>cwt per<br>acre | Green manures and treatments to cabbages 1952 |                     |      |                     |                        |      |                         |          | Mean |
|----------------------------------|-----------------------------------------------|---------------------|------|---------------------|------------------------|------|-------------------------|----------|------|
|                                  | Fallow                                        | Clover*             |      | Lupins<br>+<br>Rape | Dung: tons<br>per acre |      | Straw: tons<br>per acre |          |      |
|                                  |                                               | +<br>Rye-<br>grass* |      |                     | None                   | 10   | None                    | 1½       |      |
|                                  | (±0.486)                                      | (±0.344)            |      | (±0.308)            |                        |      |                         | (±0.217) |      |
| 0.6                              | 3.69                                          | 4.22                | 4.19 | 3.24                | 4.96                   | 4.03 | 4.17                    | 4.10     |      |
| 1.2                              | 4.37                                          | 4.82                | 4.65 | 4.02                | 5.30                   | 4.32 | 5.00                    | 4.66     |      |
| Mean                             | 4.03<br>(±0.344)                              | 4.52<br>(±0.243)    | 4.42 | 3.63                | 5.13<br>(±0.217)       | 4.18 | 4.59                    | 4.38     |      |

\*Also undersown in barley 1953.

Barley, grain: cwt per acre

| N in<br>1954:<br>cwt per<br>acre | Green manures and treatments to cabbages 1953 |                              |                     |                        |                 |                         |      |         | Mean |
|----------------------------------|-----------------------------------------------|------------------------------|---------------------|------------------------|-----------------|-------------------------|------|---------|------|
|                                  | Fallow                                        | Clover<br>+<br>Rye-<br>grass | Lupins<br>+<br>Rape | Dung: tons<br>per acre |                 | Straw: tons<br>per acre |      |         |      |
|                                  |                                               |                              |                     | None                   | 10              | None                    | 1½   |         |      |
|                                  | (±1.50)                                       | (±1.06)                      |                     | (±0.95)                |                 |                         |      | (±0.67) |      |
| 0.23                             | 32.2                                          | 36.9                         | 35.5                | 33.5                   | 37.2            | 35.6                    | 35.1 | 35.4    |      |
| 0.46                             | 36.8                                          | 40.3                         | 41.7                | 40.2                   | 40.1            | 40.5                    | 39.8 | 40.1    |      |
| Mean                             | 34.5<br>(±1.06)                               | 38.6<br>(±0.75)              | 38.6                | 36.8                   | 38.7<br>(±0.67) | 38.1                    | 37.5 | 37.8    |      |

Excluding fallow plots

| N in 1954:<br>cwt per acre | Undersown in barley 1954 |                 |          | Mean    |
|----------------------------|--------------------------|-----------------|----------|---------|
|                            | None                     | Trefoil         | Ryegrass |         |
|                            | (±1.06)                  | (±1.50)         |          | (±0.75) |
| 0.23                       | 36.0                     | 36.9            | 35.8     | 36.2    |
| 0.46                       | 40.0                     | 41.7            | 42.1     | 41.0    |
| Mean                       | 38.0<br>(±0.75)          | 39.3<br>(±1.06) | 39.0     | 38.6    |

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## Barley, straw: cwt per acre

| N in<br>1954:<br>cwt per<br>acre | Green manures and treatments to cabbages 1953 |                              |                     |                        |      |                         |      |      | Mean |
|----------------------------------|-----------------------------------------------|------------------------------|---------------------|------------------------|------|-------------------------|------|------|------|
|                                  | Fallow                                        | Clover<br>+<br>Rye-<br>grass | Lupins<br>+<br>Rape | Dung: tons<br>per acre |      | Straw: tons<br>per acre |      |      |      |
|                                  |                                               |                              |                     | None                   | 10   | None                    | 1½   |      |      |
| 0.23                             | 31.5                                          | 34.6                         | 33.3                | 30.2                   | 36.7 | 33.5                    | 33.4 | 33.5 |      |
| 0.46                             | 35.8                                          | 39.3                         | 39.4                | 37.6                   | 39.7 | 38.0                    | 39.3 | 38.6 |      |
| Mean                             | 33.7                                          | 37.0                         | 36.3                | 33.9                   | 38.2 | 35.8                    | 36.3 | 36.1 |      |

Excluding fallow plots

| N in 1954:<br>cwt per acre | Undersown in barley 1954 |         |          | Mean |
|----------------------------|--------------------------|---------|----------|------|
|                            | None                     | Trefoil | Ryegrass |      |
| 0.23                       | 34.0                     | 36.9    | 31.0     | 33.9 |
| 0.46                       | 38.7                     | 40.2    | 39.7     | 39.4 |
| Mean                       | 36.4                     | 38.5    | 35.3     | 36.6 |

54/Be/1.1

## LEY AND ARABLE ROTATIONS

Woburn Stackyard - 1954 the 17th year.

For details of rotations and treatments etc., see "Results of the Field Experiments 1939-47", Vol. I, Section Bf/1 with the following exceptions:-

In 1949 and subsequently Rye replaced Wheat.

In 1954 the Seeds Hay plots were split into two after the first crop, for testing 0.15 v. 0.30 cwt N per acre applied as nitro-chalk.

Cultivations, etc.:

### Treatment crops

#### Ley rotations

Ley 1st year. Ploughed twice: Sept 16 and Dec 30, 1953.

Basal fertilizers applied: Apr 5, 1954. Seeds mixture hand sown: Apr 7. Nitrochalk applied: July 16. Grazed 7 times: June 17-21, July 7-15, July 24-Aug 1, Aug 11-21, Sept 8-17, Sept 25-Oct 1, Oct 19-27. Seeds mixture per acre: 21 lb S23 Perennial Ryegrass, 12 lb S143 Cocksfoot, 6 lb Late flowering Montgomery Red Clover, 3 lb S100 White Clover.

Ley 2nd year. Nitrochalk applied: May 25 and July 26.

Grazed 9 times: May 17-25, June 8-17, June 21-29, July 15-24, Aug 1-11, Aug 21-30. Sept 17-25, Oct 3-11, Oct 27-Nov 4.

Ley 3rd year. Nitrochalk applied: May 25 and July 21.

Grazed 5 times: May 13-17, May 31-June 8, June 29-July 7, Aug 30-Sept 8, Oct 11-19.

Lucerne 1st year. Ploughed twice: Sept 16 and Dec 30, 1953.

Basal fertilizers applied: Apr 2, 1954. Seeds sown at 28 lb per acre: Apr 7. Dusted with 2% DDT: Apr 8. Cut twice: Aug 11 and Nov 3. Variety: Du Puits.

Lucerne 2nd year. Cut three times: June 24, Aug 11, Nov 3.

Lucerne 3rd year. Cut three times: June 24, Aug 11, Nov 3.

#### Arable rotations

Potatoes 1st course. Ploughed: Sept 16 and again Dec 30, 1953.

Ridged, basal fertilizers applied: Apr 2, 1954. Potatoes planted with dropper: Apr 6. Earthed up: June 25. Sprayed with copper fungicide, 5 lb per acre: July 30, Aug 16 and Aug 27. Sprayed with sulphuric acid: Sept 23. Lifted: Oct 4. Variety: Majestic.

Rye 2nd course. Ploughed: Oct 1, 1953. Seed drilled at 3 bushels per acre: Oct 22. Nitrochalk applied: Apr 29, 1954. Seeds hay mixture undersown on 4 plots: May 7. Harvested: Aug 23.

Seeds Hay 3rd course. Seeds undersown in Rye: Apr 9, 1953.

Basal nitrochalk applied: Apr 6, 1954. 1st cut: June 24. Nitrochalk applied: June 30. 2nd cut: Nov 3. Seeds mixture per acre: 27 lb S24 Perennial Ryegrass, 12 lb Montgomery Red Clover, 3 lb Canadian Alsike Clover.

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Sugar beet 3rd course. Ploughed: Aug 21 and again Nov 5, 1953.  
Basal nitrate of soda applied: Mar 29, 1954. Seed drilled  
at 18 lb per acre: Mar 30. Dusted with DDT: May 12.  
Singled: May 28. Sprayed with systemic insecticide  $\frac{1}{2}$  pint  
per acre, high volume: June 21. Lifted: Nov 2. Variety:  
Klein E.

#### Test Crops.

Potatoes 1st test crop. Ploughed: Nov 4, 1953. Ridged, dung  
applied: Apr 7, 1954. Basal fertilizers applied, potatoes  
hand planted: Apr 8. Earthed up: June 25. Sprayed with  
copper fungicide, 5 lb per acre: July 30, Aug 16 and Aug 27.  
Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 4.  
Variety: Majestic.

Barley 2nd test crop. Ploughed: Oct 2 and again Dec 30, 1953.  
Ground chalk applied: Mar 8, 1954. Nitrochalk applied:  
Mar 11. Seed drilled at 3 bushels per acre: Mar 17.  
Harvested: Aug 28. Variety: Plumage Archer.

Standard errors per plot, Test crops:

|                                     |                             |
|-------------------------------------|-----------------------------|
| Potatoes, Total tubers, whole plot: | 0.797 tons per acre or 7.3% |
|                                     | (4 d.f.)                    |
| sub plot:                           | 0.881 tons per acre or 8.1% |
|                                     | (4 d.f.)                    |
| Barley, Grain, whole plot:          | 2.50 cwt per acre or 7.8%   |
|                                     | (4 d.f.)                    |
| sub plot:                           | 2.12 cwt per acre or 6.7%   |
|                                     | (4 d.f.)                    |

#### Summary of Results

Treatment crops

Ley, Sheep days of grazing per acre

| 1st year | 2nd year | 3rd year |
|----------|----------|----------|
| 1817     | 2616     | 1018     |

54/Be/1.3

## Treatment crops

Lucerne, yield of hay (at 85% D.M.): cwt per acre

|                                                           | 1st crop                             | 2nd crop           | 3rd crop               | Total  |
|-----------------------------------------------------------|--------------------------------------|--------------------|------------------------|--------|
| <u>1st year</u>                                           |                                      |                    |                        |        |
| No dung                                                   | 18.7                                 | 11.4               |                        | 30.1   |
| Dung in 1952                                              | 26.1                                 | 14.1               |                        | 40.2   |
| Increase                                                  | 7.4                                  | 2.7                |                        | 10.1   |
| Previous Rotation                                         |                                      |                    |                        |        |
| Lucerne                                                   | 20.9                                 | 12.3               |                        | 33.2   |
| Arable with Hay                                           | 23.9                                 | 13.2               |                        | 37.1   |
| Mean                                                      | 22.4                                 | 12.8               |                        | 35.2   |
| <u>2nd year</u>                                           |                                      |                    |                        |        |
| No dung                                                   | 38.0                                 | 24.0               | 9.0                    | 71.0   |
| Dung in 1951                                              | 44.3                                 | 25.8               | 11.8                   | 81.9   |
| Increase                                                  | 6.3                                  | 1.8                | 2.8                    | 10.9   |
| Previous Rotation                                         |                                      |                    |                        |        |
| Lucerne                                                   | 38.8                                 | 24.3               | 9.6                    | 72.7   |
| Arable with Sugar<br>beet                                 | 43.5                                 | 25.5               | 11.2                   | 80.2   |
| Mean                                                      | 41.2                                 | 24.9               | 10.4                   | 76.5   |
| <u>3rd year</u>                                           |                                      |                    |                        |        |
| No dung                                                   | 32.5                                 | 18.9               | 6.4                    | 57.8   |
| Dung in 1950                                              | 39.2                                 | 24.9               | 11.0                   | 75.1   |
| Increase                                                  | 6.7                                  | 6.0                | 4.6                    | 17.3   |
| Previous Rotation                                         |                                      |                    |                        |        |
| Lucerne                                                   | 35.4                                 | 23.7               | 9.4                    | 68.5   |
| Arable with Hay                                           | 36.3                                 | 20.1               | 8.0                    | 64.4   |
| Mean                                                      | 35.8                                 | 21.9               | 8.7                    | 66.4   |
|                                                           | Potatoes                             |                    | Rye                    |        |
|                                                           | Total<br>tubers:<br>tons per<br>acre | Percentage<br>ware | Grain:<br>cwt per acre | Straw: |
| No dung                                                   | 8.52                                 | 85.3               | 32.0                   | 33.5   |
| Dung <sup>#</sup>                                         | 11.71                                | 88.3               | 35.3                   | 37.9   |
| Increase                                                  | 3.19                                 | 3.0                | 3.3                    | 4.4    |
| Previous Rotation                                         |                                      |                    |                        |        |
| Ley                                                       | 11.84                                | 91.3               | 33.7                   | 34.8   |
| Lucerne                                                   | 10.00                                | 87.9               | 36.7                   | 38.1   |
| Arable with Hay                                           | 9.48                                 | 83.5               | 34.5                   | 35.6   |
| Arable with Sugar<br>beet                                 | 9.13                                 | 84.4               | 29.8                   | 34.3   |
| Mean                                                      | 10.12                                | 86.8               | 33.7                   | 35.7   |
| <sup>#</sup> Dung applied: Potatoes:- 1952    Rye:- 1951. |                                      |                    |                        |        |

54/Be/1.4

## Treatment crops

|                           | Hay                                    |                          |                                    |                           |
|---------------------------|----------------------------------------|--------------------------|------------------------------------|---------------------------|
|                           | Yield (at 85% D.M.): cwt per acre      |                          |                                    |                           |
|                           | 1st crop                               | 2nd crop                 | Total                              | 2nd crop<br>Response to N |
| No dung                   | 39.4                                   | 2.7                      | 42.1                               | 0.5                       |
| Dung in 1950              | 40.5                                   | 4.9                      | 45.4                               | 2.0                       |
| Increase                  | 1.1                                    | 2.2                      | 3.3                                | 1.5                       |
| Previous Rotation         |                                        |                          |                                    |                           |
| Lucerne                   | 39.8                                   | 4.4                      | 44.2                               | 1.0                       |
| Arable with Hay           | 40.1                                   | 3.2                      | 43.3                               | 1.5                       |
| Mean                      | 40.0                                   | 3.8                      | 43.8                               | 1.2                       |
|                           | Sugar Beet                             |                          |                                    |                           |
|                           | Roots<br>(washed):<br>tons per<br>acre | Sugar<br>percent-<br>age | Total<br>sugar:<br>cwt per<br>acre | Tops:<br>tons per<br>acre |
| No dung                   | 9.06                                   | 17.0                     | 30.9                               | 8.06                      |
| Dung in 1950              | 10.18                                  | 17.0                     | 34.7                               | 8.44                      |
| Increase                  | 1.12                                   | 0.0                      | 3.8                                | 0.38                      |
| Previous Rotation         |                                        |                          |                                    |                           |
| Ley                       | 10.46                                  | 17.0                     | 35.6                               | 9.06                      |
| Arable with Sugar<br>beet | 8.78                                   | 17.1                     | 30.0                               | 7.44                      |
| Mean                      | 9.62                                   | 17.0                     | 32.8                               | 8.25                      |

54/Be/1.5

## Test Crops

|                                       |                              | Previous Rotation |         |                       |                                 |                         |
|---------------------------------------|------------------------------|-------------------|---------|-----------------------|---------------------------------|-------------------------|
|                                       |                              | Ley               | Lucerne | Arable<br>with<br>hay | Arable<br>with<br>sugar<br>beet | Mean                    |
| Potatoes, Total tubers: tons per acre |                              |                   |         |                       |                                 |                         |
| No dung                               | ( $\pm 0.715$ ) <sup>*</sup> | 11.90             | 8.90    | 8.34                  | 5.78                            | 8.73                    |
| Dung in 1954                          |                              | 14.14             | 14.86   | 13.02                 | 10.44                           | 13.12                   |
| Mean                                  | ( $\pm 0.564$ )              | 13.02             | 11.88   | 10.68                 | 8.11                            | 10.92                   |
| Increase                              | ( $\pm 0.881$ )              | 2.24              | 5.96    | 4.68                  | 4.66                            | 4.39<br>( $\pm 0.440$ ) |
| Potatoes, Percentage ware             |                              |                   |         |                       |                                 |                         |
| No dung                               |                              | 94.5              | 95.2    | 91.2                  | 88.0                            | 92.2                    |
| Dung in 1954                          |                              | 95.4              | 95.7    | 95.8                  | 94.4                            | 95.3                    |
| Mean                                  |                              | 95.0              | 95.5    | 93.5                  | 91.2                            | 93.8                    |
| Increase                              |                              | 0.9               | 0.5     | 4.6                   | 6.4                             | 3.1                     |
| Barley, Grain: cwt per acre           |                              |                   |         |                       |                                 |                         |
| No dung                               | ( $\pm 2.06$ ) <sup>*</sup>  | 33.9              | 32.0    | 30.1                  | 25.5                            | 30.4                    |
| Dung in 1953                          |                              | 35.6              | 32.2    | 33.6                  | 31.8                            | 33.3                    |
| Mean                                  | ( $\pm 1.77$ )               | 34.7              | 32.1    | 31.9                  | 28.6                            | 31.8                    |
| Increase                              | ( $\pm 2.12$ )               | 1.7               | 0.2     | 3.5                   | 6.3                             | 2.9<br>( $\pm 1.06$ )   |
| Barley, Straw: cwt per acre           |                              |                   |         |                       |                                 |                         |
| No dung                               |                              | 42.1              | 35.2    | 30.5                  | 27.4                            | 33.8                    |
| Dung in 1953                          |                              | 48.9              | 44.4    | 41.9                  | 39.7                            | 43.7                    |
| Mean                                  |                              | 45.5              | 39.8    | 36.2                  | 33.5                            | 38.8                    |
| Increase                              |                              | 6.8               | 9.2     | 11.4                  | 12.3                            | 9.9                     |

<sup>\*</sup>for use in comparisons other than vertical.

54/Bf/1.1

# WOBURN MARKET GARDEN EXPERIMENT

Organic manures and N - Lansome 1954 the 13th year.

The present cropping comprises two series, each carrying in turn the crops of a two course rotation: 1st year - Globe beet followed by spring cabbages; 2nd year - Leeks.

Note: The results for the spring cabbages 1954-55 will be included in the 1955 report.

System of replication (each series): 4 randomized blocks of 10 plots each, certain interactions being confounded with block differences.

Area of each plot: 0.0125 acre.

Treatments applied to each crop:

Organic manures: Dung; sewage sludge compost; sewage sludge (West Middlesex); vegetable compost, each at 10 and 20 tons per acre.

N (applied as nitrochalk): None; 0.3 cwt per acre on plots receiving organic manure. None; 0.3; 0.6; 0.9 cwt per acre on plots not receiving organic manure. The last two rates are applied in two equal dressings.

Basal manuring per acre to each crop: 0.3 cwt  $P_2O_5$ ; 0.3 cwt  $K_2O$ , applied as granular fertilizer (13%  $P_2O_5$ ; 13%  $K_2O$ ).

Cultivations, etc.:

Globe beet. Organic manures applied and ploughed in: Mar 31. Nitrochalk and basal fertilizers applied: May 10. Seed drilled at 13 lb per acre: May 11. Singled: June 16. Second dressing of nitrochalk: June 25. Sprayed with systemic insecticide: June 21. Harvested: Aug 13 - Sept 21. Variety: Detroit.

Leeks. Organic manures applied and ploughed in: July 22. Nitrochalk and basal fertilizers applied: July 27. Planted: Aug 3. Second dressing of nitrochalk applied: Sept 22. Harvested: Mar 8 - 31, 1955. Variety: Musselburgh.

Standard errors per plot.

Globe beet, saleable bulbs: 1.15 tons per acre or 17.3% (17 d.f.)  
Leeks, saleable produce: 0.316 tons per acre or 10.8% (17 d.f.)

54/Bf/1.2

Summary of Results

## Globe Beet

| Organic manures                  | Level of<br>manuring | N: cwt per acre    |                    |      |      | Mean     |
|----------------------------------|----------------------|--------------------|--------------------|------|------|----------|
|                                  | tons per acre        | None               | 0.3                | 0.6  | 0.9  |          |
| Saleable bulbs: tons per acre    |                      |                    |                    |      |      |          |
|                                  |                      |                    | (±0.813)           |      |      | (±0.575) |
| None                             |                      | 0.59               | 3.17               | 3.63 | 0.69 | 1.88*    |
| Dung                             | 10                   | 2.86               | 8.47               |      |      | 5.66     |
|                                  | 20                   | 12.64              | 12.69              |      |      | 12.67    |
| Sludge compost                   | 10                   | 3.35               | 6.93               |      |      | 5.14     |
|                                  | 20                   | 6.85               | 8.46               |      |      | 7.66     |
| Sludge                           | 10                   | 6.56               | 6.98               |      |      | 6.77     |
|                                  | 20                   | 8.18               | 9.97               |      |      | 9.08     |
| Vegetable compost                | 10                   | 4.92               | 6.20               |      |      | 5.56     |
|                                  | 20                   | 6.46               | 13.15              |      |      | 9.81     |
| Mean (±0.288)                    |                      | 6.48 <sup>+</sup>  | 9.11 <sup>+</sup>  |      |      | 6.64     |
| Total produce: tons per acre     |                      |                    |                    |      |      |          |
| None                             |                      | 2.16               | 6.03               | 6.91 | 2.28 | 4.09*    |
| Dung                             | 10                   | 5.23               | 13.52              |      |      | 9.37     |
|                                  | 20                   | 19.80              | 19.73              |      |      | 19.77    |
| Sludge compost                   | 10                   | 6.05               | 11.32              |      |      | 8.68     |
|                                  | 20                   | 11.80              | 13.87              |      |      | 12.84    |
| Sludge                           | 10                   | 11.67              | 12.28              |      |      | 11.97    |
|                                  | 20                   | 13.85              | 16.64              |      |      | 15.25    |
| Vegetable compost                | 10                   | 8.20               | 9.92               |      |      | 9.06     |
|                                  | 20                   | 10.42              | 20.56              |      |      | 15.49    |
| Mean                             |                      | 10.88 <sup>+</sup> | 14.73 <sup>+</sup> |      |      | 11.11    |
| Plant number: thousands per acre |                      |                    |                    |      |      |          |
| None                             |                      | 46.3               | 64.8               | 63.2 | 37.9 | 55.6*    |
| Dung                             | 10                   | 49.8               | 69.5               |      |      | 59.7     |
|                                  | 20                   | 82.8               | 75.2               |      |      | 79.0     |
| Sludge compost                   | 10                   | 52.9               | 75.8               |      |      | 64.4     |
|                                  | 20                   | 72.8               | 66.4               |      |      | 69.6     |
| Sludge                           | 10                   | 66.6               | 75.6               |      |      | 71.1     |
|                                  | 20                   | 66.9               | 73.0               |      |      | 70.0     |
| Vegetable compost                | 10                   | 59.0               | 64.6               |      |      | 61.8     |
|                                  | 20                   | 59.4               | 83.2               |      |      | 71.3     |
| Mean                             |                      | 63.8 <sup>+</sup>  | 72.9 <sup>+</sup>  |      |      | 65.3     |

\*Mean over None and 0.3 cwt N per acre only.

<sup>+</sup>Excluding 'No organics'.

54/Bf/1.3

| Leeks                           |                      |                   |                   |      |      |          |
|---------------------------------|----------------------|-------------------|-------------------|------|------|----------|
| Organic manures                 | Level of<br>manuring | N: cwt per acre   |                   |      |      | Mean     |
|                                 | tons per acre        | None              | 0.3               | 0.6  | 0.9  |          |
| Saleable produce: tons per acre |                      |                   |                   |      |      |          |
|                                 |                      |                   | (±0.224)          |      |      | (±0.158) |
| None                            |                      | 1.09              | 2.08              | 2.47 | 2.61 | 1.58*    |
| Dung                            | 10                   | 2.87              | 3.47              |      |      | 3.17     |
|                                 | 20                   | 3.06              | 3.69              |      |      | 3.37     |
| Sludge compost                  | 10                   | 2.85              | 3.46              |      |      | 3.16     |
|                                 | 20                   | 3.64              | 3.19              |      |      | 3.42     |
| Sludge                          | 10                   | 2.92              | 2.83              |      |      | 2.87     |
|                                 | 20                   | 2.87              | 3.29              |      |      | 3.08     |
| Vegetable compost               | 10                   | 2.71              | 3.06              |      |      | 2.89     |
|                                 | 20                   | 3.05              | 3.54              |      |      | 3.30     |
| Mean (±0.079)                   |                      | 3.00 <sup>+</sup> | 3.32 <sup>+</sup> |      |      | 2.94     |
| Percentage saleable (by number) |                      |                   |                   |      |      |          |
| None                            |                      | 75.3              | 89.2              | 94.9 | 93.4 | 82.2*    |
| Dung                            | 10                   | 97.0              | 98.1              |      |      | 97.6     |
|                                 | 20                   | 97.0              | 96.7              |      |      | 96.8     |
| Sludge compost                  | 10                   | 95.7              | 98.7              |      |      | 97.2     |
|                                 | 20                   | 99.6              | 95.3              |      |      | 97.4     |
| Sludge                          | 10                   | 97.0              | 95.4              |      |      | 96.2     |
|                                 | 20                   | 96.0              | 98.7              |      |      | 97.3     |
| Vegetable compost               | 10                   | 93.8              | 95.7              |      |      | 94.8     |
|                                 | 20                   | 96.1              | 98.1              |      |      | 97.1     |
| Mean                            |                      | 96.5 <sup>+</sup> | 97.1 <sup>+</sup> |      |      | 95.1     |

\*Mean over None and 0.3 cwt N per acre only.

<sup>+</sup>Excluding 'No organics'.

54/Bg/1.1

# IRRIGATION EXPERIMENT

The 4th year

The effects of irrigation and nitrogen - Woburn Butt Close 1954.

The cropping comprises four series; three of these in turn carry the crops of a 3-course rotation:-

1st year: Potatoes  
2nd year: Sugar beet  
3rd year: Barley

The fourth series (formerly 3-year ley) was resown to 3-year S37 in 1954. Cocksfoot ley for cutting.

In 1954 maincrop potatoes replaced early potatoes followed by cabbages.

System of replication: 3 randomised blocks of 4 plots each, plots being split into two for the application of nitrogen.

Area of each sub plot: Cut grass - 0.0264, remainder - 0.0278 acre.

Area harvested: Cut grass - 0.0165, potatoes - 0.0155, sugar beet - 0.0176, barley - 0.0168 acre.

Treatments: All combinations of:-

Whole plots. Irrigation: None (0 and 3 other treatments A, B and C as specified below

N.B: On potatoes 0 = B. On sugar beet, 0 = B and A = C. On cut grass, 0 plots received .50" irrigation.

Sub plots. Nitrogen: 2 levels applied to crop as below.

Rainfall and Irrigation: inches

| Week-<br>ending | Rainfall | Potatoes |   |      | Sugar<br>beet<br>A & C | Barley |     |      | Cut Grass |      |      |      |
|-----------------|----------|----------|---|------|------------------------|--------|-----|------|-----------|------|------|------|
|                 |          | A        | B | C    |                        | A      | B   | C    | 0         | A    | B    | C    |
| May 17          | 0.04     |          |   |      |                        | .50    |     | .50  | .50       | .50  | .50  | .50  |
| 24              | 0.18     |          |   |      | .50                    | .50    |     | .50  |           | .25  | .25  | .25  |
| 31              | 1.40     | .50      |   | .50  |                        |        |     |      |           |      | .25  | .50  |
| June 7          | 1.08     |          |   |      |                        |        |     |      |           |      |      |      |
| 14              | 1.73     |          |   |      |                        |        |     |      |           |      |      |      |
| 21              | 0.01     |          |   |      |                        |        |     |      |           |      |      |      |
| 28              | 0.08     |          |   | .50  |                        |        |     |      |           |      | .50  | .67  |
| July 5          | 0.26     | .85      |   | .75  | .75                    |        | .75 | .75  |           | .25  | .25  | .51  |
| 12              | 0.26     | .40      |   |      |                        |        |     |      |           | .17  |      |      |
| 19              | 0.90     |          |   | .20  |                        |        |     |      |           |      | .27  | .51  |
| 26              | 0.75     | .42      |   | .24  |                        |        |     |      |           |      |      |      |
| Total           | 6.69     | 2.17     |   | 2.19 | 1.25                   | 1.00   | .75 | 1.75 | .50       | 1.17 | 2.02 | 2.94 |

54/Bg/1.2

Levels of nitrogen (in addition to N in basal dressing):

N cwt per acre as nitrochalk

|            |                                          |
|------------|------------------------------------------|
| Potatoes   | None; 0.5                                |
| Sugar beet | None; 0.4                                |
| Barley     | None; 0.2                                |
| Cut grass  | 0.15; 0.3 (in spring and after each cut) |

Basal dressings: cwt per acre

As compound fertilizer

|                    | N    | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | Salt | Dung    |
|--------------------|------|-------------------------------|------------------|------|---------|
| Potatoes           | 0.5  | 0.5                           | 0.75             | -    | 15 tons |
| Sugar beet         | 0.4  | 0.4                           | 0.6              | 5    | -       |
| Barley             | 0.2  | 0.2                           | 0.3              | -    | -       |
| Cut grass (yearly) | None | 0.6                           | 1.2              | -    | -       |

Cultivations, etc.:

Potatoes. Ploughed: Aug 25 and again Oct 21, 1953. F.Y.M. applied: Mar 23, 1954. Ploughed: Mar 23. Fertilizers applied: Mar 30. Potatoes planted by machine: Apr 6. Earthed up: June 15. Sprayed with copper fungicide, medium volume, 5 lb in 40 gallons per acre: July 30. At low volume, 5 lb in 10 gallons: Aug 16 and again Aug 27. Sprayed with 20% sulphuric acid: Sept 23. Lifted: Oct 7. Variety: Majestic.

Sugar beet. Ploughed: Mar 2. Fertilizers applied: Mar 30. Seed drilled at 18 lb per acre: Apr 5. Singled: May 28. Sprayed with Parathion, low volume: June 18. Lifted: Oct 27. Variety: Klein E.

Barley. Ploughed: Dec 24, 1953. Fertilizers applied: Mar 15, 1954. Seed drilled at 3 bushels per acre: Mar 16. Harvested: Aug 16. Variety: Herta.

Cut grass. Ploughed: Nov 24, 1953. Basal fertilizer and nitrochalk applied: Apr 6, 1954. Grass seed sown at 28 lb per acre: Apr 7. Sprayed MCPA, low volume, 2 pints per acre: June 19. Cut: June 16, July 15 (high N plots), July 23 (low N plots), July 30 (high N plots), Aug 17, Sept 10, Nov 4. Nitrochalk applied after each cut except the last. Variety: Cocksfoot S37.

54/Bg/1.3

## Standard errors per plot:

|                                |                |             |                             |           |
|--------------------------------|----------------|-------------|-----------------------------|-----------|
| Potatoes,                      | Total tubers,  | whole plot: | 0.731 tons per acre or 4.7% | (7 d.f.)  |
|                                |                | sub plot:   | 1.069 tons per acre or 6.9% | (9 d.f.)  |
| Sugar beet,                    | Total sugar,   | whole plot: | 4.83 cwt per acre or 10.9%  | (8 d.f.)  |
|                                |                | sub plot:   | 4.25 cwt per acre or 9.6%   | (10 d.f.) |
| Tops,                          |                | whole plot: | 1.21 tons per acre or 12.5% | (8 d.f.)  |
|                                |                | sub plot:   | 1.16 tons per acre or 12.0% | (10 d.f.) |
| Barley,                        | Grain,         | whole plot: | 1.08 cwt per acre or 3.1%   | (6 d.f.)  |
|                                |                | sub plot:   | 1.75 cwt per acre or 4.9%   | (8 d.f.)  |
| Cut grass<br>(total of 6 cuts) | Hay (85% D.M.) | whole plot: | 6.89 cwt per acre or 14.3%  | (6 d.f.)  |
|                                |                | sub plot:   | 5.01 cwt per acre or 10.4%  | (8 d.f.)  |

Summary of Results

| cwt N per acre                        | O & B                        | Irrigation                   |       | Mean            |
|---------------------------------------|------------------------------|------------------------------|-------|-----------------|
|                                       |                              | A                            | C     |                 |
| Potatoes, total tubers: tons per acre |                              |                              |       |                 |
|                                       | ( $\pm 0.429$ ) <sup>*</sup> | ( $\pm 0.607$ ) <sup>*</sup> |       |                 |
| 0.0                                   | 14.06                        | 13.42                        | 13.25 | 13.70           |
| 0.5                                   | 17.88                        | 16.94                        | 16.95 | 17.41           |
| Mean                                  | ( $\pm 0.422$ )              | 15.97 <sup>(1)</sup>         | 15.18 | 15.55           |
| Difference                            | ( $\pm 0.873$ )              | 3.82 <sup>(2)</sup>          | 3.52  | 3.71            |
|                                       |                              |                              |       | ( $\pm 0.436$ ) |

|                           |      |      |      |      |
|---------------------------|------|------|------|------|
| Potatoes, percentage ware |      |      |      |      |
| 0.0                       | 87.0 | 83.7 | 85.5 | 85.8 |
| 0.5                       | 91.2 | 86.2 | 88.4 | 89.8 |
| Mean                      | 89.1 | 86.0 | 87.0 | 87.8 |
| Difference                | 4.2  | 4.5  | 2.9  | 4.0  |

(1)  $\pm 0.298$ (2)  $\pm 0.617$ <sup>\*</sup> for use in comparisons other than vertical.

54/Bg/1.4

| cwt N per acre              | Irrigation       |      |      |      | Mean            |
|-----------------------------|------------------|------|------|------|-----------------|
|                             | 0                | A    | B    | C    |                 |
| Barley, grain: cwt per acre |                  |      |      |      |                 |
|                             | ( $\pm 0.949$ )* |      |      |      |                 |
| 0.0                         | 31.3             | 35.7 | 35.6 | 33.1 | 33.9            |
| 0.2                         | 36.8             | 36.3 | 38.6 | 36.0 | 36.9            |
| Mean ( $\pm 0.625$ )        | 34.0             | 36.0 | 37.1 | 34.6 | 35.4            |
| Difference ( $\pm 1.428$ )  | 5.5              | 0.6  | 3.0  | 2.9  | 3.0             |
|                             |                  |      |      |      | ( $\pm 0.714$ ) |

|                             |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| Barley, straw: cwt per acre |      |      |      |      |      |
| 0.0                         | 25.5 | 29.3 | 28.4 | 28.3 | 27.9 |
| 0.2                         | 35.7 | 35.0 | 33.8 | 36.3 | 35.2 |
| Mean                        | 30.6 | 32.1 | 31.1 | 32.3 | 31.5 |
| Difference                  | 10.2 | 5.7  | 5.4  | 8.0  | 7.3  |

|                                                   |              |                   |      |      |                      |
|---------------------------------------------------|--------------|-------------------|------|------|----------------------|
| Cut grass, hay (at 85% D.M.) 6 cuts: cwt per acre |              |                   |      |      |                      |
|                                                   |              | $(\pm 4.47)^{\#}$ |      |      |                      |
| 0.15                                              | 37.9         | 37.5              | 35.0 | 38.4 | 37.2                 |
| 0.30                                              | 61.6         | 56.0              | 59.5 | 60.8 | 59.5                 |
| Mean                                              | $(\pm 3.98)$ | 49.8              | 46.7 | 47.2 | 49.6                 |
| Difference                                        | $(\pm 4.09)$ | 23.7              | 18.5 | 24.5 | 22.4                 |
|                                                   |              |                   |      |      | 22.3<br>$(\pm 2.04)$ |

| cwt N per acre                            | Irrigation |        | Mean  |
|-------------------------------------------|------------|--------|-------|
|                                           | C & B      | A. & C |       |
| Sugar beet, roots (washed): tons per acre |            |        |       |
| 0.0                                       | 12.26      | 12.46  | 12.36 |
| 0.4                                       | 13.56      | 13.30  | 13.43 |
| Mean                                      | 12.91      | 12.88  | 12.90 |
| Difference                                | +1.30      | +0.84  | +1.07 |

|                              |      |      |      |
|------------------------------|------|------|------|
| Sugar beet, sugar percentage |      |      |      |
| 0.0                          | 17.1 | 17.2 | 17.1 |
| 0.4                          | 17.2 | 17.3 | 17.2 |
| Mean                         | 17.1 | 17.2 | 17.2 |
| Difference                   | 0.1  | 0.1  | 0.1  |

<sup>#</sup> for use in comparisons other than vertical

54/Bg/1.5

| cwt N per acre                        | Irrigation                  |       | Mean                   |
|---------------------------------------|-----------------------------|-------|------------------------|
|                                       | C & B                       | A & C |                        |
| Sugar beet, total sugar: cwt per acre |                             |       |                        |
|                                       | ( $\pm 2.32$ ) <sup>±</sup> |       |                        |
| 0.0                                   | 41.9                        | 42.8  | 42.4                   |
| 0.4                                   | 46.6                        | 46.1  | 46.4                   |
| Mean                                  | ( $\pm 1.96$ )              |       | 44.4                   |
| Difference                            | ( $\pm 2.46$ )              |       | -4.0<br>( $\pm 1.74$ ) |

|                                 |                 |       |                       |
|---------------------------------|-----------------|-------|-----------------------|
| Sugar beet, tops: tons per acre |                 |       |                       |
|                                 | $(\pm 0.597)^*$ |       |                       |
| 0.0                             | 9.11            | 9.23  | 9.17                  |
| 0.4                             | 10.07           | 10.28 | 10.17                 |
| Mean                            | $(\pm 0.494)$   |       | 9.67                  |
| Difference                      | $(\pm 0.672)$   |       | 1.00<br>$(\pm 0.475)$ |

|                                             |    |    |    |
|---------------------------------------------|----|----|----|
| Sugar beet, noxious nitrogen: mg per 100 g. |    |    |    |
| 0.0                                         | 25 | 25 | 25 |
| 0.4                                         | 30 | 25 | 25 |
| Mean                                        | 25 | 25 | 25 |
| Difference                                  | 5  | 0  | 0  |

\* for use in comparisons other than vertical.