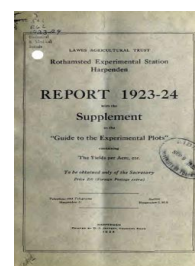


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# Report for 1923-1924 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



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## Rothamsted Experimental Plots

### Rothamsted Research

Rothamsted Research (1925) *Rothamsted Experimental Plots* ; Report For 1923-1924 With The Supplement To The Guide To The Experimental Plots Containing The Yields Per Acre Etc., pp 72 - 129 - DOI: <https://doi.org/10.23637/ERADOC-1-116>

### BOOKS PUBLISHED DURING 1923-4.

- J. DAVIDSON. "*A List of British Aphides*" (including notes on their synonymy, their recorded distribution and food-plants in Britain, and a food-plant index). Longmans, Green & Co. (in the press).

This work has been prepared owing to the great economic importance of aphides in relation to farm, garden and orchard crops, and their possible association with so-called mosaic diseases. Buckton's *Monograph on British Aphides* was published about 45 years ago, and since that time many more species have been recorded and the nomenclature has undergone drastic changes.

In the present work the species are placed in accordance with the more recent nomenclature. It is divided into four sections. Section 1 deals with the species in alphabetical order together with their food-plants and distribution in Britain. Section 2 deals with the genera, including critical notes. Section 3 is a food-plant index, forming a key to Section 1, and Section 4 a bibliography of 360 titles.

The work is intended to be a reference list and to serve as a general guide to the identification of the species of aphides.

- R. A. FISHER. "*Statistical Methods for Research Workers*." Oliver and Boyd, Edinburgh (in the press).

The wide increase in the employment of statistical methods, especially in scientific research, has been accompanied by exceptionally rapid progress in recent years in the solution of the mathematical problems which confront the statistician. Most of the mathematical problems which confront the statistician. Most of the mathematical researches of the author have been undertaken in direct response to the needs of the laboratory worker, and with a view to the development of statistical methods adequate to the practical requirements of biological and agricultural research.

The aim of the book is to provide the non-mathematical scientific worker with the detailed application of precise statistical methods, which have been available hitherto only in specialised mathematical publications. The methods are illustrated throughout with numerical examples, drawn from recent scientific literature, giving the methods of computation in detail. New mathematical tables have been specially calculated for rendering the crucial tests simple and exact.

### THE CROP RESULTS. OCTOBER, 1922, TO SEPTEMBER, 1923.

The outstanding features of the season October 1922 to September 1923, were the sunless spring and the earliness and severity of the autumn frosts of 1923.

The year commenced favourably; October was unusually dry; it had the lowest rainfall figures for this month (0.787in. against an average of 3.06in.) since our records began, so the ploughing and drilling were got well forward. The dry weather continued into November, and with the help of night frosts which

broke down the newly turned furrows, everything was in favour of winter sowing. December was fairly mild; the first part of the month was dry but the second half was very wet, there being nearly 3in. of rain during this period. This precipitation, although unwelcome at the time, added appreciably to the stores of underground water, which had been seriously depleted by the drought of 1921, and not restored by the rainfall of 1922. Winter corn looked well and the young clover still maintained a satisfactory plant. January 1923 was dry, only 1.50 in. of rain being registered against an average of 2.41in. for this month. The sunshine and mean air temperature were both above the average, but the ground temperatures were not, and seventeen ground frosts were experienced in this month.

A change came in February. There was more than double the normal rainfall and the month was practically lost as far as field work and threshing was concerned. The wet spell continued into March, and not until its last few days could work on the land be resumed. The weather had not been unduly cold; the mean air temperature was, in fact, above the average both for February and March. Wheat and oats had made no progress in the sodden conditions of the two months, but when the water got away, they tillered out rapidly. A dry and dull April saw most of the spring sowings made under favourable conditions, a warm spell at the end of the month giving the barley a good start. May was drier than usual, but cold sunless weather set in with occasional frosts. The barley kept going better than might have been expected, but clover coming into bloom was severely checked. June was a month of warm droughty weather although actually duller than either April or May—the hours of bright sunshine being no less than 86 below the monthly average. The deep rooting crops came on fairly well, but barley gave signs of needing rain before the month was out. For each of the five months, February-June inclusive, there had been a deficiency of sunshine which amounted on the average to no less than  $1\frac{1}{2}$  hours per day. Naturally the soil temperature was lower than usual, and although the rainfall had not been high, the evaporation was reduced because of the lack of sunshine, and this led to a slightly greater percolation of water through the 60in. gauge. Warmer and much brighter weather came in July, the nights being for the first time warm. The striking feature of the month was the exceedingly heavy thunder showers on the night of the 9th, which, with the falls occurring on the following day, brought down  $2\frac{1}{4}$  ins. of rain. Fortunately, our corn was not lodged, although elsewhere heavy crops of oats were badly laid over a wide area in the track of the storm. Hay was got in under good conditions and crops were satisfactory: the clover hay averaged 28 cwts. per acre over the farm and meadow hay yielded 35 cwts. on the manured land of Great Field. August was the best month of the year. The daily average of 11 hours of sunshine for the first fortnight caused some wilting of the shallow rooted crops, but refreshing rains came later in the month. The harvest weather was perfect for oats and wheat, but a little rain fell

before the barley was cut. The Broadbalk field was cleared by August 28th, and stubble cultivation was put in hand at once. Wheat yielded satisfactorily on Great Knott field, where it had been well done ( $37\frac{1}{2}$  bu.), but on Great Harpenden field, where the record root crops of the previous year had exhausted the land, the yield was disappointing (24 bu.). Oats did fairly well and proved responsive to manures, a dressing of 1 cwt. of sulphate of ammonia and 2 cwt. of superphosphate increasing the crop from 26.4 bu. to 37.3 bu. per acre; while 2 cwt. sulphate of ammonia and 2 cwt. superphosphate pushed up the yield to 46.5 bu. The barley suffered from the drought in June, and the extraordinary lack of sunshine in spring and early summer: it yielded as well as could be expected—40 bu. on the better land, and 32 bu. on poorer tilths—while the quality was good and distinctly better than in 1922.

September was a favourable month, harvest was completed and ploughing continued. October set in wet, however, and  $1\frac{3}{4}$  in. of rain was recorded in excess of the average. Root lifting was badly hindered, and the hand digging of potato plots was exceptionally slow and difficult. November brought cold drying weather, and frosts occurred on 23 nights during the month. They were exceptionally severe on the nights of the 25th and 26th, when 18 and 19 degrees of frost respectively were recorded on the grass: practically all unharvested mangolds and potatoes were lost.

In spite of the lack of sunshine, the mangolds on Barn field did well and exceeded their average yield, but a large number of the plants rotted. Swedes, in spite of adequate manuring, were only a fair crop (14 tons); a good plant was obtained, but the bulbs failed to fill out. The sheep on the grazing plots did well; there was plenty of keep and bigger live weight increases per acre were obtained than in either of the previous seasons.

#### OCTOBER, 1923, TO SEPTEMBER, 1924.

The season 1923-24 was distinguished by its wetness and by one of the most protracted harvests of recent years. The rainfall of 36.5 in. exceeded the average by 7.96 in., only two wetter seasons (1903 and 1912) having been recorded since readings were commenced at this station in 1853. It is interesting to note that the twentieth century, though only in its early stages, has already produced three years that have been wetter than anything known to the Victorians—wetter even than the notorious year, 1879. Under the wet conditions, weeds got ahead, in many cases smothering the legitimate crop, and produced one of the foulest seasons for many years.

The season opened badly for farm work. October was very wet and drilling was hindered. The frosts and dry weather of November enabled all the winter corn to be sown by the 21st, but December and January were both difficult months for late sown cereals; very little flag was made and there was a loss of plant. The land was saturated with water and impossible to

work until the hard dry weather of February, with a rainfall of 0.714in. only, against the 71 year average of 1.889in. for this month, brought the furrow into a splendid condition for the spring working. The complete change in the soil condition effected by the February weather is well illustrated by a comparison of the drain-gauge figures for this month and January. In January the drainage through all three gauges was in excess of the rainfall in consequence of the saturated state of the soil in December and the early snow-drifts on the gauges in January: the rain was 2.90in. and the drainage (60in. gauge) 3.20in.; while the February rain was 0.71in. and the drainage (60in. gauge) only 0.09in. Only 12.2 per cent. of the rain had percolated in February against an average of 75 per cent. for this month. However, the dryness of the February brought no relief to the struggling cereal crops.

The weather in March was well suited to cultivation: there were long spells of brilliant sunshine (no less than 56 per cent. over the average), a low rainfall, but with ground frosts each night except for a period of six days towards the end. In consequence barley was drilled under particularly favourable conditions in the latter half of the month. This was a general experience, many heavy land farmers never having seen spring corn go in so well. The frosts continued beyond the middle of April, and made the spring one of the latest within living memory. Later in April came milder and better weather; clover began to fill up after the long winter, barley made a good start, but winter corn was still backward, and oats in particular had lost much plant. With May the ground became much warmer, and by the end of the month the 12in. soil thermometer had risen by 10° F. to 58.8° F. May was, however, persistently wet. There were only 7 days on which no rain fell, and the total fall of 4.63in. was 2.58in. in excess of the monthly average. Weeds grew fast in the corn, and barley was checked by the wet conditions and the lack of sunshine. Rain continued during the first half of June and seriously interfered with hoeing, the very foul condition of Broadbalk being largely due to this cause. The second half of the month was warm and less wet. Clover promised excellent crops all over the farm, but some had been laid by the storms. Grass was growing too fast for the sheep on the grazing plots, although the stocking was heavier than in previous years. The first half of July contained the only period during the whole year that could properly be described by the name of summer—the nine days, July 8th-16th. The backward plants of wheat came on surprisingly well and gave promise of a fair crop. Hay making proceeded without any serious check, the coming of the fine spell at hay time being one of the few good features of the season. Crops were large, the unmanured meadow hay on Great field yielding 32 cwt., while the clover on Long Hoos averaged 42 cwt. per acre.

With the passing of the 9 fine days wet weather set in again; the aftermaths freshened up rapidly and regular plants of swedes and mangolds showed excellent promise although the mangolds needed sun.

August, though not wetter than the normal, was showery and sunless; ripening of the cereals was slow and uneven and cutting was later than usual. Wheat continued to improve, but weeds got ahead and filled up the bottom of the crop. September did nothing to improve what promised to be a difficult harvest; the rainfall of 3.42in. was nearly 1in. in excess of the average and there was little sunshine or drying weather. The bulk of the harvest was secured during the month, but much was in bad condition for early threshing. October, with 4.28in. of rain, had more than the normal rainfall by 1.14in., and with the shortening days and damp misty weather the labour involved in securing the remainder of the harvest was excessive. Cutting finished on October 17th.

Although wheat and barley were not much below the average in yield, the quality was poor and much of the barley was fit only for feeding purposes. Winter oats had lost much plant in the severe weather; they became very foul in summer and yielded badly.

Swedes and potatoes promised big yields, and in spite of the dull weather, the mangolds on Barn field were up to the average. The digging of potatoes and the lifting of the roots was in no way helped by the weather, for both November and December were considerably wetter than the average. On the other hand the absence of serious frosts enabled the roots to be got in without loss. Swedes with complete artificials yielded 26 tons per acre, second only to the excellent crop of 1922. Potatoes yielded  $9\frac{1}{2}$  tons with dung and complete artificials, the crop being practically free from disease, although a rather large proportion of the produce was of seed size.

It was commonly complained that the year was sunless, but in this respect it was over its full course no worse than usual: for the whole of the calendar year the deficiency from the average was only 50 hours. The unfortunate character of the season was its persistent wetness. From July 17th to the end of the year there were only two occasions (August 10th and 11th) when the state of the ground at 9 a.m. was recorded as dry; on all other mornings it was wet or damp. The previous year was by no means sunny, yet the ground was recorded as dry on 24 occasions in the three months beginning on July 17th.

## WOBURN EXPERIMENTAL FARM.

REPORTS FOR 1923 & 1924 BY DR. J. A. VOELCKER.

### SEASON 1923.

A late harvest made cultivation of the land backward, but open and fairly dry weather in October and November gave favourable conditions for sowing winter crops. This continued throughout December and January, rainfall not being excessive and frost nearly absent. The whole winter, 1922-3, indeed, was marked by absence of frost. February and March were wet months, and the soil was left in somewhat sticky condition for spring sowing. April, May and June were all cold and unseasonable, with absence of sunshine and late frosts in May, and crops made but little progress. About June 25th a spell of very hot and dry weather set in, giving good conditions for hay-making, though the yield was small. A violent thunderstorm in July with heavy rainfall saved the swede and other root crops, and also clovers and "seeds," which were beginning to show the effect of the drought; corn crops also grew rapidly. The fine weather continuing until August 14th, oats and wheat were safely reaped, and good crops of roots and aftermath (clover and "seeds") were promised. The drought had a bad effect on spring-sown corn crops, the first shoots ripening prematurely, and, when the rain came, fresh shoots were sent up which never developed properly. The general result was to give an exceedingly poor corn yield, and the weights at threshing were even less than the appearance in the field had indicated. The early-sown barley ripened well, but the late-sown was practically a failure. On August 14th there was a severe thunderstorm, during which  $1\frac{1}{2}$  inches of rain fell, and, the remainder of the month proving cold and showery, the harvesting of barley was delayed until August 31st.

The total rainfall for the 12 months to September inclusive was 23.2 inches, there being 175 rainy days. The heaviest rainfall was in July, viz., 3.53 inches, February giving 3.03 inches, August and September 2.94 and 2.48 inches respectively.

### SEASON 1924.

The season 1923-4 was an altogether exceptional one. Heavy rainfall and long continued absence of sunshine and warmth combined to retard the growth of corn crops and to prevent their proper maturing. Weeds spread rapidly, and it was difficult to keep the land clean. Under these conditions only poor yields of low quality corn could be expected, especially as harvesting took place in bad weather.

The rainfall for the whole season, October 1923 to October 1924, was 30.30 inches as against 23.2 in 1923, with 201 rainy days (over .01 inch) against 175 in 1923. May—just the time when dryness and warmth were required—was by far the wettest month of the whole year, with 6.06 inches of rain, and 20 rainy days. On the other hand, February was the driest month, with only 0.48 inches of rain—in February, 1923, it was 3.03 inches.

The harvest months of July, August and September were alike wet, with 3.07, 2.32 and 3.17 inches of rain respectively.

The untoward weather influences were felt in very marked measure on the continuous wheat and barley plots, the returns for which were lower than for many years past. The highest yield of barley on the continuous plots was only 13 bushels per acre, whereas land close by in the same field gave, under rotation cropping, 27.3 bushels per acre where no nitrogen but only mineral manures had been applied.

Great difficulties also were experienced with the root crops, through the excessive washing of the soil and the floods that came in the latter part of May. One field was under water for some days, and in another the newly-planted potatoes were, in places, washed out and carried some distance away. The lucerne inoculation experiment was ruined by the flooding, and had to be abandoned. A great deal of the manure put in the land for the root crops must have been washed out, and so caused a diminution in the returns.

The one really good crop was hay—alike from rotation grasses, clover and from permanent pasture—and abundant crops were gathered in excellent condition.

#### FIELD EXPERIMENTS.

##### 1. *Continuous Growing of Wheat* (Stackyard Field), 1923. 1923 (47th Season).

"Red Standard" wheat,  $2\frac{1}{2}$  bushels per acre, was drilled on October 26th, 1922, farmyard manure having been ploughed in on 11b on October 19th and 20th, while mineral manures (phosphates and potash) were applied just previously to the sowing of the wheat, and rape dust (plot 10b) on November 14th. Nitrogenous top-dressings of sulphate of ammonia and nitrate of soda were given on May 15th and June 20th, 1923.

The wheat was cut on August 13th, stacked August 21st, and threshed November 14th, 1923.

The yield was exceptionally poor, the unmanured produce averaging 5.6 bushels of corn and 7 cwt. of straw per acre, against 8.5 bushels and 7.25 cwt. in the previous year. One has to go back to 1914 to find so bad a yield on these plots, the return for these two years being, indeed, very similar. Added to the difficulties of season was the fact that the damage done by pheasants to some of the normally weak plots was so great that they had to be resown later with spring wheat. This never came up satisfactorily and, for purposes of comparison and comment, the ammonia plots must be left out of account.

##### 1924 (48th Season).

"Red Standard" wheat, at the rate of 3 bushels per acre, was drilled on October 19th, 1923, plot 11b having received its farmyard manure and plot 10b its rape dust on October 16th, and mineral manures having been given to the other plots to receive them, on October 18th. The nitrogenous top-dressings were applied, the first halves on May 5th-6th, 1924, and the second

## Continuous Growing of Wheat, 1923 (47th Season) and 1924 (48th Season).

(Wheat grown year after year on the same land, the manures being applied every year.)

Stackyard Field—Produce per acre.

1923.

1924.

| Plot. | Manures per acre.                                                                 | Head Corn.      |                    |     | Tail Corn.      |                    |     | Straw, Chaff, &c. |       |        | Head Corn.      |                    |     | Tail Corn.      |                    |     | Straw, Chaff, &c. |     |        |
|-------|-----------------------------------------------------------------------------------|-----------------|--------------------|-----|-----------------|--------------------|-----|-------------------|-------|--------|-----------------|--------------------|-----|-----------------|--------------------|-----|-------------------|-----|--------|
|       |                                                                                   | No. of bushels. | Weight per bushel. | lb. | No. of bushels. | Weight per bushel. | lb. | cwt. q. lb.       | lb.   | q. lb. | No. of bushels. | Weight per bushel. | lb. | No. of bushels. | Weight per bushel. | lb. | cwt. q. lb.       | lb. | q. lb. |
| 1     | Unmanured                                                                         | 5.2             | 62.0               | 320 | 4               | —                  | —   | 5 0 6             | 1.8   | 56.0   | 2               | —                  | —   | 2               | —                  | —   | 4 1 4             | —   | —      |
| 2a    | Sulphate of Ammonia (=25 lb. Ammonia)                                             | —               | —                  | —   | —               | —                  | —   | —                 | —     | —      | —               | —                  | —   | —               | —                  | —   | —                 | —   | —      |
| 2aa   | As 2a, with 5 cwt. Lime, Jan., 1905, repeated 1909, 1910, and 1911                | 6.0             | 61.5               | 369 | 8               | —                  | —   | 8 2 0             | 3.6   | 55.0   | 4               | —                  | —   | 4               | —                  | —   | 9 0 0             | —   | —      |
| 2b    | As 2a, with 2 tons Lime, Dec., 1897                                               | 2.0             | 60.0               | 120 | 10              | —                  | —   | 2 0 24            | 2.7   | 56.0   | 2               | —                  | —   | 2               | —                  | —   | 5 1 4             | —   | —      |
| 2bb   | As 2b, with 2 tons Lime repeated Jan., 1905                                       | 3.4             | 61.7               | 208 | 6               | —                  | —   | 4 3 12            | 6.6   | 56.5   | 4               | —                  | —   | 4               | —                  | —   | 9 1 4             | —   | —      |
| 3a    | Nitrate of Soda (=50 lb. Ammonia)                                                 | 11.7            | 61.5               | 719 | 8               | —                  | —   | 10 3 4            | 15.0  | 56.0   | 4               | —                  | —   | 4               | —                  | —   | 18 2 4            | —   | —      |
| 3b    | Nitrate of Soda (=25 lb. Ammonia)                                                 | 10.6            | 61.7               | 654 | 8               | —                  | —   | 9 2 12            | 14.3  | 56.0   | 12              | —                  | —   | 12              | —                  | —   | 18 0 20           | —   | —      |
| 4     | Mineral Manures (Superphosphate 3 cwt., Sulphate of Potash ½ cwt.)                | 8.9             | 61.0               | 541 | 4               | —                  | —   | 9 2 4             | 3.5   | 57.0   | 4               | —                  | —   | 4               | —                  | —   | 5 3 14            | —   | —      |
| 5a    | Mineral Manures and Sulphate of Ammonia (=25 lb. Ammonia)                         | 1.5             | 60.0               | 90  | 4               | —                  | —   | 2 0 24            | 4.0   | 56.0   | 4               | —                  | —   | 4               | —                  | —   | 7 3 20            | —   | —      |
| 5b    | As 5a, with 1 ton Lime, Jan., 1905                                                | 6.4             | 61.5               | 394 | 8               | —                  | —   | 7 1 16            | 6.4   | 55.5   | 2               | —                  | —   | 2               | —                  | —   | 10 0 0            | —   | —      |
| 6     | Mineral Manures and Nitrate of Soda (=25 lb. Ammonia)                             | 13.0            | 61.0               | 793 | 6               | —                  | —   | 11 1 0            | 15.2  | 55.5   | 11              | —                  | —   | 11              | —                  | —   | 20 3 10           | —   | —      |
| 7     | Unmanured                                                                         | 6.1             | 62.2               | 379 | 7               | —                  | —   | 5 3 2             | 1.4   | 56.0   | 2               | —                  | —   | 2               | —                  | —   | 4 2 2             | —   | —      |
| 8a    | Mineral Manures and, in alternate years, Sulphate of Ammonia (=50 lb. Ammonia)    | 1.5             | 62.0               | 93  | 8               | —                  | —   | 2 0 8             | —     | —      | —               | —                  | —   | —               | —                  | —   | —                 | —   | —      |
| 8aa   | As 8a, with 10 cwt. Lime, Jan., 1905, repeated Jan., 1918                         | 2.8             | 61.5               | 172 | 8               | —                  | —   | 5 1 12            | 6.8   | 56.0   | 4               | —                  | —   | 4               | —                  | —   | 16 3 12           | —   | —      |
| 8b    | Mineral Manures, Sulphate of Ammonia (=50 lb. Ammonia) omitted in alternate years | 1.2             | 62.0               | 74  | 4               | —                  | —   | 2 8               | —     | —      | —               | —                  | —   | —               | —                  | —   | —                 | —   | —      |
| 8bb   | As 8b, with 10 cwt. Lime, Jan., 1905, repeated Jan., 1918                         | 6.4             | 60.0               | 384 | 12              | —                  | —   | 6 2 24            | 4.0   | 56.0   | 4               | —                  | —   | 4               | —                  | —   | 8 3 4             | —   | —      |
| 9a    | Mineral Manures and, in alternate years, Nitrate of Soda (=50 lb. Ammonia)        | 10.0            | 60.5               | 605 | 10              | —                  | —   | 9 4 24            | 14.5  | 56.7   | 12              | —                  | —   | 12              | —                  | —   | 21 3 20           | —   | —      |
| 9b    | Mineral Manures, Nitrate of Soda (=50 lb. Ammonia) omitted in alternate years     | 3.8             | 60.5               | 230 | 4               | —                  | —   | 3 2 24            | 5.5   | 56.0   | 3               | —                  | —   | 3               | —                  | —   | 11 4 16           | —   | —      |
| 10a   | Superphosphate 3 cwt., Nitrate of Soda (=25 lb. Ammonia)                          | 11.9            | 61.5               | 732 | 8               | —                  | —   | 12 1 20           | 16.7* | 56.0   | 16              | —                  | —   | 16              | —                  | —   | 24 1 12           | —   | —      |
| 10b   | Rape dust (=25 lb. Ammonia)                                                       | 8.8             | 61.5               | 537 | 12              | —                  | —   | 10 0 16           | 9.5   | 57.2   | 8               | —                  | —   | 8               | —                  | —   | 15 0 24           | —   | —      |
| 11a   | Sulphate of Potash 1 cwt., Nitrate of Soda (=25 lb. Ammonia)                      | 10.5            | 62.0               | 651 | 8               | —                  | —   | 10 1 20           | 18.0* | 54.5   | 18              | —                  | —   | 18              | —                  | —   | 31 2 0            | —   | —      |
| 11b   | Farmyard Manure (=100 lb. Ammonia)                                                | 11.7            | 62.0               | 725 | 12              | —                  | —   | 14 1 24           | 17.5  | 54.1   | 30              | —                  | —   | 30              | —                  | —   | 32 3 24           | —   | —      |

\* Nitrate of Soda = 50 lb. Ammonia was, in error, applied in 1924 to plots 10a and 11a.

halves on June 18th. The wheat, though it came up quite well, was, for a considerable time afterwards, almost at a standstill, and was late in making a start. It looked better in January, 1924, but another period of stagnation occurred in March and April, and the crop moved but slowly. In June the farmyard manure plot (11b) looked the best; it was also specially noticeable that the nitrate of soda plots were better than the sulphate of ammonia ones, but much more weedy than any of the other plots. The crops being but small, stood up well and were cut on August 14th, carted on September 2nd and stacked, being threshed out the week before Christmas, 1924.

The produce, on account of the untoward conditions, was very poor—as low as any recorded during the whole 48 years. The unmanured produce was only 1.6 bushels of corn with 4 c. 1 qr. 17 lbs. of straw, etc., per acre; nitrate of soda was markedly superior to sulphate of ammonia throughout, but the heavier dressings were not better than the lighter ones. Lime still continued to show its influence, even in plot 2b (last limed in 1897).

The results for both years are given on page 79.

## 2. *Continuous Growing of Barley (Stackyard Field).*

### 1923 (47th Season).

Farmyard manure was applied (plot 11b) March 21st, 1923, mineral manures and rape dust on April 4th, and barley—"Plumage Archer"—at the rate of  $2\frac{1}{2}$  bushels per acre was drilled on April 5th. The first nitrogenous top-dressings were given on June 12th, the second on July 10th. On plot 2aa a further application of lime—10 cwt. per acre—was made in January 1923.

The season was very unfavourable for barley, and the crop was specially short in the straw. The farmyard manure plot (11b) was the only one to look even fair, and a small yield generally characterised the harvest which began on August 31st, the barley being stacked on September 1st and threshed November 11th, 1923.

The unmanured produce was only 3.9 bushels of corn with 6 cwt. 3 qrs. straw per acre, a yield below even the poor one of 1921. Nitrate of soda, both alone and with minerals, did much better than sulphate of ammonia, even when lime was given as well.

### 1924 (48th Season).

"Plumage Archer" barley, at the rate of 3 bushels per acre, was drilled on March 10th, 1924. Rape dust and farmyard manure had been previously (February 11th) applied to plots 10b and 11b. The barley was slow in coming up and was never more than a thin crop and not of good healthy colour; further, weeds were very abundant, especially on the nitrate of soda plots. The first top-dressings of nitrogenous salts were given on May 15th and 16th, the second on June 25th. A very poor crop only—as low as any during the whole 48 years' experiments—was obtained. This was cut on August 13th, carted and stacked on

*Continuous Growing of Barley, 1923 (47th Season), and 1924 (48th Season).*  
(Barley grown year after year on the same land, the manures being applied every year.)

Stackyard Field—Produce per acre.

1924.

1923.

| Plot. | Manures per acre.                                                                                      | 1923.           |                    |                   | 1924.           |                    |                   |
|-------|--------------------------------------------------------------------------------------------------------|-----------------|--------------------|-------------------|-----------------|--------------------|-------------------|
|       |                                                                                                        | Head Corn.      | Tail Corn.         | Straw, Chaff, &c. | Head Corn.      | Tail Corn.         | Straw, Chaff, &c. |
|       |                                                                                                        | No. of bushels. | Weight per bushel. |                   | No. of bushels. | Weight per bushel. |                   |
|       |                                                                                                        | lb.             | lb.                | cwt. q. lb.       | lb.             | lb.                | cwt. q. lb.       |
| 1     | Unmanured                                                                                              | 4.1             | 52.5               | 7 2 16            | 1.8             | 51.2               | 3 1 2             |
| 2a    | Sulphate of Ammonia (=25 lb. Ammonia)                                                                  | —               | —                  | —                 | —               | —                  | —                 |
| 2aa   | As 2a, with 5 cwt. Lime, Mar., 1905, repeated 1909, 1910 and 1912, and 10 cwt. Lime applied Jan., 1923 | 1.7             | 52.7               | 3 1 12            | 4.9             | 51.6               | 8 0 20            |
| 2b    | As 2a, with 2 tons Lime, Dec., 1897, repeated 1912                                                     | 3.2             | 52.0               | 5 2 8             | 4.1             | 51.0               | 5 2 12            |
| 2bb   | As 2a, with 2 tons Lime, Dec., 1897, repeated Mar., 1905                                               | 3.3             | 51.0               | 6 0 0             | 3.6             | 49.8               | 6 1 12            |
| 3a    | Nitrate of Soda (=50 lb. Ammonia)                                                                      | 11.1            | 51.5               | 14 0 0            | 5.0             | 50.5               | 8 3 20            |
| 3aa   | As 3a, with 2 tons Lime, Jan., 1921                                                                    | 8.0             | 51.2               | 9 2 24            | 3.6             | 49.0               | 7 1 16            |
| 3b    | Nitrate of Soda (=25 lb. Ammonia)                                                                      | 5.0             | 50.0               | 8 2 0             | 4.5             | 50.2               | 7 3 0             |
| 3bb   | As 3b, with 2 tons Lime, Jan., 1921                                                                    | 4.8             | 51.0               | 8 1 8             | 4.6             | 50.0               | 8 2 12            |
| 4a    | Mineral Manures <sup>1</sup>                                                                           | 5.8             | 50.2               | 5 2 10            | 2.1             | 49.8               | 3 1 6             |
| 4b    | As 4a, with 1 ton Lime, 1915                                                                           | 6.1             | 51.2               | 8 0 12            | 4.6             | 50.0               | 3 2 4             |
| 5a    | Mineral Manures and Sulphate of Ammonia (=25 lb. Ammonia)                                              | 2.2             | 51.7               | 3 1 12            | —               | —                  | —                 |
| 5aa   | As 5a, with 1 ton Lime, Mar., 1905, repeated 1916                                                      | 6.2             | 51.5               | 8 1 4             | 10.8            | 50.5               | 10 3 8            |
| 5b    | As 5a, with 2 tons Lime, Dec., 1897, repeated 1912                                                     | 6.5             | 51.5               | 8 2 20            | 7.1             | 50.5               | 5 1 18            |
| 6     | Mineral Manures and Nitrate of Soda (=25 lb. Ammonia)                                                  | 8.5             | 50.5               | 10 3 10           | 13.0            | 49.4               | 9 3 2             |
| 7     | Unmanured                                                                                              | 3.7             | 52.0               | 6 0 10            | 1.6             | 50.5               | 3 1 25            |
| 8a    | Mineral Manures and, in alternate years, Sulphate of Ammonia (=50 lb. Ammonia)                         | —               | —                  | —                 | —               | —                  | —                 |
| 8aa   | As 8a, with 2 tons Lime, Dec., 1897, repeated 1912                                                     | 8.7             | 52.0               | 8 1 4             | 13.9            | 51.0               | 10 3 12           |
| 8b    | Mineral Manures, Sulphate of Ammonia (=50 lb. Ammonia) omitted in alternate years                      | —               | —                  | —                 | —               | —                  | —                 |
| 8bb   | As 8b, with 2 tons Lime, Dec., 1897, repeated 1912                                                     | 6.3             | 52.0               | 8 3 4             | 6.6             | 51.0               | 6 1 16            |
| 9a    | Mineral Manures and, in alternate years, Nitrate of Soda (=50 lb. Ammonia)                             | 13.1            | 52.0               | 16 0 20           | 8.5             | 51.5               | 7 0 24            |
| 9b    | Mineral Manures, Nitrate of Soda (=50 lb. Ammonia) omitted in alternate years                          | —               | —                  | —                 | —               | —                  | —                 |
| 10a   | Superphosphate 3 cwt., Nitrate of Soda (=25 lb. Ammonia)                                               | 5.9             | 52.5               | 9 0 0             | 5.7             | 51.0               | 4 3 6             |
| 10b   | Rape dust (=25 lb. Ammonia)                                                                            | 5.6             | 52.0               | 7 0 12            | 8.5             | 51.0               | 8 0 14            |
| 11a   | Sulphate of Potash 1 cwt., Nitrate of Soda (=25 lb. Ammonia)                                           | 5.3             | 53.2               | 6 0 0             | 2.6             | 52.1               | 5 0 0             |
| 11b   | Farmyard Manure (=100 lb. Ammonia)                                                                     | 11.4            | 52.5               | 10 1 8            | 6.7             | 51.4               | 6 1 6             |
|       |                                                                                                        | 21.8            | 53.0               | 18 0 0            | 13.0            | 52.0               | 9 0 18            |

<sup>1</sup> Superphosphate 3 cwt., Sulphate of Potash  $\frac{1}{2}$  cwt.

August 31st and September 1st, and threshed just before Christmas.

The unmanured produce was only 1.7 bushels of corn with 3 c. 1 qr. 14 lb. of straw, etc., per acre. Sulphate of ammonia by itself, or with minerals and no lime, as usual, gave no crop, but with lime gave marked increases, going up to a yield of 13.9 bushels per acre (plot 8aa). Nitrate of soda did not, on the whole, do as well as sulphate of ammonia with lime, the highest yield with it being 13 bushels (plot 6).

The heavier dressings of nitrate of soda had no advantage over the lighter ones, nor did the use of lime on the nitrate plots produce any benefit.

The results for both years are given on page 81.

### 3. Rotation Experiments.

#### THE UNEXHAUSTED MANURE VALUE OF CAKE AND CORN (Stackyard Field).

1923. *Barley.*

##### (a) Series C.

As the swede crop of 1922 was quite small, mangels were carted on to augment the root supply. The sheep were on from December 20th, 1922, to February 7th, 1923. They consumed, on the corn plot (2 acres) 22 cwt. of oats and 10 cwt. of barley, equivalent to 29.25 lb. nitrogen per acre; on the cake plot (2 acres) 7 cwt. of linseed cake, 6 cwt. decorticated cotton meal and 14 cwt. 42 lb. of undecorticated cotton cake, equivalent to 67 lb. nitrogen per acre.

"Plumage Archer" barley, at the rate of  $2\frac{1}{2}$  bushels per acre, was drilled on March 28th, and a clover mixture—Red Clover 7 lb., Alsike 3 lb., Trefoil 3 lb. per acre—(red clover alone having been taken four years previously) was sown in the barley on May 1st, 1923. The barley grew fairly well in spite of the unfavourable season. The crop was cut on August 16th.

1924. *Clover.*

The clover grew well in 1924, promising an excellent crop. This was cut and gathered on June 27th—30th, 1924. The second growth was small and was ploughed in.

The results were :—

| BARLEY, 1923 |     |     |     |                   |                      |           | HAY, 1924                |
|--------------|-----|-----|-----|-------------------|----------------------|-----------|--------------------------|
|              |     |     |     | Head Corn         |                      | Tail Corn | Straw,<br>Chaff,<br>etc. |
|              |     |     |     | Yield<br>per Acre | Weight<br>per bushel | Weight    |                          |
|              |     |     |     | bushels           | lb.                  | lb.       | cwt.                     |
| Corn fed     | ... | ... | ... | 14.2              | 55                   | 21        | 9.7                      |
| Cake fed     | ... | ... | ... | 16.2              | 55                   | 28        | 10.1                     |
|              |     |     |     |                   |                      |           | Yield<br>per Acre        |
|              |     |     |     |                   |                      |           | cwt.                     |
|              |     |     |     |                   |                      |           | 38.7                     |
|              |     |     |     |                   |                      |           | 37.1                     |

Neither in the barley crop of 1923 nor in the succeeding clover of 1924 has there been anything to show the value of the richer cake-feeding as against that of corn. This result is

striking, as not only were the amounts of corn and cake much greater than previously used, but the margin between the cake and corn fed was nearly 38 lb. of nitrogen, equivalent to 2 cwt. of nitrate of soda per acre.

(b) Series D. 1923, *Clover*. 1924, *Wheat*.

Red clover had been sown in the barley crop of 1922 on May 22nd, and it looked very well through the winter. It was twice cut for hay in 1923, viz., on June 25th and on August 13th, and "Red Standard" wheat, 3 bushels per acre, was drilled October 18th. It came up fairly well, but was rather slow in growth. The cake-fed plot looked rather better than that corn-fed. The crop improved towards harvest and was cut August 26th and carted September 2nd. The results were:—

| CLOVER, 1923 |     |     |     |                |           |           | WHEAT, 1924    |                   |           |                   |
|--------------|-----|-----|-----|----------------|-----------|-----------|----------------|-------------------|-----------|-------------------|
|              |     |     |     | Yield per Acre |           |           | Head Corn      |                   | Tail Corn | Straw, Chaff, &c. |
|              |     |     |     | 1st Cut        | 2nd Cut   | Total     | Yield per acre | Weight per bushel | Weight    |                   |
| Corn fed     | ... | ... | ... | cwt. 34'0      | cwt. 13'5 | cwt. 47'5 | bushels 19'3   | lb. 54'0          | lb. 20    | cwt. 13'2         |
| Cake fed     | ... | ... | ... | 35'1           | 13'3      | 48'4      | 19'5           | 55'8              | 20        | 16'0              |

The differences are not significant, but it must be remembered that no cake or corn had been fed since 1916.

#### 4. *Green-manuring Experiments.*

(a) STACKYARD FIELD. Series A.

1923.

As noticed in the 1922 report, a change in these plots was introduced in 1922, they being now so arranged that every year there will be a corn crop on one-half of the area and a green-crop on the other half.

*Upper Half.*—The green crops grown and fed off by sheep in July and October, 1922—1½ cwt. of cotton cake per acre being given as well—were followed by wheat—"Red Standard"—which was drilled on November 9th at the rate of 2½ bushels per acre. On December 15th 3 cwt. per acre of superphosphate were given to the wheat. It was never more than a poor crop, but now, for the first time, the wheat after tares seemed to be better than that after mustard. It was cut August 13th, stacked August 21st, and threshed November 15th.

The results were:—

| Plot |                           | Head Corn      |                   | Tail Corn | Straw, Chaff, etc. |
|------|---------------------------|----------------|-------------------|-----------|--------------------|
|      |                           | Yield per acre | Weight per Bushel | Weight    |                    |
| 1    | After Tares fed off ...   | bushels 8.0    | lb. 62.3          | lb. 9     | cwt. 9.3           |
| 2    | After Mustard fed off ... | 5.6            | 62.0              | 8         | 5.3                |

The crops were miserably small, and it is hard to understand how they came to be so, seeing that not only were two crops of tares and mustard respectively fed off on the land, but that  $1\frac{1}{2}$  cwt. of cotton cake per acre were given as well to the sheep. Yet a wheat crop of only 8 bushels per acre was the result. For the first time, however, in the history of the experiment, a slight superiority was shown with the tares as compared with the mustard, similarly fed.

*Lower Half.*—Here tares were drilled—2 bushels per acre—on November 3rd, 1922, and were fed off by sheep receiving also 3 cwt. cotton cake per acre (increased from the  $1\frac{1}{2}$  cwt. per acre of former years). It was only possible to take one crop of tares. Two crops of mustard, however, were grown, the seed being sown on May 4th, 1923, and on August 4th, at the rate of 20 lb. per acre. Each crop was similarly fed off with cake, and, after ploughing the land, wheat was sown.

#### 1924.

On the upper half, green crops followed the wheat of 1923. Previous to their sowing, an application of two tons of lime per acre was given to one half of each acre plot—September 25th, 1923. Tares—2 bushels per acre were drilled on March 19th, 1924, and gave an excellent crop. Mustard—20 lbs. per acre—was sown broadcast on May 30th, and also grew well. Sheep were put on the mustard on July 22nd, and passed on to the tares on August 12th, consuming on each plot 3 cwt. per acre of cake (half linseed and half cotton cake). Only one green crop of each kind was grown, and after the sheep had eaten these off, the plots were ploughed up in October and wheat again sown.

On the lower half, wheat ("Red Standard") was drilled on November 5th, 1923, at the rate of 3 bushels per acre. It showed about the middle of December and grew well right on to May, 1924, the wheat after tares looking decidedly better than that after mustard, and being as good as, or even better than, any other wheat plot on the field. After this however came the usual falling off, and by the middle of June the wheat looked poor and short in straw on both plots. It was cut on August 14th, carted September 2nd, and threshed just before Christmas.

The yields were :—

| Plot |                           | Head Corn         |                      | Tail Corn  | Straw,<br>Chaff,<br>etc. |
|------|---------------------------|-------------------|----------------------|------------|--------------------------|
|      |                           | Yield<br>per Acre | Weight<br>per bushel | Weight     |                          |
| 1    | After Tares fed off ...   | bushels<br>7.3    | lb.<br>57.0          | lb.<br>6.0 | cwt.<br>8.7              |
| 2    | After Mustard fed off ... | 9.1               | 57.7                 | 6.5        | 9.5                      |

Thus the old order of things—broken in 1923—was restored, the mustard once more showing itself the better preparation, though both crops were miserably and unaccountably poor, the wheat crop on Series D (Rotation) in the same field being 19.5 bushels per acre.

(b) *Lansome Field.*

On the extended area, now consisting of five plots, wheat followed the ploughing-in of the green crops, 5 cwt. of basic slag and 1 cwt. of sulphate of potash per acre having been previously (1921) given to these crops. "Red Standard" wheat— $2\frac{1}{2}$  bushels to the acre—was drilled on all the plots on October 25th, 1922. Throughout the period of growth the crop looked better on the tares plots than on the mustard ones, and these appearances were borne out at harvest. The crop was cut August 14th, stacked August 21st, and threshed November 12th, 1923.

The results were :—

|           |                                | Head Corn      |                   | Tail Corn | Straw, Chaff, etc. |
|-----------|--------------------------------|----------------|-------------------|-----------|--------------------|
|           |                                | Yield per Acre | Weight per bushel | Weight    |                    |
|           | Plot                           | bushels        | lb.               | lb.       | cwt.               |
| Old Plots | 1. After Mustard ploughed in   | 6'9            | 63'0              | 8         | 8'9                |
|           | 2. After Tares ploughed in ... | 7'0            | 63'2              | 8         | 12'4               |
| New Plots | 3. After Mustard ploughed in   | 7'2            | 63'0              | 6         | 9'3                |
|           | 4. After Tares ploughed in ... | 7'2            | 63'2              | 6         | 13'9               |
|           | 5. Control (no green crop) ... | 5'7            | 63'2              | 4         | 8'6                |

The differences in weight of corn are but small, but the tares have, in each case, given appreciably more straw, and the general tendency is to confirm the results in Stackyard Field. At the same time, the crops are unaccountably small, and, following on work carried out with these soils in the Pot-culture Station, it was decided to lime one-half of each series in Lansome Field and Stackyard Field, and to see whether the small crops obtained might not be due to the poverty of the soils in lime.

## 1924.

Lime, as contemplated above, was given to one-half of all the plots on September 25th, 1923, at the rate of 2 tons per acre. Tares—2 bushels per acre—were sown on March 29th, 1924, and mustard—20 lb. per acre—on May 29th. The green crops were decidedly better on the new plots than on the old ones. They were ploughed in on July 31st and second crops sown on August 19th, these being, in turn, ploughed in green, September 26th-30th, and wheat sown.

5. *Malting Barley Experiments.*

## 1923.

The field chosen was Butt Close, a light sandy loam. The area used had previously carried a moderate crop of swedes, to which farmyard manure had been given.

The barley was drilled on April 10th at the rate of  $2\frac{1}{2}$  bushels per acre, the manures being put on the same day. The barley came up nicely and promised to be an excellent crop. Early in June the control, plot 1, looked a bit patchy, while plot 5 (no nitrogen) was much less vigorous than plots 2, 3 and 4. These appearances continued until July. The crop was cut and shocked August 30th-31st. Pots 2-5 were all dead ripe. Plot 1 had a fair proportion of green or only partially ripe straw.

F

1924.

The experiment of 1924 was in Stackyard Field, following oats. "Plumage Archer," as before, was drilled—3 bushels per acre—on March 11th, the various manures being applied at the same time. The barley grew well. The plot to ripen quickest was plot 2 (complete manuring), and the phosphate plot (3) ripened more quickly than the potash one (2).

The barley was cut on August 12th.

The yields generally were lower than in 1923 and the relative yields of the no-phosphate and no-potash plots are reversed in the two years. The results for the two years are given in the following table:—

| Manures per Acre                                                                        | 1923           |                   |           |                    | 1924           |                   |           |                    |
|-----------------------------------------------------------------------------------------|----------------|-------------------|-----------|--------------------|----------------|-------------------|-----------|--------------------|
|                                                                                         | Head Corn      |                   | Tail Corn | Straw, Chaff, etc. | Head Corn      |                   | Tail Corn | Straw, Chaff, etc. |
|                                                                                         | Yield per acre | Weight per bushel | Weight    |                    | Yield per acre | Weight per bushel | Weight    |                    |
| No Manure ... ..                                                                        | bushels 35.1   | lb. 53.3          | lb. 9.5   | cwt. 21.0          | bushels 22.5   | lb. 52.9          | lb. 22.0  | cwt. 11.2          |
| Superphosphate 3 cwt.,<br>Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1 cwt. ... .. | 43.4           | 55.6              | 9.0       | 21 0               | 29.4           | 53.1              | 26.0      | 17.85              |
| Superphosphate 3 cwt.,<br>Sulphate of Ammonia 1 cwt. ... ..                             | 41.0           | 55.5              | 10.0      | 21.2               | 32.8           | 52.7              | 26.0      | 18.25              |
| Sulphate of Potash 1½ cwt.,<br>Sulphate of Ammonia 1 cwt. ... ..                        | 38.8           | 55.0              | 10.0      | 17.75              | 38.8           | 53.5              | 30.0      | 21.45              |
| Sulphate of Potash 1½ cwt.,<br>Superphosphate 3 cwt. ... ..                             | 31.9           | 53.5              | 6.0       | 14.4               | 27.3           | 53.7              | 18.0      | 15.6               |

#### 6. Experiments with Sulphate and Muriate of Ammonia.

Comparisons of these two manures were carried out in 1923 on wheat and barley and in 1924 on wheat, mangolds and swedes. The details of cultivation, etc., follow. In each experiment 1 cwt. of sulphate of ammonia and the equivalent quantity of muriate were employed:—

Wheat, 1923: Road Piece, thin light sandy loam. Drilled, 2½ bushels per acre, October 23rd, 1922. Top dressings applied May 31st. Cut August 10th, the previous crop being "seeds," ploughed in. No basal manuring was given.

Barley, 1923: Butt Close, light sandy loam. Drilled, 2½ bushels per acre, April 10th. Top dressing applied June 2nd. Cut August 30th. Previous crop, swedes fed off with sheep.

Wheat, 1924: Great Hill, light sandy loam. Drilled, 3 bushels per acre, November 1st-2nd, 1923. Top dressing applied June 3rd. Cut August 15th-18th. Previous crop, red clover (cut twice).

Mangolds, 1924: Warren Field, Oxford clay. Dung, 8 tons per acre, April 26th. Super, 2 cwt. and Kainit 3 cwt. per acre, May 13th, seed drilled 6 lb. per acre, May 15th. Top dressings applied July 22nd-23rd. Roots pulled November 15th-25th.

Swedes, 1924: Warren Field, Oxford clay. Dung 12 tons per acre, May 10th-15th. Super 4 cwt. and Kainit 4 cwt., May 16th, seed drilled 5 lb. per acre, June 23rd. Roots pulled January 1st-23rd, 1925.

Note.—The swedes and mangolds experiments were subjected to heavy rainfall and flooding during May (p. 78).

The results follow:—

| CROP                      | PLOT                                                 | PRODUCE PER ACRE |                   |            |             |
|---------------------------|------------------------------------------------------|------------------|-------------------|------------|-------------|
|                           |                                                      | Head Corn        |                   | Tail Corn  | Straw, etc. |
|                           |                                                      | Yield per Acre   | Weight per Bushel | Weight     |             |
| Wheat, 1923...            | 2. Control ... ..                                    | 15'6             | 61'0              | 17         | 11'3        |
|                           | 1. Sulphate of Ammonia ...                           | 17'6             | 61'5              | 13         | 13'1        |
|                           | 3. Muriate of Ammonia ...                            | 19'8             | 61'5              | 16         | 14'8        |
| Barley, 1923...           | 2) Control ... ..                                    | 36'6             | 53'5              | 6          | 17'0        |
|                           | 5) Control ... ..                                    | 35'6             | 53'7              | 6          | 18'9        |
|                           | 1) Sulphate of Ammonia ...                           | 41'6             | 53'7              | 9          | 19'9        |
|                           | 4) Sulphate of Ammonia ...                           | 40'0             | 53'8              | 10         | 19'4        |
|                           | 3) Muriate of Ammonia ...                            | 46'7             | 54'0              | 7          | 22'5        |
|                           | 6) Muriate of Ammonia ...                            | 45'5             | 53'9              | 8          | 21'1        |
| Wheat, 1924...            | 1. Sulphate of Ammonia ...                           | 43'0             | 57'3              | 20         | 32'2        |
|                           | 2. Muriate of Ammonia ...                            | 45'8             | 56'8              | 22         | 34'4        |
|                           |                                                      |                  |                   | Mangolds   | Swedes      |
| Mangolds and Swedes, 1924 | 1. Dung and Minerals only ... ..                     |                  |                   | Tons 11'85 | Tons 14'56  |
|                           | 2. Dung and Minerals with Sulphate of Ammonia ... .. |                  |                   | 14'07      | 17'21       |
|                           | 3. Dung and Minerals with Muriate of Ammonia ... ..  |                  |                   | 12'85      | 15'76       |
|                           | 4. Dung and Minerals with Muriate of Ammonia ... ..  |                  |                   | 12'87      | 16'80       |

Although the differences in some cases are small, it appears that for corn the muriate gives a bigger yield than sulphate of ammonia, while the reverse holds for roots.

#### 7. *The Relative Values of Lime and Chalk for Liming Purposes* (STACKYARD FIELD). Series B.

1923.

This experiment—one conducted on the crops of an ordinary 4-course rotation—was started in 1919, when 12 plots in Stackyard Field, each one-sixth of an acre in extent, were set out in two series, the one consisting of plots to which caustic (burnt) lime was given in different quantities, the other of plots which received ground chalk in quantities supplying the same amount of lime (CaO) as given to the corresponding caustic lime plots. There were also two unlimed plots.

The lime and chalk were spread in January, 1919, and the land ploughed.

The crops were :—1919, barley; 1920, swedes; 1921, barley; 1922, tares followed by mustard; 1923, oats. The ordinary course of cultivation, manuring, etc., was followed over the whole area, the only difference being in the application of lime or of chalk.

It would naturally take some time for the lime and chalk to distribute themselves fairly over the soil; for the first few years there was little beyond the general indication that lime produced rather the better crop; this was the case with the swedes of 1920 and the barley of 1921; the tares of 1922 and subsequent mustard crop were fed off by sheep and not weighed. Black Winter oats followed as the crop of 1923, and were drilled on October 31st at the rate of 4 bushels per acre. The crop was cut August 2nd-3rd, stacked August 16th, and threshed November 12th and 13th, 1923.

The harvest results were as follows :—

| Plot | Applications per acre       | Head Corn      |                   | Tail Corn | Straw, Chaff, etc. |
|------|-----------------------------|----------------|-------------------|-----------|--------------------|
|      |                             | Yield per acre | Weight per bushel |           |                    |
|      |                             | bushels        | lb.               | lb.       | cwt.               |
| 1    | No Chalk ... ..             | 22.1           | 38.0              | 3.5       | 8.5                |
| 2    | Chalk = 10 cwt. Lime ... .. | 19.9           | 39.0              | 2.5       | 7.3                |
| 3    | „ = 1 ton Lime ... ..       | 20.6           | 37.5              | 3.0       | 7.6                |
| 4    | „ = 2 tons „ ... ..         | 24.9           | 37.2              | 3.5       | 8.7                |
| 5    | „ = 3 „ „ ... ..            | 28.1           | 36.7              | 4.5       | 10.6               |
| 6    | „ = 4 „ „ ... ..            | 26.2           | 36.5              | 3.5       | 9.0                |
| 7    | No Lime ... ..              | 23.0           | 38.5              | 3.5       | 7.8                |
| 8    | Lime, 10 cwt. ... ..        | 26.2           | 39.0              | 4.0       | 8.5                |
| 9    | „ 1 ton ... ..              | 30.9           | 39.0              | 4.5       | 10.6               |
| 10   | „ 2 tons ... ..             | 26.8           | 39.0              | 4.0       | 10.9               |
| 11   | „ 3 „ ... ..                | 31.1           | 38.5              | 3.5       | 11.1               |
| 12   | „ 4 „ ... ..                | 25.7           | 38.5              | 3.5       | 10.1               |

These results, taken as a whole, run very consistently, and point to what had been previously noticed, viz., that the lime series gave better crops than the chalk. Adding up the chalk series, a total of 141.8 bushels of corn is shown as against 163.7 bushels with the lime series. The duplicate unlimed plots are in very fair agreement. The lime series shows a more or less regular increase as more lime is added, up to 4 tons per acre, which latter amount would appear to be too much. With the chalk plots there is a similar, though not so marked, increase. The increase from lime is equally marked in the straw as in the corn.

It is worthy of remark that the exact duplicate of these observations is to be found in the pot-culture experiments on the same subject (see page 94).

Examining the stubble after harvest, it was noticed that, as the quantity of lime or chalk was increased, so the spurry became less and less prominent, and its absence was more marked on the limed plots.

## 1924.

After the oat crop of 1923 swedes were to follow. These were put in—June 12th—with 5 cwt. superphosphate and 1 cwt. sulphate of potash per acre, and came a fair plant. The lime plots looked, throughout, somewhat superior to the chalk ones. The roots will be weighed and then fed off on the land by sheep.

# 11. RAINFALL AT WOBURN EXPERIMENTAL FARM, 1923 and 1924.

(292 ft. above Sea Level.)

| 1922-23       |     |              |                                           | 1923-24       |     |              |                                           |
|---------------|-----|--------------|-------------------------------------------|---------------|-----|--------------|-------------------------------------------|
| Month         |     | Total inches | No. of days with .01 in. or more recorded | Month         |     | Total inches | No. of days with .01 in. or more recorded |
| 1922          |     |              |                                           | 1923          |     |              |                                           |
| October ...   | ... | 0.76         | 14                                        | October ...   | ... | 3.58         | 23                                        |
| November ...  | ... | 1.07         | 11                                        | November ...  | ... | 1.25         | 15                                        |
| December ...  | ... | 2.38         | 18                                        | December ...  | ... | 2.37         | 20                                        |
| 1923          |     |              |                                           | 1924          |     |              |                                           |
| January ...   | ... | 1.28         | 13                                        | January ...   | ... | 2.25         | 21                                        |
| February ...  | ... | 3.04         | 25                                        | February ...  | ... | 0.48         | 12                                        |
| March ...     | ... | 2.10         | 17                                        | March ...     | ... | 0.69         | 9                                         |
| April ...     | ... | 1.50         | 12                                        | April ...     | ... | 2.71         | 13                                        |
| May ...       | ... | 1.63         | 17                                        | May ...       | ... | 6.05         | 20                                        |
| June ...      | ... | 0.53         | 10                                        | June ...      | ... | 2.33         | 15                                        |
| July ...      | ... | 3.52         | 12                                        | July ...      | ... | 3.06         | 17                                        |
| August ...    | ... | 3.02         | 12                                        | August ...    | ... | 2.31         | 17                                        |
| September ... | ... | 2.48         | 12                                        | September ... | ... | 3.17         | 19                                        |
| Total ...     | ... | 23.31        | 173                                       | Total ...     | ... | 30.25        | 201                                       |

## POT-CULTURE EXPERIMENTS, 1923.

### 1. *The Hills' Experiments.* (a) Lead Chloride. (b) Uranium Compounds.

#### (a) LEAD CHLORIDE.

In 1922, work with different compounds of lead had shown that, for wheat, 1% of lead as the oxide, carbonate, or sulphate, was not toxic, but that with lead chloride, so soon as .25 per cent. of lead was exceeded, a toxic effect was produced. It was thought well to continue the lead chloride series for a second year. At the same time a fresh series was started, using lead chloride in smaller and intermediate amounts.

#### i—Old Series.

The quantities of lead used in 1922 were .25 per cent., .50 per cent., and 1 per cent., as chloride. The soil was from Stack-yard Field, and the salts were mixed with the whole of the soil

in a pot, each experiment being in duplicate. In 1922, .25 per cent. of lead had produced a crop somewhat in excess of the control, but with .50 per cent. only a few stunted plants were left, and with 1 per cent. everything was killed.

Wheat was sown again in the old pots on December 23rd, 1922, after the soil had been turned out, sieved, and replaced. The plants came up quite well with the .25 per cent. and .50 per cent., but with 1 per cent. only a few weak plants appeared, and these gradually died off. For a time the .25 per cent. and the .50 per cent. looked about as good as the control, but about July, 1923, the .50 per cent. began to show a marked toxic effect. The crops when reaped gave the following comparative results :—

*Lead Chloride upon Wheat, 1923. (2nd year).*

| Treatment                               | Corn | Straw |
|-----------------------------------------|------|-------|
| Untreated ... ..                        | 100  | 100   |
| Lead Chloride .25 per cent. Lead ... .. | 79   | 92    |
| " " .50 " " " " " " " " " "             | 3    | 37    |
| " " 1.0 " " " " " " " " " "             | —    | —     |

From this it is clear that the toxic influence of 1 per cent. and .50 per cent. of lead used as chloride will continue for a second year, and that even .25 per cent. will show, in a second year, some ill effect. It is true that in the first year .25 per cent. gave some increase of crop, but it has to be remembered that then some of the plants were destroyed, while the rest, as is often the case with pot experiments, developed abnormally. In the form of chloride 0.25 per cent. of lead must, therefore, be considered harmful.

## ii—New Series.

The quantities decided on were .20 per cent., .30 per cent., .40 per cent. and .50 per cent. of lead as chloride. The soil now used was from Lansome Field, and the salts were mixed with the whole soil; experiments were, as usual, in duplicate.

The wheat was sown on December 23rd, 1922, and came up well in all the pots, none of the plants being killed off. The .20 per cent. application, and possibly the .30 per cent., seemed to show an improvement on the control, but with the higher amounts there was a gradual diminution. The crops were cut on August 13th, when they gave the following comparative returns :—

*Lead Chloride upon Wheat, 1923.*

| Treatment                               | Corn | Straw |
|-----------------------------------------|------|-------|
| Untreated ... ..                        | 100  | 100   |
| Lead Chloride .20 per cent. Lead ... .. | 126  | 124   |
| " " .30 " " " " " " " " " "             | 129  | 119   |
| " " .40 " " " " " " " " " "             | 70   | 83    |
| " " .50 " " " " " " " " " "             | 14   | 37    |

The results in general were not as marked as in 1922 when, however, a different soil was used. But the results are in each case in the same direction and tend to show that lead as chloride will be toxic, and almost entirely destroy a crop at a concentration of .50 per cent. It was noticed after removal of the soil from the pots at the close of the experiment that, with the higher concentrations, viz., .50 per cent. and 1 per cent., a deposit of metallic lead formed round the edge of the soil on the inside of the pots.

(b) URANIUM COMPOUNDS.

In 1919, experiments had been made with ores stated to be "radio-active," but no benefit was found from their use. As the activity of these ores was believed to be dependent upon the presence of compounds of uranium, experiments were made with salts of this metal. Wheat was used, and the soil was from Lansome Field. The oxide (as sodium diuranate) and uranyl chloride, sulphate and nitrate were tried, each concentration supplying .05 per cent. and .10 per cent. respectively of uranium. The quantities were mixed with the whole of the soil in each pot, these being filled on December 19th-20th, 1922, and sown with wheat on December 23rd.

Germination was quicker with the untreated pots. The poorest lots were those with the chloride and sulphate. About the end of April the treated pots improved. The absence of sun in May prevented any marked change, except that in some cases—chiefly with the sulphate and chloride—one or two plants developed abnormally. The wheat was cut on August 13th, and the comparative results obtained were:—

*Uranium Compounds on Wheat, 1923.*

| Treatment                                             | Corn | Straw |
|-------------------------------------------------------|------|-------|
| Untreated ... ..                                      | 100  | 100   |
| Sodium diuranate containing Uranium .05 per cent. ... | 95   | 102   |
| " " " " .10 " " ...                                   | 126  | 120   |
| Uranyl chloride " " .05 " " ...                       | 78   | 88    |
| " " " " .10 " " ...                                   | 74   | 68    |
| Uranyl sulphate " " .05 " " ...                       | 76   | 84    |
| " " " " .10 " " ...                                   | 6    | 9     |
| Uranyl nitrate " " .05 " " ...                        | 96   | 99    |
| " " " " .10 " " ...                                   | 100  | 146   |

With the doubtful exception of the .1 per cent. dose of sodium diuranate, uranium had no good effect, and in most forms it was actually harmful.

2. *Green-manuring Experiments.*

New interest having been aroused in the subject of green-manuring, it was decided to revert to the experiments at the Woburn Pot-culture Station which had been previously carried on in conjunction with the Field Experiments, but which had been temporarily suspended.

Briefly to recapitulate, field experiments conducted on Lansome Field since 1895, and on Stackyard Field since 1911, had shown that, without exception, better cereal crops (both of wheat

and of barley) followed the ploughing-in, or the feeding-off, of mustard than of tares, this being contrary to what would be expected from scientific considerations as to the power of tares to utilise atmospheric nitrogen, a power not possessed by the mustard crop.

Whether this unexpected result was due to the particular nature of the soil in question or to considerations of moisture, mechanical condition, etc., was unknown, though one set of experiments conducted at the Pot-culture Station seemed to point to the fact that if the tares were plentifully supplied with water all through the growing period, then they would give the better succeeding cereal crop. Such conditions, however, could not obtain in practice, and the experiments had no further interest beyond showing that the experience of the superiority of tares on a heavy soil, where moisture is better retained, may in this way be accounted for. Repeated analyses of the soils and of the crops grown and ploughed in or fed off had shown more nitrogen to accrue from the growing of tares than of mustard, and yet, for some reason, it could not be utilised for the following corn crop.

1923.

In renewing the enquiry by pot-culture methods, it was now determined to try the addition to the soils of the respective plots (the soil being taken direct from the plots in the fields), of materials such as lime, superphosphate, and sulphate of potash, and to see if these brought about any change.

The quantities so added were :—

|                          |     |     |                                 |
|--------------------------|-----|-----|---------------------------------|
| Lime                     | ... | ... | at the rate of 2 tons per acre. |
| Superphosphate (30%)     | „   | „   | 3 cwt. „                        |
| Sulphate of potash (90%) | „   | „   | 1 cwt. „                        |

These were used both singly and, in a fourth instance, all of them together. The additions were given to the soils previous to sowing of wheat, they being mixed with the whole of the soil, and wheat was sown on December 23rd, 1923.

In the case of Stackyard Field soil, the green crops had been fed off by sheep in 1922; in that of Lansome Field the green crop had been ploughed in. In each field wheat had been sown in November (1922), so that the crops in the field and at the Pot-culture Station were in the same stage.

#### (a) STACKYARD FIELD SOIL.

The plants grew satisfactorily, and up to the middle of February no changes were noticeable. Then, however, the tares series as a whole looked rather better than the mustard. Also the pots in which lime had been used, either alone or in conjunction with the two mineral manures, began to show to advantage, both with tares and with mustard; these differences remained more or less throughout the summer. The influence of superphosphate and of sulphate of potash was hardly apparent.

The weather was very unfavourable in June, and when warmer weather came in July it was almost too late to allow the plants to benefit fully.

It should be noted here that the entire Stackyard Field series was somewhat inferior to the Lansome Field series.

## (b) LANSOME FIELD SOIL.

Much the same comparative observations as just recorded were made in this series, the crops being, however, as stated, slightly superior to the Stackyard Field soil ones.

After threshing in November, the following comparative results were obtained:—

*Green-manuring Experiment—Wheat after green crops, 1923.*

|                                    | (a) STACKYARD<br>FIELD SOIL |       | (b) LANSOME<br>FIELD SOIL |       |
|------------------------------------|-----------------------------|-------|---------------------------|-------|
|                                    | Corn                        | Straw | Corn                      | Straw |
| <i>i. Wheat after Tares.</i>       |                             |       |                           |       |
| Untreated ... ..                   | 100                         | 100   | 100                       | 100   |
| Lime—2 tons per acre ... ..        | 143                         | 166   | 202                       | 174   |
| Superphosphate—3 cwt. per acre ... | 97                          | 96    | 91                        | 92    |
| Sulphate of Potash—1 cwt. per acre | 99                          | 96    | 83                        | 96    |
| Lime, Superphosphate and S/Potash  | 153                         | 160   | 174                       | 177   |
| <i>ii. Wheat after Mustard.</i>    |                             |       |                           |       |
| Untreated ... ..                   | 100                         | 100   | 100                       | 100   |
| Lime—2 tons per acre ... ..        | 244                         | 206   | 327                       | 205   |
| Superphosphate—3 cwt. per acre ... | 99                          | 133   | 125                       | 91    |
| Sulphate of Potash—1 cwt. per acre | 101                         | 117   | 128                       | 103   |
| Lime, Superphosphate and S/Potash  | 233                         | 191   | 275                       | 179   |

These results are most consistent and point clearly to the benefit resulting from the use of lime. This is the case with both soils and with both green crops. Superphosphate and sulphate of potash, on the other hand, produced no benefit in either, and the advantage obtained in the mixed dressing was clearly due to the lime.

Taking the actual crop returns and not those stated in the Table (given in percentages of the untreated produce), there was no very marked difference between the tares soil and the mustard soil. The actual weights for the untreated and limed pots were:—

|                                 | STACKYARD<br>FIELD SOIL |         | LANSOME<br>FIELD SOIL |         |
|---------------------------------|-------------------------|---------|-----------------------|---------|
|                                 | Corn                    | Straw   | Corn                  | Straw   |
| <i>i. Wheat after Tares.</i>    | grammes                 | grammes | grammes               | grammes |
| Untreated ... ..                | 13·9                    | 20·3    | 11·8                  | 18·6    |
| Limed ... ..                    | 19·9                    | 33·3    | 23·8                  | 32·4    |
| <i>ii. Wheat after Mustard.</i> |                         |         |                       |         |
| Untreated ... ..                | 8·3                     | 14·0    | 8·3                   | 17·7    |
| Limed ... ..                    | 20·3                    | 28·7    | 27·2                  | 36·1    |

In pot-culture work, too much importance must not be attached to actual crop-weighings, and the above results must be taken purely as an indication, but a very clear one, as to the benefit likely to accrue from liming both lands and both sets of plots. Whether doing this will result in bringing out in practice differences between the two green crops, remains to be seen; but, acting upon the above results, it was determined to lime one half of each of the plots in Stackyard Field and Lansome Field in the winter of 1923, lime being put on at the rate of 2 tons per acre, the other halves being left unlimed.

1924.

The experiment was carried on for a second year, the green crops, tares and mustard, being grown, but no further manurial applications given. The green crops were sown on March 26th, and were cut June 23rd, the weights, both green and dry, being recorded. There is no occasion for dealing with these in detail, but it may be said generally that the differences were not marked; what indications of increased crop were given bore, as with the wheat of 1923, on the result of applying lime or a complete manure including lime.

### 3. *The Relative Values of Lime and Chalk.*

1923.

In previous experiments on this subject the soil had not had any applications given it beyond the lime and chalk respectively. The experiment was therefore repeated, with the addition of superphosphate and sulphate of potash, at the rates of 3 cwt. and 1 cwt. per acre respectively. The soil used came, not from Stackyard Field as usual, but from Lansome Field. The 40-lb. pots were filled with soil, the whole of which was previously mixed with lime or with chalk, so as to give the equivalent of 10 cwt., 1 ton, 2 tons, 3 tons and 4 tons of lime per acre. The superphosphate and sulphate of potash were added to the top 16 lb. of soil used, wheat being sown on December 23rd.

All the plants came up well. About the middle of March, both lime, and to a lesser extent chalk, showed a clear improvement over the control (unlimed) pots. In the case of the lime applications the improvement was greater with the heavier dressings. This held good until July, when the lime series showed a progressive increase of crop up to 3 tons, but with 4 tons the crop was shorter, though individual plants were greener and stronger. With chalk, however, though there was a general increase over the control, the heavier applications were not better than the 10 cwt. per acre. The crop was cut on August 13th, and the following comparative results were obtained:—

#### *Lime and Chalk upon Wheat—Lansome Field Soil, 1923.*

| Treatment       |          |          |     |     |     |     |     | Corn | Straw |
|-----------------|----------|----------|-----|-----|-----|-----|-----|------|-------|
| No Lime         | ...      | ...      | ... | ... | ... | ... | ... | 100  | 100   |
| Lime (CaO)      | 10 cwt.  | per acre | ... | ... | ... | ... | ... | 129  | 125   |
| "               | "        | 1 ton    | "   | "   | ... | ... | ... | 140  | 145   |
| "               | "        | 2 tons   | "   | "   | ... | ... | ... | 191  | 183   |
| "               | "        | 3        | "   | "   | ... | ... | ... | 228  | 225   |
| "               | "        | 4        | "   | "   | ... | ... | ... | 207  | 254   |
| Chalk = 10 cwt. | CaO      | "        | "   | ... | ... | ... | ... | 137  | 128   |
| "               | = 1 ton  | "        | "   | ... | ... | ... | ... | 126  | 135   |
| "               | = 2 tons | "        | "   | ... | ... | ... | ... | 139  | 132   |
| "               | = 3      | "        | "   | ... | ... | ... | ... | 141  | 129   |
| "               | = 4      | "        | "   | ... | ... | ... | ... | 157  | 141   |

The weights are in close accordance with the appearances already discussed, and with previous experiments made with the

soil of Stackyard Field, and show that the gains already recorded do not depend upon the presence or absence of phosphates and potash, but are the direct result of the applications of lime and chalk respectively.

1924.

A return was made in 1924 to Stackyard Field soil, phosphates and potash being used additionally as in 1923. The same amounts of lime and chalk were used as in 1923, and mixed, as then, with the top six inches of soil. An addition of ground limestone, at the rate of 1 ton and 2 tons per acre respectively, was, however, made this year. Wheat was sown on December 18th, 1923. It was noticed that the higher amounts of chalk retarded the germination, but eventually all plants came well. By April the lime pots showed an increasing improvement up to 3 tons per acre, a slight drop occurring with 4 tons. The chalk pots, on the other hand, were not so good, but more level, while limestone showed no increase.

These appearances were maintained more or less to the end of the growing period, and the crops were cut on August 18th. The recorded comparative results were:—

*Lime and Chalk upon Wheat—Stackyard Field Soil, 1924.*

| Treatment                              | Corn | Straw |
|----------------------------------------|------|-------|
| No Lime ... ..                         | 100  | 100   |
| Lime (CaO) 10 cwt. per acre ... ..     | 113  | 100   |
| „ „ 1 ton „ „ ... ..                   | 136  | 133   |
| „ „ 2 tons „ „ ... ..                  | 145  | 167   |
| „ „ 3 „ „ „ „ ... ..                   | 168  | 196   |
| „ „ 4 „ „ „ „ ... ..                   | 179  | 194   |
| Chalk = 10 cwt. CaO „ „ ... ..         | 94   | 88    |
| „ = 1 ton „ „ „ „ ... ..               | 94   | 79    |
| „ = 2 tons „ „ „ „ ... ..              | 101  | 94    |
| „ = 3 „ „ „ „ ... ..                   | 99   | 93    |
| „ = 4 „ „ „ „ ... ..                   | 92   | 78    |
| Ground Limestone 1 ton per acre ... .. | 84   | 72    |
| „ „ 2 tons „ „ „ „ ... ..              | 85   | 76    |

The results again confirm the preceding ones, and also indicate that limestone is ineffectual in the first year.

4. *Magnesia and Magnesium Carbonate on Wheat, 1924.*

As a counterpart of the last-named experiment, a repetition of earlier experiments with magnesia and magnesium carbonate on Stackyard Field soil was made in 1924, phosphates and potash being given also, magnesium limestone also being added to the series. The applications were mixed, as before, with the top six inches of soil, and the respective quantities used were the same as in the lime and chalk experiment (3). Wheat was sown on December 18th, 1923.

From the beginning, magnesia in the higher amount exercised a bad effect upon the young plants, this not being apparent

with magnesium carbonate. By the end of May, 1924, all the plants in the 2, 3 and 4 tons per acre of magnesia lots were killed. One ton per acre showed some ill effect at first, but the crop recovered. With magnesium carbonate there was no failure, but, on the contrary, a slight proportional increase all round.

The crops were cut on August 18th, and the comparative results were :—

*Magnesia and Magnesium Carbonate upon Wheat—Stackyard Field Soil, 1924.*

| Treatment                                        | Corn | Straw |
|--------------------------------------------------|------|-------|
| No Magnesia ... ..                               | 100  | 100   |
| Magnesia (MgO) 10 cwt. per acre ... ..           | 185  | 189   |
| "  "  1 ton  "  ... ..                           | 180  | 216   |
| "  "  2 tons  "  ... ..                          | —    | —     |
| "  "  3  "  "  ... ..                            | —    | —     |
| "  "  4  "  "  ... ..                            | —    | —     |
| Magnesium Carbonate=10 cwt. MgO per acre ... ..  | 148  | 158   |
| "  "  "  = 1 ton  ... ..                         | 191  | 199   |
| "  "  "  = 2 tons  ... ..                        | 201  | 230   |
| "  "  "  = 3  "  ... ..                          | 226  | 240   |
| "  "  "  = 4  "  ... ..                          | 191  | 235   |
| Ground Magnesian Limestone=1 ton per acre ... .. | 108  | 108   |
| "  "  "  2 tons  ... ..                          | 108  | 108   |

The Table shows that an increase of crop is given with a half-ton and 1 ton of magnesia, but that 2 tons per acre or more will absolutely kill a wheat crop, whereas higher amounts of magnesia as carbonate will improve the crop. Magnesian limestone, however, is ineffective, at least in the first year.

These experiments on lime and magnesia (3 and 4), confirmed, as they have been, on different soils of the farm, and with and without mineral manures, leave no doubt that there is a very marked difference between the effect of caustic lime and that of carbonate of lime, and again, between lime and magnesia. Caustic lime has clearly been proved to be a far more active form than chalk, and, while its addition, within reason—say up to 2 and 3 tons per acre—will produce much benefit on land requiring lime, magnesia, in the caustic state, will in that amount prevent the growth of the crop. The further information is now given that ground limestone, be it magnesian or not, exercises no influence, for a time at least.

These experiments have now been, in the main, so frequently repeated, and with like general results, as to leave practically no room for doubt as to their bearing on agricultural practice, and on the respective use of caustic lime, chalk, caustic magnesia or carbonate of magnesia. Incidentally, as I have pointed out elsewhere, they have a marked bearing on the practical treatment of land which contains magnesia in excess of the lime present.

### 5. *Sulphate of Ammonia and Muriate of Ammonia Compared.*

Along with the field experiment on this subject (see page 86) a similar one was carried out at the Pot-culture Station. The soil was from the headland of Stackyard Field, the crop, wheat. A dressing of superphosphate and sulphate of potash was given to each lot at sowing time, and the ammonia salts were given later as top-dressings. These latter consisted of sulphate of ammonia, 1 cwt. per acre, and muriate of ammonia equivalent in ammonia to 1 cwt. per acre of sulphate of ammonia.

Wheat was sown on December 23rd, 1922; the top-dressings were given on June 11th. Towards the end of July the muriate pots looked the better, though the ripening of the crops was retarded.

The crops were cut on August 14th and gave the following comparative returns:—

#### *Sulphate of Ammonia and Muriate of Ammonia, 1923.*

| Applications per acre                                                         | Corn | Straw |
|-------------------------------------------------------------------------------|------|-------|
| Superphosphate 3 cwt. + S/Potash 1 cwt. ... ..                                | 100  | 100   |
| Superphosphate 3 cwt. + S/Potash 1 cwt. + S/Amm.<br>1 cwt. ... ..             | 145  | 131   |
| Superphosphate 3 cwt. + S/Potash 1 cwt. + M/Amm.<br>= 1 cwt. of S/Amm. ... .. | 171  | 138   |

The results were confirmatory of the field ones, and indicated the superiority of the muriate in the case, at least, of corn crops.



ERRATA

- Page 100. Harvest 1924, line 5, for 28 tons read 8 tons.
- Page 102. Conversion Table, line 2, for 0.346 Hectolitre (36.346 litres) read 0.364 Hectolitre (36.364 litres).
- Page 114. Malting Barley, 1923, line 4, column 5, for 1265 read 1625.
- Page 122. Clover, 1924, in last six columns for cwt. read lb.

## DATES OF SOWING AND HARVESTING (Harvest 1923).

| Field.            | Crop.                                        | Variety.                                  | Sowing<br>began.           | Sowing<br>finished.        | Cutting<br>began. | *Carting<br>began. | *Carting<br>finished. | Yield<br>per Acre.      |
|-------------------|----------------------------------------------|-------------------------------------------|----------------------------|----------------------------|-------------------|--------------------|-----------------------|-------------------------|
| Great Knott, east | Fallow                                       | ...                                       | ...                        | ...                        | ...               | ...                | ...                   | ...                     |
| " west            | Wheat                                        | Red Standard                              | Oct. 27, '22               | Oct. 30, '22               | Aug. 10           | Aug. 22            | Sept. 3               | 37.5 bush.              |
| Little Knott      | Potatoes                                     | Kerr's Pink                               | May 11, '23                | May 17, '23                | ...               | Oct. 29            | Oct. 29               | see p.118               |
| Foster's, east    | Mangolds*                                    | Prizewinner Yellow Globe                  | May 2, '23                 | May 10, '23                | ...               | frosted            | ...                   | ...                     |
| " west            | Swedes                                       | Hurst's Monarch                           | May 15, '23                | May 23, '23                | ...               | Oct. 20            | Nov. 8                | 14.3 tons.              |
| West Barnfield    | Oats                                         | { Grey Winters ...<br>White Winters ... } | Oct. 12, '22               | Oct. 13, '22               | Aug. 2            | Aug. 13            | Aug. 14               | 48.0 bush.              |
| Long Hoos, east   | Barley                                       | Plumage Archer                            | Apr. 18, '23               | Apr. 18, '23               | Aug. 16           | Sept. 3            | Sept. 6               | 32.0 bush.              |
| " west            | Clover                                       | Red                                       | May 10, '22                | May 10, '22                | July 2            | July 13            | July 14               | ...                     |
| New Zealand       | Clover                                       | Red                                       | May 2, '22                 | May 4, '22                 | June 25           | July 3             | July 18               | 1.4 tons.               |
| Stackyard         | Clover                                       | Red                                       | May 5, '22                 | May 16, '22                | June 29           | July 9             | July 19               | ...                     |
| Great Harpenden   | Wheat                                        | Red Standard                              | Nov. 16, '22               | Nov. 30, '22               | Aug. 13           | Aug. 22            | Aug. 29               | 24.0 bush.              |
| Sawpit            | Oats                                         | { Black Winters ...<br>Grey Winters ... } | Oct. 10, '22               | Oct. 12, '22               | July 27           | Aug. 10            | Aug. 11               | 42.5 bush.              |
| Sawyers           | { Barley ...<br>Potatoes ...<br>Fallow ... } | Plumage Archer<br>Kerr's Pink             | Apr. 18, '23<br>May 4, '23 | Apr. 19, '23<br>May 5, '23 | Aug. 21<br>...    | Sept. 6<br>Nov. 1  | Sept. 7<br>Nov. 17    | 40.0 bush.<br>see p.121 |
| Broadbalk         | Wheat                                        | Red Standard                              | Oct. 31, '22               | Nov. 1, '22                | Aug. 15           | Aug. 27            | Aug. 28               | see p.108               |
| Little Hoos       | Clover                                       | Red                                       | May 8, '22                 | May 9, '22                 | June 28           | July 6             | July 7                | 112                     |
| Hoos              | Barley                                       | Plumage Archer                            | Apr. 20, '23               | Apr. 20, '23               | Aug. 25           | Sept. 5            | Sept. 5               | 112                     |
| Barnfield         | Mangolds                                     | Prizewinner Yellow Globe                  | Apr. 30, '23               | Apr. 30, '23               | Aug. 22           | Sept. 3            | Sept. 6               | 110                     |
| Agdell            | Wheat                                        | Red Standard                              | Oct. 30, '22               | Oct. 30, '22               | ...               | Nov. 17            | Dec. 15               | 103                     |
| Great Field       | Grass                                        | ...                                       | ...                        | ...                        | July 17           | July 21            | Aug. 18               | 102                     |
| Park              | Grass                                        | { 1st Crop ...<br>2nd Crop ... }          | ...                        | ...                        | June 16           | June 22            | July 23               | 124                     |
|                   |                                              |                                           | ...                        | ...                        | Dec. 20           | Jan. 15 '24        | Jan. 17 '24           | 104                     |

\* In the case of roots, the dates given are those on which lifting began and finished.

## DATES OF SOWING AND HARVESTING (Harvest 1924).

| Field.            | Crop.      | Variety.                 | Sowing<br>began. | Sowing<br>finished. | Cutting<br>began. | *Carting<br>began. | *Carting<br>finished. | †Yield<br>per Acre. |
|-------------------|------------|--------------------------|------------------|---------------------|-------------------|--------------------|-----------------------|---------------------|
| Great Knott, east | Oats       | Black Winter             | Oct. 16, '23     | Oct. 17, '23        | Aug. 5            | Aug. 23            | Aug. 25               | 16 bush.            |
| " west            | Oats       | Grey Winter              | Nov. 5, '23      | Nov. 7, '23         | Aug. 8            | Aug. 25            | Aug. 27               | 14 "                |
| Little Knott      | Barley     | Plumage Archer           | Mar. 14, '24     | Mar. 17, '24        | Aug. 20           | Sept. 8            | Oct. 17               | 28 "                |
| Foster's, east    | Swedes     | Hurst's Monarch          | May 28, '24      | May 30, '24         | ...               | Nov. 5             | Nov. 28               | 25 tons             |
| " west            | { Potatoes | Kerr's Pink              | May 6, '24       | May 10, '24         | ...               | Oct. 1             | Nov. 4                | 28 "                |
| "                 | { Mangolds | Prizewinner Yellow Globe | May 27, '24      | May 28, '24         | ...               | Nov. 17            | Nov. 21               | 27 "                |
| West Barnfield    | Wheat      | Red Standard             | Nov. 1, '23      | Nov. 3, '23         | Sept. 4           | Sept. 19           | Sept. 22              | 24 bush.            |
| Long Hoos, east   | Clover     | Broad Red                | Apr. 18, '23     | Apr. 19, '23        | June 23           | July 2             | July 4                | 2.5 tons            |
| " west            | Wheat      | Red Standard             | Oct. 19, '23     | Oct. 20, '23        | Aug. 22           | Sept. 3            | Sept. 5               | 28 bush.            |
| Great Harpenden   | Barley     | Plumage Archer           | Mar. 18, '24     | Mar. 21, '24        | Aug. 15           | Aug. 28            | Oct. 15               | 26 "                |
| New Zealand       | Wheat      | Red Standard             | Nov. 19, '23     | Nov. 21, '23        | Sept. 3           | Sept. 18           | Oct. 10               | 25 "                |
| Stackyard         | Wheat      | Red Standard             | Nov. 12, '23     | Nov. 15, '23        | Sept. 2           | Sept. 16           | Oct. 10               | 20 "                |
| Sawpit            | Barley     | Plumage Archer           | Apr. 4, '24      | Apr. 5, '24         | Sept. 1           | Sept. 19           | Oct. 7                | 26 "                |
| Sawyers           | { Clover   | Broad Red                | Apr. 24, '23     | Apr. 24, '23        | June 24           | July 5             | July 8                | 1.5 tons            |
| "                 | { Barley   | Plumage Archer           | Mar. 31, '24     | Mar. 31, '24        | Sept. 1           | Sept. 24           | Sept. 24              | 20 bush.            |
| Broadbalk         | Wheat      | Red Standard             | Nov. 9, '23      | Nov. 12, '23        | Sept. 5           | Sept. 25           | Oct. 3                | see p. 109          |
| Little Hoos       | Wheat      | Red Standard             | Nov. 21, '23     | Nov. 22, '23        | Sept. 3           | Sept. 22           | Sept. 24              | " 112               |
| Hoos              | Barley     | Plumage Archer           | Mar. 17, '24     | Mar. 18, '24        | Aug. 26           | Oct. 3             | Oct. 10               | " 110               |
| Barnfield         | Mangolds   | Prizewinner Yellow Globe | Apr. 25, '24     | Apr. 25, '24        | ...               | Oct. 27            | Nov. 17               | " 103               |
| Agdell            | Turnips    | Aberdeen Yellow          | July 19, '24     | July 19, '24        | ...               | Nov. 28            | Dec. 5                | " 102               |
| Great Field       | Hay        | "                        | ...              | ...                 | June 26           | June 30            | June 30               | " 124               |
| Park              | Grass      | 1st crop                 | ...              | ...                 | June 24           | June 27            | June 28               | " 104               |

\* In the case of roots, the dates given are those on which lifting began and finished.

† Estimates of standing crops.

## METEOROLOGICAL RECORDS, 1923 and 1924.

|                  | Rain.                                                |                                                                                          | Drainage through soil. |                  |                  | Bright<br>Sun-<br>shine. | Temperature (Mean). |      |                     |               |               |
|------------------|------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------|------------------|------------------|--------------------------|---------------------|------|---------------------|---------------|---------------|
|                  | Total<br>Fall.<br>$\frac{1}{1000}$<br>Acre<br>Gauge. | No. of<br>Rainy<br>Days.<br>(0.01 inch<br>or more)<br>$\frac{1}{1000}$<br>Acre<br>Gauge. | 20 ins.<br>deep.       | 40 ins.<br>deep. | 60 ins.<br>deep. |                          | Max.                | Min. | 1 ft. in<br>ground. | Solar<br>Max. | Grass<br>Min. |
| <b>1923</b>      | Inches.                                              | No.                                                                                      | Inches.                | Inches.          | Inches.          | Hours.                   | °F.                 | °F.  | °F.                 | °F.           | °F.           |
| Jan. ...         | 1'500                                                | 12                                                                                       | 1'269                  | 1'449            | 1'296            | 59.8                     | 46.1                | 34.7 | 38.4                | 70.0          | 29.2          |
| Feb. ...         | 3'914                                                | 23                                                                                       | 3'510                  | 3'598            | 3'346            | 53.5                     | 46.0                | 36.8 | 40.6                | 77.7          | 32.4          |
| Mar. ...         | 2'481                                                | 16                                                                                       | 1'584                  | 1'754            | 1'620            | 75.9                     | 48.4                | 36.7 | 41.3                | 86.9          | 31.6          |
| April ...        | 1'480                                                | 12                                                                                       | 0'371                  | 0'434            | 0'401            | 115.3                    | 52.3                | 38.0 | 45.1                | 103.9         | 32.4          |
| May ...          | 1'681                                                | 14                                                                                       | 0'177                  | 0'180            | 0'179            | 166.2                    | 56.7                | 42.0 | 50.4                | 115.8         | 37.8          |
| June ...         | 0'617                                                | 9                                                                                        | 0'003                  | 0'045            | 0'047            | 116.1                    | 60.7                | 46.8 | 53.6                | 111.3         | 42.2          |
| July ...         | 3'871                                                | 12                                                                                       | 1'380                  | 1'395            | 1'355            | 223.8                    | 72.5                | 55.1 | 63.1                | 127.3         | 50.2          |
| Aug. ...         | 2'329                                                | 11                                                                                       | 0'342                  | 0'375            | 0'295            | 256.9                    | 68.5                | 51.1 | 60.7                | 124.1         | 44.8          |
| Sept. ...        | 2'541                                                | 12                                                                                       | 1'009                  | 1'023            | 0'891            | 189.1                    | 62.9                | 46.1 | 54.4                | 114.1         | 39.2          |
| Oct. ...         | 4'974                                                | 23                                                                                       | 3'691                  | 3'691            | 3'452            | 98.3                     | 55.4                | 43.9 | 50.0                | 96.1          | 39.0          |
| Nov. ...         | 1'648                                                | 14                                                                                       | 1'083                  | 1'147            | 1'068            | 103.9                    | 42.2                | 31.0 | 40.4                | 77.6          | 26.3          |
| Dec. ...         | 2'932                                                | 19                                                                                       | 2'630                  | 2'592            | 2'467            | 42.3                     | 42.6                | 31.4 | 37.0                | 60.5          | 28.1          |
| Total or<br>Mean | 29.968                                               | 177                                                                                      | 17.049                 | 17.683           | 16.417           | 1501.1                   | 54.5                | 41.1 | 47.9                | 97.1          | 36.1          |
| <b>1924</b>      |                                                      |                                                                                          |                        |                  |                  |                          |                     |      |                     |               |               |
| Jan. ...         | 2'898                                                | 19                                                                                       | 3'024                  | 3'199            | 3'196            | 58.1                     | 43.5                | 34.8 | 38.1                | 64.1          | 31.2          |
| Feb. ...         | 0'714                                                | 12                                                                                       | 0'045                  | 0'097            | 0'087            | 54.8                     | 40.2                | 31.5 | 36.9                | 67.3          | 28.4          |
| Mar. ...         | 1'138                                                | 10                                                                                       | 0'379                  | 0'390            | 0'364            | 174.2                    | 47.1                | 31.3 | 37.1                | 92.4          | 25.0          |
| April ...        | 3'182                                                | 14                                                                                       | 1'358                  | 1'324            | 1'281            | 157.5                    | 52.4                | 37.2 | 42.6                | 102.4         | 31.3          |
| May ...          | 4'628                                                | 21                                                                                       | 2'208                  | 2'228            | 2'201            | 190.9                    | 61.0                | 45.3 | 52.2                | 117.9         | 41.9          |
| June ...         | 1'974                                                | 11                                                                                       | 0'666                  | 0'823            | 0'733            | 199.6                    | 65.2                | 50.2 | 59.3                | 126.1         | 46.2          |
| July ...         | 4'533                                                | 16                                                                                       | 1'763                  | 1'801            | 1'670            | 236.1                    | 68.3                | 51.0 | 61.1                | 127.6         | 45.3          |
| Aug. ...         | 2'551                                                | 22                                                                                       | 0'080                  | 0'095            | 0'056            | 169.0                    | 64.8                | 50.5 | 58.7                | 121.6         | 46.6          |
| Sept. ...        | 3'417                                                | 19                                                                                       | 1'312                  | 1'265            | 1'105            | 118.4                    | 61.4                | 50.8 | 56.6                | 110.9         | 46.7          |
| Oct. ...         | 4'279                                                | 21                                                                                       | 3'549                  | 3'494            | 3'333            | 89.9                     | 55.3                | 45.3 | 51.3                | 89.9          | 40.3          |
| Nov. ...         | 3'271                                                | 12                                                                                       | 2'749                  | 2'789            | 2'651            | 36.1                     | 48.1                | 39.6 | 45.2                | 70.4          | 35.9          |
| Dec. ...         | 3'920                                                | 20                                                                                       | 3'637                  | 3'742            | 3'638            | 42.5                     | 46.4                | 37.8 | 42.7                | 63.3          | 34.2          |
| Total or<br>Mean | 36.505                                               | 197                                                                                      | 20.770                 | 21.247           | 20.315           | 1527.1                   | 54.5                | 42.1 | 48.5                | 96.2          | 37.8          |

**RAIN AND DRAINAGE.**  
**MONTHLY MEAN FOR 54 HARVEST YEARS, 1870-1—1923-4.**

|             | Rainfall. | Drainage.       |                 |                 | Drainage % of<br>Rainfall. |                 |                 | Evaporation.    |                 |                 |
|-------------|-----------|-----------------|-----------------|-----------------|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|             |           | 20-in.<br>Gauge | 40-in.<br>Gauge | 60-in.<br>Gauge | 20-in.<br>Gauge            | 40-in.<br>Gauge | 60-in.<br>Gauge | 20-in.<br>Gauge | 40-in.<br>Gauge | 60-in.<br>Gauge |
|             | Ins.      | Ins.            | Ins.            | Ins.            |                            |                 |                 | Ins.            | Ins.            | Ins.            |
| September   | 2'348     | 0'762           | 0'727           | 0'666           | 32.5                       | 31.0            | 28.4            | 1'586           | 1'621           | 1'682           |
| October ... | 3'143     | 1'793           | 1'749           | 1'624           | 57.0                       | 55.6            | 51.7            | 1'350           | 1'394           | 1'519           |
| November    | 2'724     | 2'053           | 2'086           | 1'965           | 75.4                       | 76.6            | 72.1            | 0'671           | 0'638           | 0'759           |
| December    | 2'851     | 2'426           | 2'511           | 2'397           | 85.1                       | 88.1            | 84.1            | 0'425           | 0'340           | 0'454           |
| January ... | 2'374     | 1'922           | 2'104           | 2'024           | 81.0                       | 88.6            | 85.3            | 0'452           | 0'270           | 0'350           |
| February    | 1'995     | 1'468           | 1'569           | 1'496           | 73.6                       | 78.6            | 75.0            | 0'527           | 0'426           | 0'499           |
| March ...   | 2'076     | 1'125           | 1'257           | 1'188           | 54.2                       | 60.5            | 57.2            | 0'951           | 0'819           | 0'888           |
| April ...   | 2'043     | 0'666           | 0'736           | 0'703           | 32.6                       | 36.0            | 34.4            | 1'377           | 1'307           | 1'340           |
| May ...     | 2'048     | 0'488           | 0'548           | 0'515           | 23.8                       | 26.8            | 25.2            | 1'560           | 1'500           | 1'533           |
| June ...    | 2'270     | 0'564           | 0'586           | 0'565           | 24.8                       | 25.8            | 24.9            | 1'706           | 1'684           | 1'705           |
| July ...    | 2'713     | 0'718           | 0'743           | 0'691           | 26.5                       | 27.4            | 25.5            | 1'995           | 1'970           | 2'022           |
| August ...  | 2'683     | 0'706           | 0'707           | 0'664           | 26.3                       | 26.4            | 24.7            | 1'977           | 1'976           | 2'019           |
| Year ...    | 29.268    | 14.691          | 15.323          | 14.498          | 50.2                       | 52.4            | 49.5            | 14.577          | 13.945          | 14.770          |

Area of each gauge  $\frac{1}{1000}$  acre.

G

## CROP YIELDS ON THE EXPERIMENTAL PLOTS.

NOTES.—In each case the year refers to the harvest, *e.g.*, Wheat harvested in 1924.  
In the tables, total straw includes straw, cavings and chaff.

## CONVERSION TABLE.

|                             |                                                                        |                                 |
|-----------------------------|------------------------------------------------------------------------|---------------------------------|
| 1 acre ... .. =             | 0.404 Hectare ... ..                                                   | 0.963 Feddan.                   |
| 1 bushel (Imperial) =       | 0.346 Hectolitre (36.346 litres) ...                                   | 0.184 Ardeb.                    |
| 1 lb. (pound avoirdupois) = | 0.453 Kilogramme ... ..                                                | 1.009 Rotls.                    |
| 1 cwt. (hundredweight) =    | 50.8 Kilogrammes ... ..                                                | { 113.0 Rotls.<br>1.366 Maunds. |
| 1 metric quintal ... =      | { 100.0 Kilogrammes ... ..<br>220.46 lb. ... ..                        |                                 |
| 1 bushel per acre ... =     | 0.9 Hectolitre per Hectare ...                                         | 0.191 Ardeb per Feddan.         |
| 1 lb. per acre ... .. =     | 1.12 Kilogramme per Hectare ...                                        | 1.049 Rotls per Feddan.         |
| 1 cwt. per acre ... .. =    | 125.60 Kilogrammes per Hectare or<br>1.256 metric Quintals per Hectare | 117.4 Rotls per Feddan.         |

In America the Winchester bushel is used = 35.236 litres. 1 English bushel = 1.032 American bushels.

CROPS GROWN IN ROTATION. AGDELL FIELD.  
PRODUCE PER ACRE.

| Year.                                             | CROP.                                   | O.<br>Unmanured. |                              | M.<br>Mineral Manure. |                              | C.<br>Complete Mineral<br>and Nitrogenous<br>Manure. |                              |
|---------------------------------------------------|-----------------------------------------|------------------|------------------------------|-----------------------|------------------------------|------------------------------------------------------|------------------------------|
|                                                   |                                         | 5.<br>Fallow.    | 6.<br>Clover<br>or<br>Beans. | 3.<br>Fallow.         | 4.<br>Clover<br>or<br>Beans. | 1.<br>Fallow.                                        | 2.<br>Clover<br>or<br>Beans. |
| AVERAGE OF THE FIRST NINETEEN COURSES, 1848-1923. |                                         |                  |                              |                       |                              |                                                      |                              |
|                                                   | Roots (Swedes) cwt.*                    | 32.7             | 11.2                         | 175.7                 | 195.9                        | 355.3                                                | 302.0                        |
|                                                   | Barley—                                 |                  |                              |                       |                              |                                                      |                              |
|                                                   | Dressed Grain bush.                     | 22.7             | 20.9                         | 23.8                  | 27.9                         | 32.2                                                 | 36.8                         |
|                                                   | Total Straw ... cwt.                    | 13.9             | 13.7                         | 14.0                  | 16.0                         | 19.5                                                 | 22.6                         |
|                                                   | Beans—                                  |                  |                              |                       |                              |                                                      |                              |
|                                                   | Dressed Grain bush.                     | —                | 13.1                         | —                     | 18.2                         | —                                                    | 22.3                         |
|                                                   | Total Straw ... cwt.                    | —                | 9.2                          | —                     | 13.2                         | —                                                    | 15.3                         |
|                                                   | Clover Hay ... cwt.                     | —                | 28.3                         | —                     | 54.1                         | —                                                    | 55.0                         |
|                                                   | Wheat—                                  |                  |                              |                       |                              |                                                      |                              |
|                                                   | Dressed Grain bush.                     | 24.2             | 22.8                         | 28.5                  | 31.2                         | 29.5                                                 | 31.2                         |
|                                                   | Total Straw ... cwt.                    | 23.7             | 21.7                         | 29.0                  | 30.3                         | 31.4                                                 | 30.4                         |
| NINETEENTH COURSE, 1920-23.                       |                                         |                  |                              |                       |                              |                                                      |                              |
| 1920                                              | Roots (Swedes) ... cwt.                 | 20.5             | 2.1                          | 163.9                 | 270.0                        | 262.1                                                | 56.4†                        |
| 1921                                              | Barley—                                 |                  |                              |                       |                              |                                                      |                              |
|                                                   | Dressed Grain bush.                     | 13.0             | 2.4†                         | 12.8                  | 26.3                         | 10.9                                                 | 25.7                         |
|                                                   | Offal Grain ... lb.                     | 57.0             | 42.0                         | 45.0                  | 58.0                         | 39.0                                                 | 65.0                         |
|                                                   | Straw ... lb.                           | 891.0            | 601.0                        | 596.0                 | 1124.0                       | 444.0                                                | 1444.0                       |
|                                                   | Total Straw ... cwt.                    | 10.9             | 7.8                          | 7.9                   | 14.2                         | 6.3                                                  | 17.7                         |
|                                                   | Wt. of Dressed } lb.                    | 55.1             | 51.0                         | 56.5                  | 56.8                         | 56.4                                                 | 56.7                         |
|                                                   | Grain per bush. }                       |                  |                              |                       |                              |                                                      |                              |
|                                                   | Proportion of Total } Grain to 100 of } | 63.0             | 19.0                         | 86.3                  | 97.5                         | 92.2                                                 | 77.1                         |
|                                                   | Total Straw }                           |                  |                              |                       |                              |                                                      |                              |
| 1922                                              | Clover Hay ... cwt.                     | —                | 4.4                          | —                     | 9.7                          | —                                                    | 3.5                          |
|                                                   | (1 crop only)                           |                  |                              |                       |                              |                                                      |                              |
| 1923                                              | Wheat—                                  |                  |                              |                       |                              |                                                      |                              |
|                                                   | Dressed Grain bush.                     | 18.0             | 25.2                         | 20.3                  | 28.3                         | 19.7                                                 | 22.9                         |
|                                                   | Offal Grain ... lb.                     | 174.0            | 206.0                        | 190.0                 | 221.0                        | 205.0                                                | 220.0                        |
|                                                   | Straw ... lb.                           | 2019.0           | 2575.0                       | 2590.0                | 2975.0                       | 2363.0                                               | 2390.0                       |
|                                                   | Total Straw ... cwt.                    | 20.6             | 26.5                         | 26.9                  | 30.7                         | 24.3                                                 | 24.5                         |
|                                                   | Wt. of Dressed } lb.                    | 63.6             | 63.4                         | 63.5                  | 64.3                         | 64.3                                                 | 64.6                         |
|                                                   | Grain per bush. }                       |                  |                              |                       |                              |                                                      |                              |
|                                                   | Proportion of Total } Grain to 100 of } | 57.0             | 60.7                         | 49.0                  | 59.4                         | 54.0                                                 | 61.9                         |
|                                                   | Total Straw }                           |                  |                              |                       |                              |                                                      |                              |
| PRESENT COURSE (20th), 1924.                      |                                         |                  |                              |                       |                              |                                                      |                              |
| 1924                                              | Roots (Turnips) ... cwt.                | 2.9              | 0.7                          | 42.8                  | 31.5                         | 127.4                                                | 104.7                        |

\* Plots 1, 3 and 5 based upon 18 years. Plots 2, 4 and 6 based upon 17 years.

† Plot 6 was more badly attacked by Gout Fly than the other plots.

‡ The roots on this plot were badly attacked by finger and toe disease in 1920.  
In 1920 Rape Cake was omitted from plots 1 and 2.

## MANGOLDS, BARN FIELD, 1923 and 1924.

Roots since 1856. Mangolds since 1876.

Produce per Acre.

| Strip. | Strip Manures.                                                       | Cross Dressings.                               |                                               |                 |                             |                 |
|--------|----------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------|-----------------|-----------------------------|-----------------|
|        |                                                                      | O.                                             | N.                                            | A.              | A.C.                        | C.              |
|        |                                                                      | None.                                          | Nitrate of Soda                               | Ammon. Salts.   | Ammon. Salts and Rape Cake. | Rape Cake.      |
|        | <b>1923†.</b>                                                        | Tons.                                          | Tons.                                         | Tons.           | Tons.                       | Tons.           |
| 1      | Dung only ...                                                        | { R. 16.55<br>L. 2.20                          | { 32.69<br>3.70                               | { 23.67<br>3.78 | { 21.63<br>4.15             | { 22.29<br>4.18 |
| 2      | Dung, Super., Potash ...                                             | { R. 18.92<br>L. 2.16                          | { 37.38<br>4.48                               | { 30.40<br>4.64 | { 29.64<br>5.23             | { 29.96<br>4.11 |
| 4      | Complete Minerals ...                                                | { R. 4.72 <sup>a</sup><br>L. 0.92 <sup>b</sup> | { R. 22.04*<br>L. 3.69<br>R. 19.18<br>L. 3.70 | { 19.18<br>2.82 | { 25.28<br>5.12             | { 20.85<br>2.96 |
| 5      | Superphosphate only ...                                              | { R. 5.22<br>L. 1.23                           | { 19.09<br>2.92                               | { 8.48<br>3.54  | { 6.16<br>3.15              | { 6.59<br>3.21  |
| 6      | Super. and Potash ...                                                | { R. 4.25<br>L. 1.06                           | { 19.73<br>2.56                               | { 16.08<br>2.65 | { 18.39<br>4.50             | { 16.48<br>2.72 |
| 7      | Super., Sulphate of Mag.,<br>and Sodium Chloride                     | { R. 4.71<br>L. 1.11                           | { 21.92<br>2.86                               | { 19.82<br>2.78 | { 17.53<br>4.62             | { 15.44<br>2.69 |
| 8      | None ...                                                             | { R. 3.63<br>L. 1.14                           | { 11.05<br>2.72                               | { 5.90<br>2.80  | { 4.71<br>2.49              | { 3.47<br>1.92  |
| 9      | Sodium Chloride, Nit.<br>Soda, Sulph. Potash,<br>and Sulph. Mag. ... | { R. 24.73<br>L. 3.03                          | —                                             | —               | —                           | —               |
|        | <b>1924.</b>                                                         |                                                |                                               |                 |                             |                 |
| 1      | Dung only ...                                                        | { R. 14.49<br>L. 3.83                          | { 23.99<br>6.11                               | { 20.75<br>6.43 | { 28.38<br>6.77             | { 24.80<br>5.29 |
| 2      | Dung, Super., Potash ...                                             | { R. 18.61<br>L. 3.86                          | { 25.08<br>5.68                               | { 23.28<br>5.52 | { 34.17<br>7.20             | { 32.15<br>6.13 |
| 4      | Complete Minerals ...                                                | { R. 3.15 <sup>a</sup><br>L. 1.06 <sup>b</sup> | { R. 14.34<br>L. 4.55<br>R. 11.15<br>L. 4.19  | { 14.42<br>3.50 | { 34.16<br>5.62             | { 20.91<br>3.66 |
| 5      | Superphosphate only ...                                              | { R. 3.31<br>L. 1.03                           | { 14.92<br>3.76                               | { 11.47<br>3.61 | { 15.81<br>4.83             | { 15.31<br>3.54 |
| 6      | Super. and Potash ...                                                | { R. 3.16<br>L. 1.12                           | { 12.58<br>3.52                               | { 16.40<br>2.96 | { 29.40<br>5.73             | { 20.55<br>2.73 |
| 7      | Super., Sulphate of Mag.,<br>and Sodium Chloride                     | { R. 3.42<br>L. 1.11                           | { 17.28<br>3.94                               | { 18.34<br>3.29 | { 28.91<br>5.24             | { 20.18<br>3.05 |
| 8      | None ...                                                             | { R. 2.14<br>L. 1.87                           | { 11.70<br>3.62                               | { 10.18<br>3.18 | { 13.35<br>4.32             | { 11.55<br>3.49 |
| 9      | Sodium Chloride, Nit.<br>Soda, Sulph. Potash<br>and Sulph. Mag. ...  | { R. 20.46<br>L. 3.51                          | —                                             | —               | —                           | —               |

R. = roots. L. = leaves.

\* From 1904 onwards plot 4 N has been divided, 4a receiving Sulphate of Potash. Sulphate of Magnesia, Sodium Chloride and Nitrate of Soda; 4b receiving Calcium Chloride, Potassium Nitrate and Calcium Nitrate.

† In 1923 plot 4 in series A, N, AC and C were lifted on Nov. 22nd in good condition. The remainder of the plots were lifted Dec. 10th—15th after several severe frosts.

## HAY. THE PARK GRASS PLOTS. 1923, 1924.

| Plot. | Manuring per acre.                                                                                | 1923.                  |           |                      |           |                        | 1924.                |           | Plot. |        |
|-------|---------------------------------------------------------------------------------------------------|------------------------|-----------|----------------------|-----------|------------------------|----------------------|-----------|-------|--------|
|       |                                                                                                   | Yield of Hay per acre. |           | Dry Matter per acre. |           | Yield of Hay per acre. | Dry Matter per acre. |           |       |        |
|       |                                                                                                   | 1st Crop.              | 2nd Crop. | Total.               | 1st Crop. |                        |                      | 2nd Crop. |       | Total. |
|       |                                                                                                   | cwt.                   | cwt.      | cwt.                 | lb.       | lb.                    | lb.                  | cwt.      |       | lb.    |
| 1     | Single dressing Amm. Salts (= 43 lb. N.) ; (with Dung also 8 years 1856-63)                       | 23.8                   | 16.2      | 40.0                 | 1917      | 310                    | 2227                 | 29.0      | 2667  | 1      |
| 2     | Unmanured ; (after Dung 8 years, 1856-63)                                                         | 21.1                   | 9.8       | 30.9                 | 1732      | 199                    | 1931                 | 28.1      | 2551  | 2      |
| 3     | Unmanured                                                                                         | 17.4                   | 6.1       | 23.5                 | 1297      | 102                    | 1399                 | 18.1      | 1518  | 3      |
| 4-1   | Superphosphate of Lime                                                                            | 18.0                   | 2.6       | 20.6                 | 1426      | 48                     | 1474                 | 23.8      | 1804  | 4-1    |
| 4-2   | Superphosphate of Lime and double dressing Amm. Salts (= 86 lb. N.)                               | 15.0                   | 5.7       | 20.7                 | 1165      | 98                     | 1263                 | 15.8      | 1383  | 4-2    |
| 5-1   | (N. half) Unmanured ; following double dressing Amm. Salts (= 86 lb. N.) 1856-97                  | 14.9                   | 2.9       | 17.8                 | 1142      | 66                     | 1208                 | 17.6      | 1445  | 5-1    |
| 5-2   | (S. half) Super., Sulphate of Potash ; following double dressing Amm. Salts (= 86 lb. N.) 1856-97 | 20.8                   | 4.4       | 25.2                 | 1435      | 83                     | 1518                 | 23.0      | 1944  | 5-2    |
| 6     | Complete Mineral Manure as plot 7 ; following double dressing Amm. Salts (= 86 lb. N.) 1856-68    | 18.7                   | 4.1       | 22.8                 | 1444      | 83                     | 1527                 | 20.9      | 1818  | 6      |
| 7     | Complete Mineral Manure                                                                           | 45.5                   | 4.8       | 50.3                 | 3210      | 77                     | 3287                 | 27.7      | 2478  | 7      |
| 8     | Mineral Manure without Potash                                                                     | 38.9                   | 21.3      | 60.2                 | 3135      | 358                    | 3493                 | 46.4      | 4319  | 8      |
| 9     | Complete Mineral Manure and double dressing Amm. Salts (= 86 lb. N.)                              | 20.3                   | 9.9       | 30.2                 | 1405      | 191                    | 1596                 | 15.2      | 1390  | 9      |
| 10    | Mineral Manure (without Potash) and double dressing Amm. Salts (= 86 lb. N.)                      | 21.3                   | 20.4      | 41.7                 | 1593      | 438                    | 2031                 | 27.3      | 2287  | 10     |
| 11-1  | Complete Mineral Manure and treble dressing Amm. Salts (= 129 lb. N.)                             | 23.0                   | 27.3      | 50.3                 | 1838      | 507                    | 2345                 | 36.0      | 3166  | 11-1   |
| 11-2  | As plot 11-1 and Silicate of Soda                                                                 | 23.0                   | 20.8      | 43.8                 | 1806      | 402                    | 2208                 | 36.1      | 3123  | 11-2   |
|       |                                                                                                   | 38.3                   | 21.3      | 59.6                 | 2838      | 438                    | 3276                 | 54.0      | 4851  |        |
|       |                                                                                                   | 21.3                   | 8.7       | 30.0                 | 1505      | 151                    | 1656                 | 21.3      | 1854  |        |
|       |                                                                                                   | 19.1                   | 8.7       | 27.8                 | 1513      | 200                    | 1713                 | 17.4      | 1539  |        |
|       |                                                                                                   | 57.5                   | 17.3      | 74.8                 | 4009      | 287                    | 4296                 | 32.9      | 2946  |        |
|       |                                                                                                   | 59.9                   | 22.7      | 82.6                 | 4488      | 443                    | 4931                 | 66.2      | 5600  |        |
|       |                                                                                                   | 45.2                   | 8.3       | 53.5                 | 3210      | 132                    | 3342                 | 31.5      | 2970  |        |
|       |                                                                                                   | 46.7                   | 28.9      | 75.6                 | 3197      | 577                    | 3774                 | 49.1      | 4744  |        |
|       |                                                                                                   | 72.0                   | 55.5      | 127.5                | 4559      | 779                    | 5338                 | 39.9      | 3267  |        |
|       |                                                                                                   | 75.8                   | 34.0      | 109.8                | 5184      | 586                    | 5770                 | 73.4      | 6467  |        |
|       |                                                                                                   | 77.4                   | 55.0      | 132.4                | 5472      | 831                    | 6303                 | 50.5      | 4502  |        |
|       |                                                                                                   | 75.7                   | 33.7      | 109.4                | 5219      | 666                    | 5885                 | 70.8      | 5957  |        |

|    |                                                                                                                                                                                                                                       |     |     |     |     |     |     |      |      |      |      |     |      |      |      |    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|------|------|------|----|
| 12 | Unmanured                                                                                                                                                                                                                             | ... | ... | ... | ... | ... | ... | 19'8 | 6'0  | 25'8 | 1415 | 147 | 1562 | 16'7 | 1403 | 12 |
| 13 | Dung in 1905, and every fourth year since (omitted in 1917). Fish Guano in 1907 and every fourth year since                                                                                                                           | ... | ... | ... | ... | ... | ... | 60'6 | 29'2 | 89'8 | 4015 | 535 | 4550 | 41'2 | 3668 | 13 |
| 14 | Complete Mineral Manure and double dressing Nitrate of Soda (=86 lb. N.)                                                                                                                                                              | ... | ... | ... | ... | ... | ... | 47'5 | 29'0 | 76'5 | 3264 | 540 | 3804 | 38'1 | 3392 | 14 |
| 15 | Complete Mineral Manure as plot 7; following double dressing Nitrate of Soda (=86 lb. N.)                                                                                                                                             | ... | ... | ... | ... | ... | ... | 53'2 | 26'6 | 79'8 | 4298 | 493 | 4791 | 63'7 | 5142 | 15 |
| 16 | Complete Mineral Manure and single dressing Nitrate of Soda (=43 lb. N.)                                                                                                                                                              | ... | ... | ... | ... | ... | ... | 45'9 | 17'5 | 63'4 | 3400 | 375 | 3775 | 57'4 | 4854 | 16 |
| 17 | Single dressing Nitrate of Soda (=43 lb. N.)                                                                                                                                                                                          | ... | ... | ... | ... | ... | ... | 28'5 | 10'6 | 39'1 | 2443 | 203 | 2646 | 45'4 | 3615 | 17 |
| 18 | Potash, Sulphate of Soda, Magnesia and double dressing Sulphate of Amm. (=86 lb. N.) 1905 and since; following Minerals and Amm. Salts, supplying the constituents of 1 ton of Hay, 1865-1904                                         | ... | ... | ... | ... | ... | ... | 24'4 | 10'2 | 34'6 | 2091 | 221 | 2312 | 42'7 | 3539 | 18 |
| 19 | Farmyard Dung in 1905 and every 4th year since (omitted in 1917); following Nitrate of Soda (=43 lb. N.) and Minerals, 1872-1904                                                                                                      | ... | ... | ... | ... | ... | ... | 41'5 | 8'1  | 49'6 | 3150 | 142 | 3292 | 47'2 | 3820 | 19 |
| 20 | Farmyard Dung in 1905 and every 4th year since (omitted 1917); each intervening year, plot 20 receives Sulphate of Potash, Superphosphate and Nitrate of Soda (=26 lb. N.); following Nitrate of Potash and Superphosphate, 1872-1904 | ... | ... | ... | ... | ... | ... | 42'5 | 16'9 | 59'4 | 3303 | 345 | 3648 | 52'2 | 4376 | 20 |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 31'6 | 5'8  | 37'4 | 1979 | 105 | 2084 | 33'0 | 2498 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 30'3 | 6'4  | 36'7 | 2293 | 119 | 2412 | 33'7 | 2769 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 38'3 | 26'3 | 64'6 | 2550 | 589 | 3139 | 28'0 | 2600 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 48'1 | 9'0  | 57'1 | 3541 | 231 | 3772 | 29'5 | 2547 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 40'0 | 11'8 | 51'8 | 2953 | 283 | 3236 | 32'5 | 2688 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 25'3 | 27'4 | 52'7 | 1943 | 525 | 2468 | 25'3 | 2392 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 21'6 | 31'1 | 52'7 | 1842 | 775 | 2617 | 27'4 | 2717 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 19'1 | 27'0 | 46'1 | 1621 | 653 | 2274 | 24'2 | 2411 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 35'6 | 28'3 | 63'9 | 2857 | 625 | 3482 | 31'7 | 2984 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 36'2 | 26'1 | 62'3 | 2814 | 558 | 3372 | 35'8 | 3347 |    |
|    |                                                                                                                                                                                                                                       | ... | ... | ... | ... | ... | ... | 42'6 | 19'1 | 61'7 | 3192 | 429 | 3621 | 51'0 | 4790 |    |

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

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

The 2nd Hay Crop, 1923, was carted in very bad condition as the plots could only be cut when the frost was on them. The Dry Matter figures give a truer indication of the relative yields of the different plots.

The Park Grass Plots.  
BOTANICAL COMPOSITION, PER CENT. 1921, 1st Crop.

| Plot. | Manuring.                                                                                                                             | Liming.        | Gramineæ. | Leguminosæ. | Other Orders. | "Other Orders" consist largely of                        | Plot. |
|-------|---------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|-------------|---------------|----------------------------------------------------------|-------|
| 3     | Unmanured ... ..                                                                                                                      | Limed ...      | 68.4      | 10.5        | 21.1          | Plantago lanceolata ...                                  | 3     |
| 5-1   | Unmanured, following double Amm. Salts, 1856-97 ... ..                                                                                | Not limed      | 73.1      | 4.7         | 22.2          | Plantago lanceolata ...                                  | 5-1   |
| 5-2   | Super. and Sulph. Potash following double Amm. Salts, 1856-97 ...                                                                     | Not limed      | 86.8      | 1.1         | 12.1          | Centaurea nigra ...                                      | 5-2   |
| 7     | Complete Mineral Manure ... ..                                                                                                        | Not limed      | 72.5      | 9.2         | 18.3          | Rumex acetosa ...                                        | 7     |
| 9     | Complete Mineral Manure and double Amm. Salts ... ..                                                                                  | Limed ...      | 66.1      | 22.0        | 11.9          | Heracleum sphondylium ...                                | 9     |
| 14    | Complete Mineral Manure and double Nitrate of Soda ... ..                                                                             | Not limed      | 68.9      | 13.5        | 17.6          | Achillea millefolium ...                                 | 14    |
| 15    | As plot 7 following double Nitrate of Soda, 1858-75 ... ..                                                                            | Limed ...      | 96.3      | —           | 3.7           | Rumex acetosa; Heracleum sphondylium ...                 | 15    |
| 17    | Single Nitrate of Soda ... ..                                                                                                         | Not limed      | 99.0      | —           | 1.0           | Rumex acetosa ...                                        | 17    |
| 18    | Potash, Sulphate Soda, Magnesia, and double Sulphate of Amm. 1905 and since ... ..                                                    | Limed ...      | 95.5      | 3.0         | 1.5           | Taraxacum vulgare ...                                    | 18    |
| 19    | Farmyard Dung in 1905 and every 4th year since (omitted in 1917)                                                                      | Not limed      | 97.4      | 0.2         | 2.4           | Taraxacum vulgare ...                                    | 19    |
| 20    | Farmyard Dung in 1905 and every 4th year since (omitted 1917), each intervening year Sulphate Potash, Super., and Nitrate of Soda ... | Limed ...      | 70.6      | 18.2        | 11.2          | Plantago lanceolata ...                                  | 20    |
|       |                                                                                                                                       | Not limed      | 76.2      | 8.8         | 15.0          | Plantago lanceolata ...                                  |       |
|       |                                                                                                                                       | Limed ...      | 74.1      | 0.9         | 25.0          | Plantago lanceolata ...                                  |       |
|       |                                                                                                                                       | Not limed      | 65.3      | 0.2         | 34.5          | Plantago lanceolata ...                                  |       |
|       |                                                                                                                                       | limed 6788 lb. | 82.6      | —           | 17.4          | Rumex acetosa ...                                        |       |
|       |                                                                                                                                       | " 3951 lb.     | 86.0      | —           | 14.0          | Rumex acetosa ...                                        |       |
|       |                                                                                                                                       | Not limed      | 91.2      | —           | 8.8           | Rumex acetosa ...                                        |       |
|       |                                                                                                                                       | limed 3150 lb. | 92.3      | 4.0         | 3.7           | Conopodium denudatum ...                                 |       |
|       |                                                                                                                                       | " 570 lb.      | 92.3      | 2.3         | 5.4           | Rumex acetosa ...                                        |       |
|       |                                                                                                                                       | Not limed      | 88.8      | 5.1         | 6.1           | Rumex acetosa; Centaurea nigra ...                       |       |
|       |                                                                                                                                       | limed 2772 lb. | 20.2      | 3.8         | 6.0           | Rumex acetosa; Conopodium denudatum; Ranunculus spp. ... |       |
|       |                                                                                                                                       | limed 570 lb.  | 91.0      | 4.8         | 4.2           | Rumex acetosa ...                                        |       |
|       |                                                                                                                                       | Not limed      | 90.2      | 4.0         | 5.8           | Rumex acetosa ...                                        |       |

The Park Grass Plots—*contd.*  
BOTANICAL COMPOSITION, PER CENT. 1922, 1st CROP.

| Plot. | Manuring.                                                                                                                              | Liming.        | Gramineae. | Leguminosae. | Other Orders. | "Other Orders" consist largely of                 | Plot. |
|-------|----------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|--------------|---------------|---------------------------------------------------|-------|
| 3     | Unmanured ... ..                                                                                                                       | Limed ...      | 51.0       | 7.6          | 41.4          | Centaurea nigra ... ..                            | 3     |
| 5-1   | Unmanured, following double Ammonium Salts 1856-97 ... ..                                                                              | Not limed      | 60.5       | 4.6          | 34.9          | Plantago lanceolata ... ..                        | 5-1   |
| 5-2   | Super. and Sulph. Potash following double Ammonium Salts 1856-97 ... ..                                                                | Not limed      | 57.2       | 2.1          | 40.7          | Centaurea nigra ... ..                            | 5-2   |
| 7     | Complete Mineral Manure ... ..                                                                                                         | Not limed      | 71.8       | 6.1          | 22.1          | Rumex acetosa ... ..                              | 7     |
| 9     | Complete Mineral Manure & double Ammonium Salts ... ..                                                                                 | Limed ...      | 61.3       | 29.6         | 9.0           | Heracleum sphondylium ... ..                      | 9     |
| 14    | Complete Mineral Manure & double Nitrate of Soda ... ..                                                                                | Not limed      | 69.7       | 12.7         | 17.5          | Centaurea nigra ... ..                            | 14    |
| 18    | Potash, Sulphate Soda, Magnesia, and double Sulphate of Ammonia, 1905 and since.                                                       | Limed ...      | 99.2       | 0.3          | 0.5           | Taraxacum vulgare ... ..                          | 18    |
| 19    | Farmyard Dung in 1905 and every fourth year since (omitted in 1917)                                                                    | Limed ...      | 99.1       | 0.1          | 0.8           | Taraxacum vulgare ... ..                          | 19    |
| 20    | Farmyard Dung in 1905 and every fourth year since (omitted in 1917), each intervening year Sulphate Potash, Super. and Nitrate of Soda | Limed ...      | 92.5       | 1.1          | 6.4           | Rumex acetosa ... ..                              | 20    |
|       |                                                                                                                                        | Not limed      | 96.4       | 0.2          | 3.4           | Rumex acetosa ... ..                              |       |
|       |                                                                                                                                        | limed 6788 lb. | 82.3       | 1.4          | 16.3          | Rumex acetosa ... ..                              |       |
|       |                                                                                                                                        | " 3951 lb.     | 87.5       | —            | 12.5          | Rumex acetosa ... ..                              |       |
|       |                                                                                                                                        | Not limed      | 80.7       | —            | 19.3          | Centaurea nigra ... ..                            |       |
|       |                                                                                                                                        | limed 3150 lb. | 86.2       | 7.2          | 6.6           | Conopodium denudatum ... ..                       |       |
|       |                                                                                                                                        | " 570 lb.      | 88.1       | 5.9          | 5.9           | Rumex acetosa; Ranunculus spp. ... ..             |       |
|       |                                                                                                                                        | Not limed      | 85.8       | 7.5          | 6.7           | Rumex acetosa ... ..                              |       |
|       |                                                                                                                                        | limed 2772 lb. | 85.6       | 4.6          | 9.8           | Conopodium denudatum ... ..                       |       |
|       |                                                                                                                                        | " 570 lb.      | 86.8       | 7.9          | 5.3           | Conopodium denudatum ... ..                       |       |
|       |                                                                                                                                        | Not limed      | 90.9       | 1.0          | 8.1           | Conopodium denudatum; Achillea millefolium ... .. |       |

## WHEAT. BROADBALK FIELD, 1923.

| Plot. | Manurial Treatment.                            | Top Portion.    |                    |                       |                 |                       |                                   | Bottom Portion. |                    |                       |                 |                       |                                   | 71 year Average 1852-1922. |                       |
|-------|------------------------------------------------|-----------------|--------------------|-----------------------|-----------------|-----------------------|-----------------------------------|-----------------|--------------------|-----------------------|-----------------|-----------------------|-----------------------------------|----------------------------|-----------------------|
|       |                                                | Dressed Grain.  |                    | Offal Grain per Acre. | Straw per Acre. | Total Straw per Acre. | Proportion of Total Grain to 100. | Dressed Grain.  |                    | Offal Grain per Acre. | Straw per Acre. | Total Straw per Acre. | Proportion of Total Grain to 100. | Dressed Grain per Acre.    | Total Straw per Acre. |
|       |                                                | Yield per Acre. | Weight per Bushel. |                       |                 |                       |                                   | Yield per Acre. | Weight per Bushel. |                       |                 |                       |                                   |                            |                       |
|       |                                                | bush.           | lb.                | lb.                   | lb.             | cwt.                  |                                   | bush.           | lb.                | lb.                   | lb.             | cwt.                  |                                   | bush.                      | cwt.                  |
| 2A    | Farmyard Manure                                | 12.5            | 63.4               | 124                   | 1718            | 20.3                  | 40.4                              | 20.4            | 63.2               | 206                   | 2470            | 29.2                  | 45.7                              | 28.4*                      | 32.8*                 |
| 2B    | Farmyard Manure                                | 13.5            | 63.3               | 155                   | 2751            | 32.9                  | 27.4                              | 21.2            | 63.8               | 328                   | 3060            | 37.5                  | 40.0                              | 34.3                       | 34.6                  |
| 3     | Unmanured                                      | 3.8             | 62.8               | 27                    | 332             | 3.7                   | 65.4                              | 4.2             | 62.9               | 37                    | 298             | 3.7                   | 71.6                              | 12.1                       | 9.9                   |
| 5     | Complete Mineral Manure                        | 3.1             | 61.5               | 29                    | 264             | 3.1                   | 63.3                              | 4.4             | 62.8               | 56                    | 430             | 5.3                   | 56.6                              | 13.9                       | 11.7                  |
| 6     | As 5, and Single Amm. Salts                    | 6.2             | 62.0               | 61                    | 813             | 9.9                   | 40.0                              | 7.9             | 63.1               | 69                    | 828             | 9.7                   | 52.2                              | 22.3                       | 20.7                  |
| 7     | As 5, and Double Amm. Salts                    | 10.2            | 62.6               | 109                   | 1824            | 20.9                  | 31.8                              | 15.8            | 63.5               | 300                   | 2808            | 32.4                  | 35.9                              | 30.9                       | 32.2                  |
| 8     | As 5, and Treble Amm. Salts                    | 12.4            | 62.5               | 142                   | 2708            | 30.2                  | 27.1                              | 17.8            | 63.3               | 388                   | 3312            | 38.6                  | 35.0                              | 35.1                       | 40.2                  |
| 9     | As 5, and Single Nitrate of Soda               | 8.3             | 62.0               | 81                    | 1302            | 14.6                  | 36.3                              | 9.3             | 62.8               | 150                   | 1924            | 23.0                  | 28.5                              | 24.5†                      | 24.7†                 |
| 10    | Double Amm. Salts alone                        | 7.6             | 62.0               | 84                    | 1174            | 14.1                  | 35.2                              | 7.5             | 63.5               | 194                   | 1396            | 19.8                  | 30.1                              | 19.1                       | 18.0                  |
| 11    | As 10, and Superphosphate                      | 6.5             | 62.2               | 100                   | 1472            | 18.5                  | 24.4                              | 8.4             | 63.3               | 225                   | 1902            | 24.1                  | 28.0                              | 21.5                       | 21.7                  |
| 12    | As 10, and Super. and Sulph. Soda              | 7.8             | 62.4               | 108                   | 1396            | 17.6                  | 30.1                              | 11.1            | 63.6               | 250                   | 2096            | 25.3                  | 33.8                              | 27.6                       | 27.2                  |
| 13    | As 10, and Super. and Sulph. Potash            | 12.2            | 63.3               | 113                   | 1816            | 21.8                  | 36.2                              | 12.3            | 62.6               | 216                   | 2748            | 30.3                  | 29.0                              | 29.8                       | 31.0                  |
| 14    | As 10, and Super. and Sulph. Magnesia          | 10.5            | 63.3               | 135                   | 1714            | 20.5                  | 34.7                              | 11.3            | 63.4               | 300                   | 2270            | 27.6                  | 32.9                              | 27.3                       | 27.2                  |
| 15    | Double Amm. Salts in Autumn and Minerals       | 17.4            | 63.3               | 126                   | 1896            | 22.2                  | 49.5                              | 13.3            | 63.5               | 168                   | 1972            | 23.4                  | 38.6                              | 28.4                       | 28.7                  |
| 16    | Double Nitrate and Minerals                    | 16.9            | 63.3               | 167                   | 2224            | 26.5                  | 41.7                              | 11.8            | 61.0               | 275                   | 2958            | 33.1                  | 26.8                              | 30.7†                      | 35.8†                 |
| 17)   | Minerals alone, or Double Amm. Salts alone in  | 2.9             | 61.5               | 39                    | 356             | 4.7                   | 40.9                              | 5.0             | 62.4               | 76                    | 698             | 9.2                   | 37.6                              | 28.6                       | 28.6                  |
| 18)   | alternate years                                | 11.7            | 63.9               | 201                   | 1620            | 20.0                  | 42.3                              | 11.8            | 63.4               | 192                   | 2232            | 25.9                  | 32.4                              | 14.3                       | 12.4                  |
| 19    | Rape Cake alone                                | 13.6            | 63.4               | 232                   | 1664            | 20.5                  | 47.6                              | 12.2            | 63.9               | 229                   | 1918            | 24.4                  | 36.8                              | 22.0†                      | 22.7†                 |
| 20    | Mineral Manure (without Super.) and Amm. Salts | 8.6             | 63.0               | 122                   | 1443            | 17.9                  | 33.0                              | —               | —                  | —                     | —               | —                     | —                                 | 18.6§                      | 19.8§                 |

\* 23 years only, 1885-1922.

† 38 years only, 1893-1922.

‡ 30 years only, 1893-1922.

§ 15 years only, 1906-1922 (no crop in 1912 and 1914)

## WHEAT. BROADBALK FIELD, 1924.

| Plot. | Manurial Treatment.                                           | Top Portion.          |                        |               |               |                | Bottom Portion. |               |               |                |                                  |
|-------|---------------------------------------------------------------|-----------------------|------------------------|---------------|---------------|----------------|-----------------|---------------|---------------|----------------|----------------------------------|
|       |                                                               | Dressed Grain.        |                        | Offal Grain   | Straw         | Total          | Dressed Grain.  | Offal Grain   | Straw         | Total          | Proportion of Total Grain to 100 |
|       |                                                               | Yield per Acre. bush. | Weight per Bushel. lb. | per Acre. lb. | per Acre. lb. | per Acre. cwt. |                 | per Acre. lb. | per Acre. lb. | per Acre. cwt. |                                  |
| 2A    | Farmyard Manure                                               | 10.3                  | 60.3                   | 142           | 1047          | 18.6           | 16.6            | 156           | 1417          | 22.2           | 46.5                             |
| 2B    | Farmyard Manure                                               | 10.4                  | 59.5                   | 158           | 1181          | 19.3           | 14.6            | 137           | 1367          | 22.4           | 40.6                             |
| 3     | Unmanured                                                     | 2.1                   | 58.9                   | 25            | 188           | 3.6            | 2.2             | 23            | 136           | 2.8            | 47.3                             |
| 5     | Complete Mineral Manure                                       | 4.4                   | 58.8                   | 29            | 270           | 4.0            | 3.9             | 25            | 220           | 3.7            | 60.0                             |
| 6     | As 5, and Single Amm. Salts                                   | 10.2                  | 60.0                   | 52            | 827           | 11.2           | 9.1             | 43            | 554           | 7.6            | 69.9                             |
| 7     | As 5, and Double Amm. Salts                                   | 19.3                  | 60.7                   | 160           | 2182          | 28.9           | 24.1            | 136           | 1898          | 24.9           | 57.5                             |
| 8     | As 5, and Treble Amm. Salts                                   | 23.2                  | 60.5                   | 174           | 2826          | 35.8           | 23.7            | 148           | 2578          | 33.1           | 42.4                             |
| 9     | As 5, and Single Nitrate of Soda                              | 12.9                  | 59.6                   | 107           | 1268          | 18.6           | 12.6            | 69            | 1012          | 13.5           | 54.1                             |
| 10    | Double Amm. Salts alone                                       | 4.9                   | 59.0                   | 72            | 532           | 11.4           | 5.4             | 85            | 434           | 8.3            | 43.1                             |
| 11    | As 10, and Superphosphate                                     | 5.5                   | 58.3                   | 111           | 944           | 16.6           | 4.6             | 109           | 632           | 12.8           | 26.3                             |
| 12    | As 10, and Super. and Sulph. Soda                             | 9.1                   | 59.4                   | 128           | 910           | 15.7           | 9.3             | 129           | 1008          | 17.0           | 35.3                             |
| 13    | As 10, and Super. and Sulph. Potash                           | 15.0                  | 60.2                   | 118           | 1420          | 21.2           | 11.0            | 85            | 1234          | 17.6           | 37.7                             |
| 14    | As 10, and Super. and Sulph. Magnesia                         | 9.9                   | 58.8                   | 159           | 1260          | 18.0           | 8.6             | 129           | 948           | 14.8           | 38.3                             |
| 15    | Double Amm. Salts in Autumn and Minerals                      | 7.9                   | 59.0                   | 91            | 836           | 14.0           | 4.6             | 66            | 532           | 10.9           | 27.3                             |
| 16    | Double Nitrate and Minerals                                   | 22.1                  | 60.0                   | 146           | 2168          | 32.8           | 19.3            | 156           | 1648          | 25.6           | 45.3                             |
| 17    | Minerals alone, or double Amm. Salts alone in alternate years | 7.8                   | 59.8                   | 68            | 722           | 11.1           | 7.4             | 58            | 556           | 9.6            | 45.0                             |
| 18    | Rape Cake alone                                               | 7.8                   | 59.5                   | 39            | 480           | 6.7            | 8.4             | 46            | 560           | 7.8            | 61.7                             |
| 19    | Mineral Manure (without Super.) and Amm. Salts                | 6.2                   | 58.8                   | 90            | 822           | 14.0           | 4.5             | 98            | 666           | 12.1           | 26.4                             |
| 20    |                                                               | 2.7                   | 56.8                   | 41            | 510           | 8.5            | —               | —             | —             | —              | —                                |

# PERMANENT BARLEY PLOTS. Hoos Field, 1923, 1924.

## PRODUCE PER ACRE.

| Plot. | Manuring.                                | 1923.                 |                          |                       |                       |                                |                                                              | 1924.                 |                          |                       |                       |                                |                                                              | 70 years Average Yield<br>1852—1922.† |                          |
|-------|------------------------------------------|-----------------------|--------------------------|-----------------------|-----------------------|--------------------------------|--------------------------------------------------------------|-----------------------|--------------------------|-----------------------|-----------------------|--------------------------------|--------------------------------------------------------------|---------------------------------------|--------------------------|
|       |                                          | Dressed Grain.        |                          |                       | Total Grain           |                                |                                                              | Dressed Grain.        |                          |                       | Total Grain           |                                |                                                              | Dressed Grain<br>per Acre.            | Total Straw<br>per Acre. |
|       |                                          | Yield<br>per<br>Acre. | Weight<br>per<br>Bushel. | Offal<br>per<br>Acre. | Straw<br>per<br>Acre. | Total<br>Straw<br>per<br>Acre. | Proportion<br>of<br>Total Grain<br>to 100 of<br>Total Straw. | Yield<br>per<br>Acre. | Weight<br>per<br>Bushel. | Offal<br>per<br>Acre. | Straw<br>per<br>Acre. | Total<br>Straw<br>per<br>Acre. | Proportion<br>of<br>Total Grain<br>to 100 of<br>Total Straw. |                                       |                          |
| 1 O   | Unmanured                                | 11.4                  | 53.0                     | 84                    | 690                   | 8.2                            | 74.7                                                         | 1.7                   | 44.3                     | 72                    | 217                   | 2.7                            | 47.8                                                         | bush.<br>14.0                         | cwt.<br>8.0              |
| 2 O   | Superphosphate only                      | 19.9                  | 54.8                     | 69                    | 927                   | 10.8                           | 96.1                                                         | 7.5                   | 45.4                     | 107                   | 410                   | 5.3                            | 75.6                                                         | 19.6                                  | 9.9                      |
| 3 O   | Alkali Salts only                        | 13.6                  | 52.1                     | 54                    | 916                   | 11.1                           | 61.5                                                         | 1.7                   | 44.0                     | 72                    | 195                   | 3.0                            | 44.3                                                         | 15.0                                  | 8.8                      |
| 4 O   | Complete Minerals                        | 17.2                  | 53.6                     | 66                    | 996                   | 11.4                           | 77.0                                                         | 2.5                   | 44.8                     | 101                   | 289                   | 4.7                            | 40.5                                                         | 19.8                                  | 11.1                     |
| 5 O   | Potash and Superphosphate                | 10.4                  | 54.4                     | 62                    | 655                   | 8.3                            | 67.0                                                         | 3.2                   | 47.5                     | 96                    | 347                   | 4.9                            | 45.3                                                         | 16.2                                  | 9.6                      |
| 1 A   | Ammonium Salts only                      | 13.4                  | 53.5                     | 144                   | 858                   | 10.5                           | 73.3                                                         | 4.1                   | 48.1                     | 196                   | 490                   | 7.2                            | 48.8                                                         | 24.8                                  | 14.1                     |
| 2 A   | Superphosphate and Amm. Salts            | 23.3                  | 54.3                     | 108                   | 1232                  | 14.1                           | 87.4                                                         | 33.5                  | 48.9                     | 336                   | 1680                  | 18.6                           | 95.0                                                         | 37.0                                  | 20.9                     |
| 3 A   | Alkali Salts and Amm. Salts              | 16.5                  | 54.3                     | 149                   | 1213                  | 15.7                           | 59.1                                                         | 7.0                   | 44.9                     | 153                   | 583                   | 8.0                            | 52.1                                                         | 27.0                                  | 16.3                     |
| 4 A   | Complete Minerals and Amm. Salts         | 33.0                  | 55.9                     | 98                    | 1598                  | 18.2                           | 95.3                                                         | 28.4                  | 49.0                     | 343                   | 1744                  | 20.3                           | 76.1                                                         | 40.6                                  | 24.0                     |
| 5 A   | Potash, Super. and Amm. Salts            | 25.3                  | 56.0                     | 76                    | 1336                  | 15.6                           | 85.7                                                         | 28.4                  | 49.0                     | 216                   | 1650                  | 18.6                           | 77.0                                                         | 34.9                                  | 22.2                     |
| 1 AA  | Nitrate of Soda only                     | 18.1                  | 53.0                     | 122                   | 1320                  | 15.1                           | 64.0                                                         | 5.7                   | 48.3                     | 227                   | 699                   | 10.5                           | 42.8                                                         | 25.3*                                 | 15.6*                    |
| 2 AA  | Super. and Nitrate of Soda               | 32.1                  | 54.9                     | 102                   | 1656                  | 18.4                           | 90.4                                                         | 32.0                  | 47.8                     | 342                   | 1832                  | 20.3                           | 82.1                                                         | 39.9*                                 | 23.5*                    |
| 3 AA  | Alkali Salts and Nitrate of Soda         | 17.0                  | 54.3                     | 123                   | 1408                  | 17.0                           | 55.0                                                         | 6.0                   | 44.6                     | 157                   | 627                   | 9.2                            | 41.3                                                         | 25.9*                                 | 16.8*                    |
| 4 AA  | Complete Minerals and Nitrate of Soda    | 31.2                  | 56.1                     | 107                   | 1562                  | 18.2                           | 91.3                                                         | 24.3                  | 46.7                     | 337                   | 1700                  | 21.3                           | 61.7                                                         | 39.2*                                 | 23.9*                    |
| 1 AAS | As Plot 1 AA and Silicate of Soda        | 21.4                  | 55.0                     | 133                   | 1397                  | 16.5                           | 71.1                                                         | 10.0                  | 48.3                     | 221                   | 908                   | 11.8                           | 52.9                                                         | 31.6*                                 | 18.7*                    |
| 2 AAS | " " 2 AA "                               | 35.3                  | 55.0                     | 100                   | 1711                  | 18.8                           | 96.9                                                         | 26.3                  | 48.3                     | 278                   | 1518                  | 17.6                           | 78.3                                                         | 41.0*                                 | 24.5*                    |
| 3 AAS | " " 3 AA "                               | 23.3                  | 54.3                     | 107                   | 1749                  | 19.7                           | 62.2                                                         | 9.7                   | 49.5                     | 188                   | 858                   | 12.3                           | 48.5                                                         | 32.9*                                 | 20.4*                    |
| 4 AAS | " " 4 AA "                               | 36.0                  | 55.9                     | 96                    | 1898                  | 21.0                           | 89.5                                                         | 21.2                  | 46.4                     | 250                   | 1469                  | 17.9                           | 61.4                                                         | 41.5*                                 | 26.0*                    |
| 1 C   | Rape Cake only                           | 28.1                  | 54.9                     | 78                    | 1507                  | 17.3                           | 83.6                                                         | 22.6                  | 45.2                     | 257                   | 1287                  | 15.1                           | 75.7                                                         | 36.5                                  | 20.9                     |
| 2 C   | Superphosphate and Rape Cake             | 36.0                  | 55.8                     | 89                    | 1471                  | 16.7                           | 112.2                                                        | 30.8                  | 44.7                     | 284                   | 1612                  | 18.3                           | 80.9                                                         | 38.8                                  | 22.3                     |
| 3 C   | Alkali Salts and Rape Cake               | 27.9                  | 55.3                     | 65                    | 1474                  | 17.2                           | 83.6                                                         | 17.9                  | 45.0                     | 219                   | 1125                  | 13.5                           | 67.7                                                         | 35.0                                  | 20.9                     |
| 4 C   | Complete Minerals and Rape Cake          | 35.2                  | 54.9                     | 65                    | 1765                  | 19.5                           | 91.4                                                         | 27.0                  | 47.7                     | 278                   | 1689                  | 19.5                           | 71.8                                                         | 38.5                                  | 22.9                     |
| 7-1   | Unmanured (after dung 20 years, 1852-71) | 17.6                  | 54.9                     | 81                    | 1106                  | 12.7                           | 73.5                                                         | 2.2                   | 46.5                     | 107                   | 297                   | 4.7                            | 39.7                                                         | 24.0†                                 | 14.1†                    |
| 7-2   | Farmyard Manure                          | 30.6                  | 56.1                     | 68                    | 1856                  | 19.3                           | 82.3                                                         | 28.4                  | 49.9                     | 212                   | 2034                  | 23.8                           | 61.1                                                         | 46.0                                  | 28.5                     |
| 6-1   | Unmanured                                | 8.7                   | 53.1                     | 82                    | 628                   | 8.2                            | 59.2                                                         | —                     | —                        | 42                    | 102                   | 1.6                            | 36.8                                                         | 15.4                                  | 8.9                      |
| 6-2   | Ashes from Laboratory furnace            | 12.3                  | 54.8                     | 87                    | 704                   | 9.4                            | 72.0                                                         | 2.0                   | 44.0                     | 91                    | 234                   | 3.2                            | 49.8                                                         | 16.3                                  | 9.5                      |
| 1 N   | Nitrate of Soda only                     | 18.3                  | 54.0                     | 144                   | 1320                  | 15.9                           | 63.6                                                         | 4.4                   | 44.0                     | 169                   | 479                   | 7.4                            | 43.8                                                         | 30.0§                                 | 18.3§                    |
| 2 N   | " " "                                    | 23.1                  | 55.0                     | 119                   | 1463                  | 17.4                           | 71.3                                                         | 11.7                  | 44.4                     | 215                   | 847                   | 11.3                           | 58.1                                                         | 33.8§§                                | 20.4§§                   |

† 1912, all plots were fallowed.

\* 54 years, 1868—1922.

† 50 years, 1872—1922.

§ 69 years, 1853—1922.

§§ 63 years, 1859—1922.

# RED CLOVER grown year after year on rich Garden Soil, Rothamsted Garden.

Hay, Dry Matter, and Nitrogen per Acre, 1923 and 1924.

| Year.               | No. of Cuttings. | As Hay.     | Dry Matter. | Nitrogen. | Seed Sown.        |
|---------------------|------------------|-------------|-------------|-----------|-------------------|
| 1923                | 2                | lb.<br>1477 | lb.<br>1231 | lb.<br>37 | 1923 May mended   |
| 1924                | 2                | 794         | 663         | 20        | 1924 April mended |
| Averages :          |                  |             |             |           |                   |
| 25 years, 1854—1878 |                  | 7664        | 6387        | 179       |                   |
| 25 years, 1879—1903 |                  | 3924        | 3270        | 101       |                   |
| 20 years, 1904—1923 |                  | 2640        | 2200        | 65        |                   |

# WHEAT AFTER FALLOW (without Manure 1851, and since).

Hoos Field, 1923 and 1924.

|                                                           | 1923. | 1924.   | Average<br>67 years<br>1856-1922. |
|-----------------------------------------------------------|-------|---------|-----------------------------------|
| Dressed Grain { Yield per Acre—bushels                    | 2·8   | 1·6 lb. | 15·22                             |
| Weight per Bushel—lb.                                     | 62·0  | —       | 59·6                              |
| Offal Grain per Acre—lb. ... ..                           | 42·0  | 1·5     | 52·0                              |
| Straw per Acre—lb. ... ..                                 | 459·0 | 18·0    | —                                 |
| Total Straw per Acre—cwt. ... ..                          | 5·4   | 0·9     | 13·1                              |
| Proportion of Total Grain to 100 of<br>Total Straw ... .. | 35·9  | 3·1     | —                                 |

# AVERAGE WHEAT YIELDS of VARIOUS COUNTRIES.

| Country.             | Mean<br>Yield<br>per Acre<br>1901-10.<br>bushels. | Country.               | Mean<br>Yield<br>per Acre<br>1901-10.<br>bushels. |
|----------------------|---------------------------------------------------|------------------------|---------------------------------------------------|
| Great Britain ... .. | 31·6                                              | Denmark ... ..         | 41·3                                              |
| England ... ..       | 31·7                                              | Argentina ... ..       | 10·6                                              |
| Hertfordshire ... .. | 30·5                                              | Australia ... ..       | 10·1                                              |
| France ... ..        | 20·2                                              | Canada ... ..          | 19·5                                              |
| Germany ... ..       | 29·1                                              | United States ... ..   | 14·3                                              |
| Belgium ... ..       | 35·1                                              | Russia—European ... .. | 10·0                                              |

NOTE.—Figures for Great Britain, England and Hertfordshire are taken from the Board of Agriculture's "Agricultural Statistics," Vol. 46. Other figures from "Annuaire International de Statistique Agricole," 1910-12, and converted at the rate of 60 lb. per bushel.

# ROTATION PLOTS.

Little Hoos Field, 1923 and 1924.

Arranged to test the VALUE of VARIOUS MANURES in year of application and their RESIDUAL VALUE one, two, and three years after.

Produce per acre.

| Plot. | Manure per Acre<br>from 1919 onwards.          | Season of<br>Last Dressing. | 1923 (20th Season), Clover. |              |                      |             | 1924 (21st Season), Wheat. |             |                       |                                                                         |                       |                        |      |
|-------|------------------------------------------------|-----------------------------|-----------------------------|--------------|----------------------|-------------|----------------------------|-------------|-----------------------|-------------------------------------------------------------------------|-----------------------|------------------------|------|
|       |                                                |                             | Yield per Acre.             |              | Dry Matter per Acre. |             | Dressed Grain.             |             | Straw<br>per<br>Acre. | Total<br>Straw<br>per<br>Acre.                                          |                       |                        |      |
|       |                                                |                             | 1st<br>Crop                 | 2nd<br>Crop  | Total                | 1st<br>Crop | 2nd<br>Crop                | Total       |                       |                                                                         | Yield<br>per<br>Acre. | Weight<br>per<br>Bush. |      |
|       |                                                |                             |                             |              |                      |             |                            |             |                       | Propor-<br>tion of<br>Total<br>Grain<br>to<br>100 of<br>Total<br>Straw. |                       |                        |      |
| A 1   | Control                                        | —                           | cwt.<br>24.0                | cwt.<br>26.7 | cwt.<br>50.7         | lb.<br>2578 | lb.<br>2163                | lb.<br>4741 | bush.<br>12.8         | lb.<br>58.9                                                             | lb.<br>146            | cwt.<br>11.0           | 72.8 |
| 2     | Ordinary Dung, 16 tons                         | 1920                        | 41.2                        | 34.9         | 76.1                 | 4002        | 2814                       | 6816        | 46.2                  | 60.0                                                                    | 190                   | 3008                   | 36.6 |
| 3     |                                                | 1921                        | 41.3                        | 32.1         | 73.4                 | 4312        | 2572                       | 6884        | 39.0                  | 60.8                                                                    | 197                   | 2772                   | 33.9 |
| 4     |                                                | 1922                        | 43.2                        | 30.7         | 73.9                 | 4564        | 2495                       | 7059        | 36.7                  | 60.0                                                                    | 175                   | 2416                   | 28.9 |
| 5     |                                                | 1924                        | 34.9                        | 28.1         | 63.0                 | 3605        | 2371                       | 5976        | 47.8                  | 60.3                                                                    | 149                   | 3248                   | 37.5 |
| B 1   | Cake fed dung, 16 tons                         | 1920                        | 40.6                        | 34.1         | 74.7                 | 4068        | 2702                       | 6770        | 43.0                  | 60.0                                                                    | 216                   | 3016                   | 36.1 |
| 2     | Control ...                                    | —                           | 26.4                        | 27.6         | 54.0                 | 2694        | 2148                       | 4842        | 19.9                  | 58.2                                                                    | 177                   | 1180                   | 16.1 |
| 3     |                                                | 1921                        | 44.4                        | 34.4         | 78.8                 | 4420        | 2716                       | 7136        | 40.4                  | 60.4                                                                    | 201                   | 2728                   | 32.5 |
| 4     |                                                | 1922                        | 42.1                        | 34.7         | 76.8                 | 4345        | 2690                       | 7035        | 40.7                  | 59.9                                                                    | 189                   | 2720                   | 33.9 |
| 5     | Cake fed dung, 16 tons                         | 1924                        | 38.4                        | 30.1         | 68.5                 | 3866        | 2453                       | 6319        | 43.6                  | 60.8                                                                    | 215                   | 3260                   | 39.7 |
| C 1   | Shoddy; Superphosphate; Sulphate of Potash ... | 1920                        | 26.1                        | 26.4         | 52.5                 | 2540        | 2144                       | 4684        | 14.6                  | 59.0                                                                    | 120                   | 916                    | 13.1 |
| 2     |                                                | 1921                        | 17.7                        | 28.1         | 45.8                 | 1788        | 2258                       | 4046        | 16.7                  | 59.0                                                                    | 141                   | 1052                   | 15.0 |
| 3     |                                                | —                           | 16.6                        | 28.0         | 44.6                 | 1668        | 2235                       | 3903        | 16.9                  | 58.6                                                                    | 125                   | 1004                   | 13.8 |
| 4     | Control ...                                    | 1922                        | 28.1                        | 33.3         | 61.4                 | 2837        | 2820                       | 5657        | 20.1                  | 58.5                                                                    | 132                   | 1252                   | 17.0 |
| 5     |                                                | 1924                        | 20.3                        | 27.1         | 47.4                 | 1985        | 2178                       | 4163        | 33.4                  | 59.7                                                                    | 135                   | 2180                   | 26.0 |

|     |                                                         |      |      |      |      |      |      |      |      |      |     |      |      |      |
|-----|---------------------------------------------------------|------|------|------|------|------|------|------|------|------|-----|------|------|------|
| D 1 | Guano; Sulphate of Ammonia; Sulphate of Potash          | 1920 | 27.1 | 28.1 | 55.2 | 2762 | 2298 | 5060 | 20.3 | 59.8 | 160 | 1148 | 15.5 | 79.3 |
| 2   | ...                                                     | 1921 | 21.6 | 23.0 | 44.6 | 2179 | 1900 | 4079 | 16.8 | 59.3 | 156 | 1000 | 16.0 | 64.3 |
| 3   | ...                                                     | 1922 | 25.7 | 26.9 | 52.6 | 2644 | 2228 | 4872 | 18.3 | 58.3 | 124 | 1112 | 14.9 | 71.4 |
| 4   | Control                                                 | —    | 24.3 | 27.9 | 52.2 | 2303 | 2278 | 4581 | 17.7 | 59.8 | 148 | 1112 | 16.7 | 64.6 |
| 5   | Guano; Sulphate of Ammonia; Sulphate of Potash          | 1924 | 25.7 | 27.6 | 53.3 | 2600 | 2247 | 4847 | 22.9 | 60.1 | 164 | 1416 | 20.8 | 66.2 |
| E 1 | ...                                                     | 1920 | 25.5 | 27.1 | 52.6 | 2626 | 2070 | 4696 | 16.1 | 58.5 | 160 | 820  | 12.5 | 78.8 |
| 2   | Rape Dust; Superphosphate; Sulphate of Potash           | 1921 | 25.4 | 27.0 | 52.4 | 2598 | 2158 | 4756 | 21.1 | 59.4 | 174 | 1148 | 17.6 | 72.3 |
| 3   | ...                                                     | 1922 | 22.6 | 25.9 | 48.5 | 2298 | 2131 | 4429 | 18.2 | 59.0 | 161 | 1000 | 15.3 | 71.9 |
| 4   | ...                                                     | 1924 | 23.5 | 27.9 | 51.4 | 2397 | 2213 | 4610 | 29.2 | 60.0 | 206 | 1912 | 27.6 | 63.3 |
| 5   | Control                                                 | —    | 31.4 | 31.6 | 63.0 | 3072 | 2520 | 5592 | 24.0 | 59.7 | 168 | 1408 | 20.4 | 70.3 |
| F 1 | ...                                                     | —    | 17.6 | 26.1 | 43.7 | 1825 | 2029 | 3854 | 7.8  | 58.0 | 129 | 444  | 10.2 | 50.7 |
| 2   | Control                                                 | 1920 | 20.1 | 24.1 | 44.2 | 1934 | 1875 | 3809 | 17.2 | 59.0 | 147 | 932  | 13.5 | 76.9 |
| 3   | Superphosphate; Sulphate of Ammonia; Sulphate of Potash | 1921 | 20.7 | 25.0 | 45.7 | 1945 | 1840 | 3785 | 20.3 | 59.8 | 162 | 1104 | 14.7 | 83.4 |
| 4   | ...                                                     | 1922 | 25.3 | 29.3 | 54.6 | 2454 | 2286 | 4740 | 19.9 | 60.0 | 133 | 1120 | 15.2 | 78.0 |
| 5   | Control                                                 | 1924 | 26.6 | 26.7 | 53.3 | 2667 | 2144 | 4811 | 30.1 | 60.2 | 209 | 2176 | 28.1 | 64.4 |
| G 1 | Bone Meal; Sulphate of Ammonia; Sulphate of Potash      | 1920 | 20.4 | 24.4 | 44.8 | 1982 | 2060 | 4042 | 11.3 | 60.1 | 133 | 648  | 11.6 | 62.1 |
| 2   | ...                                                     | 1921 | 18.1 | 25.6 | 43.7 | 1791 | 2083 | 3874 | 21.7 | 60.3 | 130 | 1296 | 18.3 | 70.4 |
| 3   | Control                                                 | —    | 20.1 | 23.0 | 43.1 | 1932 | 1896 | 3828 | 20.3 | 60.2 | 118 | 1244 | 15.8 | 75.6 |
| 4   | Bone Meal; Sulphate of Ammonia; Sulphate of Potash      | 1922 | 25.6 | 24.4 | 50.0 | 2503 | 1918 | 4421 | 21.7 | 60.5 | 104 | 1432 | 17.1 | 74.0 |
| 5   | ...                                                     | 1924 | 18.1 | 22.3 | 40.4 | 1777 | 1833 | 3610 | 20.8 | 59.9 | 156 | 1560 | 22.0 | 56.9 |
| H 1 | ...                                                     | 1920 | 31.2 | 26.9 | 58.1 | 3113 | 2199 | 5312 | 29.1 | 60.8 | 156 | 1980 | 25.4 | 67.6 |
| 2   | Basic Slag; Sulphate of Ammonia; Sulphate of Potash     | 1921 | 25.3 | 27.6 | 52.9 | 2426 | 2258 | 4684 | 32.6 | 60.6 | 181 | 2140 | 26.2 | 73.4 |
| 3   | ...                                                     | 1922 | 32.6 | 28.9 | 61.5 | 3178 | 2341 | 5519 | 32.8 | 60.2 | 184 | 2092 | 24.4 | 79.2 |
| 4   | ...                                                     | 1924 | 31.8 | 25.0 | 56.8 | 3146 | 2055 | 5201 | 34.0 | 60.1 | 260 | 2952 | 33.4 | 61.6 |
| 5   | Control                                                 | —    | 27.9 | 22.0 | 49.9 | 2725 | 1778 | 4503 | 18.2 | 60.5 | 128 | 1416 | 17.3 | 63.2 |

NOTES.—Since 1919 the manure for each plot (except of series A and B) has been rationed at 40 lb. Nitrogen, 100 lb. Calcium Phosphate and 50 lb. Potash per acre. Each plot has been supplied with as much of its particular manure (shoddy, guano, &c.) as possible without exceeding the receipt in any of the three rationed ingredients. Any deficit in either of these three has then been made good by adding the necessary quantity of Sulphate of Ammonia, Superphosphate, or Sulphate of Potash. No manure was applied for 1923 crop. Figures in italics denote unmanured plots. The yields on the plots to which the manure was applied in a given season are printed in heavy type.

## NITROGENOUS TRIALS.

Analyses of Manures used, 1923† and 1924.

| Description.                                  | % Nitrogen. |
|-----------------------------------------------|-------------|
| Sulphate of Ammonia ... ..                    | 20.72       |
| Muriate of Ammonia ... ..                     | 24.75       |
| Urea ... ..                                   | 46.65       |
| Phosphazote (Tricalc. Phosphate 26.2%) ... .. | 11.65       |

Except Top Dressing Oats, 1923.

## MALTING BARLEY EXPERIMENTS.

Malting Barley (Plumage Archer). Long Hoos Field, 1923.

| Manures per Acre.                                             | Dressed Grain.  |                    | Offal Grain per Acre. | Straw per Acre. |              | Proportion of Total Grain to 100 of Total Straw. |
|---------------------------------------------------------------|-----------------|--------------------|-----------------------|-----------------|--------------|--------------------------------------------------|
|                                                               | Yield per Acre. | Weight per Bushel. |                       | Straw.          | Total Straw. |                                                  |
|                                                               | bushels         | lb.                | lb.                   | lb.             | cwt.         |                                                  |
| Super. 3 cwt., Sul./Pot. 1½ cwt.,<br>Sul./Amm. 1 cwt. ... ..  | 32.5            | 56.4               | 78                    | 1762            | 19.9         | 85.7                                             |
| Super. 3 cwt., Sul./Pot. 1½ cwt.,<br>Mur./Amm. 104 lb. ... .. | 35.6            | 56.1               | 91                    | 1787            | 19.9         | 93.6                                             |
| Super. 3 cwt., Sul./Pot. 1½ cwt. ... ..                       | 19.9            | 55.0               | 59                    | 1212            | 15.2         | 67.6                                             |
| Super. 3 cwt., Sul./Amm. 1 cwt. ... ..                        | 34.2            | 55.5               | 69                    | 1265            | 17.4         | 100.8                                            |
| Super. 3 cwt., Sul./Amm. 1 cwt.,<br>Mur./Pot. 1½ cwt. ... ..  | 37.2            | 56.1               | 95                    | 1787            | 19.7         | 98.9                                             |
| Sul./Amm. 1 cwt., Sul./Pot. 1½ cwt. ... ..                    | 34.4            | 54.9               | 84                    | 1675            | 18.4         | 96.1                                             |
| No Manure ... ..                                              | 22.2            | 54.1               | 81                    | 1288            | 14.5         | 79.2                                             |

Clover (after Malting Barley). Long Hoos Field, 1924.

| Manures per Acre.<br>Applied in 1923.                         | Yield per Acre. |           |             | Dry Matter per Acre. |           |             |
|---------------------------------------------------------------|-----------------|-----------|-------------|----------------------|-----------|-------------|
|                                                               | 1st Crop.       | 2nd Crop. | Total Crop. | 1st Crop.            | 2nd Crop. | Total Crop. |
|                                                               | cwt.            | cwt.      | cwt.        | lb.                  | lb.       | lb.         |
| Super. 3 cwt., Sul./Pot. 1½ cwt.,<br>Sul./Amm. 1 cwt. ... ..  | 52.0            | 20.3      | 72.3        | 4796                 | 1464      | 6260        |
| Super. 3 cwt., Sul./Pot. 1½ cwt.,<br>Mur./Amm. 104 lb. ... .. | 47.1            | 16.5      | 63.6        | 4149                 | 1260      | 5409        |
| Super. 3 cwt., Sul./Pot. 1½ cwt. ... ..                       | 49.2            | 12.3      | 61.5        | 4439                 | 936       | 5375        |
| Super. 3 cwt., Sul./Amm. 1 cwt. ... ..                        | 46.4            | 11.6      | 58.0        | 4207                 | 875       | 5082        |
| Super. 3 cwt., Sul./Amm. 1 cwt.,<br>Mur./Pot. 1½ cwt. ... ..  | 50.2            | 15.4      | 65.6        | 4344                 | 1120      | 5464        |
| Sul./Amm. 1 cwt., Sul./Pot. 1½ cwt. ... ..                    | 49.3            | 16.9      | 66.2        | 4493                 | 1250      | 5743        |
| No Manure ... ..                                              | 47.8            | 9.6       | 57.4        | 4226                 | 734       | 4960        |

Manures applied April 17th, 1923.

## Clover (after Malting Barley). Long Hoos Field, 1923.

| Manuring per Acre, applied Spring 1922.                                     | Yield per Acre.<br>cwt. |
|-----------------------------------------------------------------------------|-------------------------|
| Super. 3 cwt., Sulphate Potash $1\frac{1}{2}$ cwt., Sulphate Ammonia 1 cwt. | 36.8                    |
| Super. 3 cwt., Sulphate Potash $1\frac{1}{2}$ cwt., Muriate Ammonia 93 lb.  | 37.1                    |
| Super. 3 cwt., Sulphate Potash $1\frac{1}{2}$ cwt. ... ..                   | 35.3                    |
| Super. 3 cwt., Sulphate Ammonia 1 cwt. ... ..                               | 23.7                    |
| Super. 3 cwt., Sulphate Ammonia 1 cwt., Muriate Potash, $1\frac{1}{2}$ cwt. | 39.1                    |
| Sulphate Ammonia 1 cwt., Sulphate Potash $1\frac{1}{2}$ cwt. ... ..         | 35.1                    |
| No Manure ... ..                                                            | 31.0                    |

Manures applied March 24th, 1922.

## Malting Barley (Plumage Archer). Great Harpenden Field, 1924.

| No.<br>of<br>Plot. | Manuring.<br>Quantities per Acre.                                                                      | Dressed Grain.                 |                                 | Offal<br>Grain<br>per<br>Acre.<br>lb. | Straw per Acre. |                         | Proportion of<br>Total<br>Grain<br>to 100 of<br>Total<br>Straw. |
|--------------------|--------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------|---------------------------------------|-----------------|-------------------------|-----------------------------------------------------------------|
|                    |                                                                                                        | Yield<br>per<br>Acre.<br>bush. | Weight<br>per<br>bushel.<br>lb. |                                       | Straw.<br>lb.   | Total<br>Straw.<br>cwt. |                                                                 |
| 1A                 | No Manure ... ..                                                                                       | 27.2                           | 53.8                            | 172                                   | 1112            | 14.1                    | 103.8                                                           |
| 5B                 |                                                                                                        | 22.6                           | 52.6                            | 200                                   | 863             | 12.1                    | 102.8                                                           |
| 6C                 |                                                                                                        | 27.5                           | 53.5                            | 144                                   | 988             | 12.5                    | 115.4                                                           |
| 2A                 | Superphosphate 3 cwt., Sulphate of<br>Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia<br>1 cwt. ... .. | 33.7                           | 52.6                            | 345                                   | 1575            | 18.5                    | 102.0                                                           |
| 6B                 |                                                                                                        | 29.0                           | 52.0                            | 344                                   | 1338            | 16.4                    | 100.7                                                           |
| 4C                 |                                                                                                        | 26.6                           | 52.3                            | 289                                   | 1188            | 14.6                    | 102.5                                                           |
| 3A                 | Superphosphate 3 cwt., Sulphate of<br>Ammonia 1 cwt. ... ..                                            | 38.9                           | 51.9                            | 275                                   | 1663            | 19.1                    | 107.1                                                           |
| 7B                 |                                                                                                        | 31.5                           | 53.3                            | 289                                   | 1388            | 17.0                    | 103.4                                                           |
| 2C                 |                                                                                                        | 32.7                           | 52.9                            | 325                                   | 1575            | 19.5                    | 94.0                                                            |
| 4A                 | Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate<br>of Ammonia 1 cwt. ... ..                           | 32.4                           | 52.4                            | 247                                   | 1438            | 17.2                    | 101.0                                                           |
| 1B                 |                                                                                                        | 30.8                           | 52.8                            | 369                                   | 1525            | 17.9                    | 99.8                                                            |
| 7C                 |                                                                                                        | 28.7                           | 53.4                            | 291                                   | 1300            | 15.4                    | 105.6                                                           |
| 5A                 | Superphosphate 3 cwt., Sulphate of<br>Potash $1\frac{1}{2}$ cwt. ... ..                                | 25.6                           | 51.8                            | 184                                   | 988             | 12.3                    | 109.8                                                           |
| 2B                 |                                                                                                        | 22.7                           | 51.8                            | 211                                   | 938             | 12.3                    | 100.6                                                           |
| 5C                 |                                                                                                        | 17.9                           | 51.8                            | 228                                   | 738             | 9.7                     | 106.0                                                           |
| 6A                 | Superphosphate 3 cwt., Muriate of Potash<br>136 lb., Sulphate of Ammonia 1 cwt.                        | 30.6                           | 53.3                            | 328                                   | 1400            | 17.3                    | 100.9                                                           |
| 3B                 |                                                                                                        | 27.4                           | 51.4                            | 369                                   | 1288            | 15.8                    | 100.2                                                           |
| 3C                 |                                                                                                        | 28.0                           | 52.3                            | 366                                   | 1338            | 16.4                    | 99.5                                                            |
| 7A                 | Superphosphate 3 cwt., Sulphate of<br>Potash $1\frac{1}{2}$ cwt., Muriate of Ammonia<br>94 lb. ... ..  | 24.1                           | 51.8                            | 325                                   | 1138            | 14.2                    | 99.0                                                            |
| 4B                 |                                                                                                        | 29.8                           | 53.0                            | 372                                   | 1450            | 18.1                    | 96.3                                                            |
| 1C                 |                                                                                                        | 35.2                           | 53.4                            | 347                                   | 1663            | 20.2                    | 98.5                                                            |

Manures sown March 17th, 1924.

# NITROGENOUS FERTILISER EXPERIMENTS, 1923 AND 1924. Oats (Black Winter). Sawpit Field, 1923.

| Treatment of Plots<br>and Quantities per Acre.                | Date of<br>Application<br>of<br>Top<br>Dressing. | Dressed Grain.                 |           |           |                              |           |           | Offal Grain<br>per Acre. |           |           |           |           |           | Straw per Acre. |           |           |                         |           |           | Proportion of<br>Total Grain<br>to 100 of<br>Total Straw. |           |           |
|---------------------------------------------------------------|--------------------------------------------------|--------------------------------|-----------|-----------|------------------------------|-----------|-----------|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------------|-----------|-----------|-------------------------|-----------|-----------|-----------------------------------------------------------|-----------|-----------|
|                                                               |                                                  | Yield<br>per Acre.<br>bushels. |           |           | Weight<br>per Bushel.<br>lb. |           |           | lb.                      |           |           | lb.       |           |           | Straw.<br>lb.   |           |           | Total<br>Straw.<br>cwt. |           |           | Total Straw.                                              |           |           |
|                                                               |                                                  | Plot<br>A                      | Plot<br>B | Plot<br>C | Plot<br>A                    | Plot<br>B | Plot<br>C | Plot<br>A                | Plot<br>B | Plot<br>C | Plot<br>A | Plot<br>B | Plot<br>C | Plot<br>A       | Plot<br>B | Plot<br>C | Plot<br>A               | Plot<br>B | Plot<br>C | Plot<br>A                                                 | Plot<br>B | Plot<br>C |
| No Manure ... ..                                              | —                                                | 27.3                           | 29.4      | 22.4      | 44.3                         | 42.8      | 43.0      | 300                      | 288       | 241       | 1500      | 1600      | 1350      | 18.1            | 19.9      | 16.1      | 74.5                    | 69.4      | 66.8      | 74.5                                                      | 69.4      | 66.8      |
| No Manure ... ..                                              | —                                                | 27.7                           | 33.1      | 24.9      | 42.0                         | 43.5      | 43.5      | 284                      | 350       | 231       | 1600      | 1875      | 1525      | 19.0            | 21.7      | 17.2      | 68.1                    | 73.7      | 68.2      | 68.1                                                      | 73.7      | 68.2      |
| Superphosphate, 2 cwt. ... ..                                 | —                                                | 28.5                           | 34.0      | 25.0      | 43.3                         | 42.5      | 42.8      | 256                      | 234       | 244       | 1700      | 1875      | 1325      | 19.0            | 21.7      | 16.7      | 70.0                    | 69.3      | 70.0      | 70.0                                                      | 69.3      | 70.0      |
| Sulphate of Ammonia, 1 cwt. ... ..                            | April 23rd                                       | 36.3                           | 38.9      | 34.0      | 42.4                         | 42.3      | 41.5      | 331                      | 337       | 319       | 2200      | 2325      | 2075      | 25.0            | 25.9      | 23.9      | 66.7                    | 68.3      | 64.7      | 66.7                                                      | 68.3      | 64.7      |
| Superphosphate, 1 cwt., Sulphate of<br>Ammonia, 1 cwt. ... .. | April 23rd                                       | 37.1                           | 38.2      | 32.9      | 42.0                         | 42.0      | 42.0      | 300                      | 347       | 266       | 2250      | 2275      | 2025      | 25.7            | 25.0      | 22.8      | 64.6                    | 69.8      | 64.6      | 64.6                                                      | 69.8      | 64.6      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 1 cwt. ... .. | March 28th                                       | 39.8                           | 33.5      | 38.7      | 44.3                         | 42.9      | 43.3      | 400                      | 294       | 366       | 2375      | 2000      | 2525      | 27.2            | 23.0      | 28.3      | 70.9                    | 67.2      | 64.3      | 70.9                                                      | 67.2      | 64.3      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 1 cwt. ... .. | April 23rd                                       | 38.8                           | 34.7      | 39.7      | 43.5                         | 43.4      | 43.6      | 416                      | 372       | 356       | 2375      | 2150      | 2450      | 27.2            | 25.4      | 28.3      | 69.0                    | 65.9      | 65.7      | 69.0                                                      | 65.9      | 65.7      |
| Superphosphate, 2 cwt., Muriate of<br>Ammonia, 103 lb. ... .. | April 23rd                                       | 41.4                           | 44.9      | 49.0      | 44.1                         | 43.3      | 43.5      | 419                      | 353       | 372       | 2550      | 2775      | 2750      | 28.1            | 30.1      | 31.0      | 71.2                    | 68.0      | 72.0      | 71.2                                                      | 68.0      | 72.0      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 1 cwt. ... .. | May 22nd                                         | 29.2                           | 37.4      | 37.2      | 42.1                         | 43.8      | 42.3      | 338                      | 394       | 350       | 1700      | 2075      | 2025      | 20.1            | 24.8      | 23.4      | 69.7                    | 73.2      | 73.2      | 69.7                                                      | 73.2      | 73.2      |
| Superphosphate, 4 cwt., Sulphate of<br>Ammonia, 2 cwt. ... .. | March 28th                                       | 44.1                           | 52.1      | 43.1      | 43.5                         | 43.8      | 42.9      | 456                      | 406       | 394       | 3050      | 3450      | 2725      | 35.5            | 37.3      | 31.3      | 59.7                    | 64.4      | 64.1      | 59.7                                                      | 64.4      | 64.1      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 2 cwt. ... .. | March 28th                                       | 44.5                           | 54.0      | 40.9      | 43.5                         | 44.9      | 43.5      | 406                      | 597       | 375       | 3125      | 3750      | 2725      | 35.0            | 41.3      | 30.6      | 59.7                    | 65.3      | 62.9      | 59.7                                                      | 65.3      | 62.9      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 2 cwt. ... .. | April 23rd                                       | 40.7                           | 48.0      | 47.4      | 44.3                         | 43.8      | 43.5      | 372                      | 506       | 397       | 2475      | 3350      | 2775      | 27.9            | 37.3      | 31.0      | 69.5                    | 62.4      | 70.8      | 69.5                                                      | 62.4      | 70.8      |
| Superphosphate, 2 cwt., Muriate of<br>Ammonia, 208 lb. ... .. | April 23rd                                       | 49.7                           | 47.1      | 53.2      | 43.8                         | 43.5      | 43.9      | 544                      | 425       | 441       | 3250      | 2800      | 3325      | 36.6            | 32.4      | 37.1      | 66.3                    | 68.3      | 66.9      | 66.3                                                      | 68.3      | 66.9      |
| Superphosphate, 2 cwt., Sulphate of<br>Ammonia, 2 cwt. ... .. | May 22nd                                         | 54.5                           | 49.4      | 57.3      | 42.0                         | 40.8      | 41.9      | 606                      | 500       | 513       | 3050      | 2575      | 3100      | 34.8            | 31.0      | 35.7      | 74.2                    | 72.3      | 72.8      | 74.2                                                      | 72.3      | 72.8      |

## Barley (Plumage Archer). Long Hoos Field, 1923.

| Manuring per Acre.                             | Dressed Grain.  |           |                    |           | Offal Grain per Acre. |     | Straw per Acre. |      | Proportion of Total Grain to 100 of Total Straw. |           |
|------------------------------------------------|-----------------|-----------|--------------------|-----------|-----------------------|-----|-----------------|------|--------------------------------------------------|-----------|
|                                                | Yield per Acre. |           | Weight per Bushel. |           | lb.                   | lb. | lb.             | cwt. | 1st Plot.                                        | 2nd Plot. |
|                                                | 1st Plot.       | 2nd Plot. | 1st Plot.          | 2nd Plot. |                       |     |                 |      |                                                  |           |
| Super. 2 cwt., Sulphate of Ammonia 1 cwt. ...  | 22.7            | 22.9      | 56.0               | 55.5      | 100                   | 94  | 1550            | 18.6 | 65.7                                             | 71.2      |
| Super. 2 cwt., Sulphate of Ammonia 2 cwt. ...  | 27.5            | 27.6      | 56.0               | 56.3      | 119                   | 84  | 1925            | 21.0 | 70.5                                             | 78.3      |
| Super. 2 cwt., Sulphate of Ammonia 93½ lb. ... | 25.4            | 24.9      | 56.3               | 55.5      | 88                    | 84  | 1500            | 17.5 | 77.2                                             | 80.8      |
| Super. 2 cwt., Muriate of Ammonia 187½ lb. ... | 23.5            | 34.3      | 55.5               | 55.9      | 116                   | 97  | 1700            | 19.6 | 64.6                                             | 85.2      |
| Super. 2 cwt., Urea 49½ lb. ...                | 26.8            | 22.5      | 56.1               | 56.0      | 103                   | 72  | 1500            | 16.6 | 86.2                                             | 76.6      |
| Super. 2 cwt. ...                              | 18.0            | 24.3      | 56.0               | 55.3      | 78                    | 103 | 1200            | 14.0 | 69.4                                             | 82.5      |
| Control—No Manure ...                          | 19.6            | 20.1      | 56.5               | 55.8      | 94                    | 88  | 1275            | 15.7 | 68.1                                             | 71.1      |

## Barley (Plumage Archer). Great Harpenden Field, 1924.

|                                                            |      |      |      |      |     |     |      |      |      |       |
|------------------------------------------------------------|------|------|------|------|-----|-----|------|------|------|-------|
| Basal Manure (= Superphosphate 2 cwt., S/Pot., 1 cwt.) ... | 22.2 | 25.5 | 52.0 | 52.8 | 197 | 169 | 1225 | 14.1 | 85.9 | 96.2  |
| Basal Manure, Sulphate of Ammonia 1 cwt. ...               | 29.7 | 37.8 | 50.8 | 51.9 | 272 | 234 | 1650 | 18.8 | 84.7 | 95.5  |
| Basal Manure, Sulphate of Ammonia 2 cwt. ...               | 45.4 | 40.1 | 52.5 | 52.3 | 247 | 322 | 2350 | 25.7 | 91.4 | 91.2  |
| Basal Manure, Muriate of Ammonia 94 lb. ...                | 36.3 | 33.4 | 52.8 | 52.3 | 212 | 281 | 1825 | 20.8 | 91.4 | 95.3  |
| Basal Manure, Muriate of Ammonia 188 lb. ...               | 47.2 | 43.3 | 53.0 | 52.5 | 256 | 338 | 2375 | 26.1 | 94.2 | 102.5 |
| Basal Manure, Urea 50 lb. ...                              | 30.4 | 27.7 | 51.8 | 51.0 | 297 | 253 | 1750 | 19.6 | 85.1 | 86.5  |
| Control—No Manure ...                                      | 41.2 | 31.8 | 52.0 | 52.0 | 222 | 241 | 2150 | 22.8 | 92.8 | 90.2  |
| Control—No Manure ...                                      | 22.5 | 24.3 | 52.0 | 53.0 | 212 | 175 | 1225 | 13.8 | 89.3 | 92.9  |

1923, Nitrogenous Manures applied as top dressing on May 19th.  
1924, Nitrogenous Manures applied with seed on March 15th.

H

## Potatoes (Kerr's Pink).

| Treatment of Plots and Manuring per Acre.                                                                      | Produce per Acre.  |                    |
|----------------------------------------------------------------------------------------------------------------|--------------------|--------------------|
|                                                                                                                | 1st Plot.<br>Tons. | 2nd Plot.<br>Tons. |
| Little Knott Field, 1923.                                                                                      |                    |                    |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia 3 cwt.* ... ..              | 15.6               | 14.9               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia $1\frac{1}{2}$ cwt. ... ..  | 14.4               | 13.0               |
| Superphosphate 4 cwt., Sylvinit 273 $\frac{1}{2}$ lb., Sulphate of Ammonia $1\frac{1}{2}$ cwt. ... ..          | 14.8               | 12.6               |
| Superphosphate 4 cwt., Sylvinit 273 $\frac{1}{2}$ lb. ... ..                                                   | 12.8               | 10.8               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt. ... ..                                           | 12.0               | 12.0               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Muriate of Ammonia $2\frac{1}{2}$ cwt. ... ..   | 14.0               | 13.9               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia 3 cwt. ... ..               | 15.4               | 14.9               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia $4\frac{1}{2}$ cwt.* ... .. | 14.9               | 14.7               |
| Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Sulphate of Ammonia 3 cwt. ... ..                            | 16.6               | 14.9               |
| Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Sulphate of Ammonia $4\frac{1}{2}$ cwt.* ... ..              | 16.3               | 16.0               |
| Foster's Field, 1924.                                                                                          |                    |                    |
| Control. No Manure ... ..                                                                                      | 5.4                | 7.5                |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt. ... ..                                           | 8.3                | 7.8                |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia $1\frac{1}{2}$ cwt. ... ..  | 9.0                | 10.0               |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia 3 cwt. ... ..               | 10.2               | 8.6                |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia 3 cwt.* ... ..              | 8.4                | 9.9                |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Sulphate of Ammonia $4\frac{1}{2}$ cwt.* ... .. | 10.0               | 9.9                |
| Superphosphate 4 cwt., Sulphate of Potash $1\frac{1}{2}$ cwt., Muriate of Ammonia $2\frac{1}{2}$ cwt. ... ..   | 8.6                | 10.2               |
| Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Muriate of Ammonia 5 cwt. ... ..                             | 11.7               | 10.3               |
| Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Muriate of Ammonia $7\frac{1}{2}$ cwt.† ... ..               | 10.3               | 10.7               |

\*  $1\frac{1}{2}$  cwt. given as Top Dressing. †  $2\frac{1}{2}$  cwt. given as Top Dressing.

Date of application of Manures:—1923, May 12th and 14th; Top Dressings July 14th.  
1924, May 9th; Top Dressings, July 9th.

## Swedes (Hurst's Monarch). Foster's Field.

| Treatment of Plots and<br>Manuring per Acre.                                                          | Produce per Acre.     |                       |                       |                       |
|-------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                                                                                                       | Roots.                |                       | Leaves.               |                       |
|                                                                                                       | 1st<br>Plot.<br>Tons. | 2nd<br>Plot.<br>Tons. | 1st<br>Plot.<br>Tons. | 2nd<br>Plot.<br>Tons. |
| <b>1923.</b>                                                                                          |                       |                       |                       |                       |
| Superphosphate 5 cwt., Muriate of Potash 1 cwt.,<br>Dung 10 tons ... ..                               | 14.2                  | 14.4                  | 1.5                   | 1.3                   |
| Superphosphate 5 cwt., Muriate of Potash 1 cwt.,<br>Dung 10 tons, Sulphate of Ammonia 2 cwt.* ...     | 17.1                  | 16.4                  | 1.8                   | 1.6                   |
| Superphosphate 5 cwt., Muriate of Potash 1 cwt.,<br>Sulphate of Ammonia 2 cwt.* ... ..                | 16.0                  | 15.4                  | 1.6                   | 1.5                   |
| Superphosphate 5 cwt., Muriate of Potash 1 cwt. ...                                                   | 13.5                  | 12.9                  | 1.3                   | 1.2                   |
| <b>1924.</b>                                                                                          |                       |                       |                       |                       |
| Control. No Manure ... ..                                                                             | 24.3                  | 23.0                  | 3.3                   | 2.9                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt. ...                                                  | 20.5                  | 28.5                  | 2.1                   | 3.5                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt. ...                                                  | 27.5                  | 26.2                  | 3.0                   | 3.2                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $\frac{3}{4}$ cwt. § ... ..  | 22.0                  | 27.0                  | 2.3                   | 3.1                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $\frac{3}{4}$ cwt. § ... ..  | 27.2                  | 25.0                  | 3.0                   | 2.9                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $1\frac{1}{2}$ cwt. § ... .. | 28.8                  | 27.6                  | 3.3                   | 3.2                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $1\frac{1}{2}$ cwt. † ... .. | 26.0                  | 28.7                  | 3.3                   | 3.3                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $2\frac{1}{4}$ cwt. † ... .. | 28.2                  | 28.7                  | 3.8                   | 3.5                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $2\frac{1}{4}$ cwt. † ... .. | 26.4                  | 28.2                  | 3.6                   | 3.6                   |
| Superphosphate 5 cwt., Sulphate of Potash 1 cwt.,<br>Sulphate of Ammonia $2\frac{1}{4}$ cwt. § ... .. | 27.3                  | 27.6                  | 3.4                   | 3.5                   |

\* Applied as top dressing. July 14th, 1923.

§ Applied as top dressing. July 9th, 1924.

†  $\frac{3}{4}$  cwt. applied as top dressing. July 9th, 1924.‡  $1\frac{1}{2}$  cwt. applied as top dressing. July 9th, 1924.

# **POTASSIC TRIALS.** Analyses of Manures, 1923 and 1924.

| Description.                        | % K <sub>2</sub> O |       |
|-------------------------------------|--------------------|-------|
|                                     | 1923               | 1924  |
| Sulphate of Potash ... ..           | 51.90              | 47.55 |
| Muriate of Potash—High Grade ... .. | 62.85              | —     |
| Muriate of Potash—Low Grade ... ..  | 56.35              | 51.36 |
| Potash Manure Salts 30% ... ..      | 31.35              | 30.33 |
| Potash Manure Salts 20% ... ..      | 21.35              | 22.21 |
| Sylvinite ... ..                    | 17.20              | 18.13 |
| Kainit ... ..                       | 13.45              | —     |

## Potatoes (Kerr's Pink). Foster's Field, 1924.

| Manures per Acre. | Produce per Acre<br>in<br>Tons. |
|-------------------|---------------------------------|
|-------------------|---------------------------------|

### \* Farmyard Manure Series (15 tons per Acre).

|                                                                            | Series<br>D. | Series<br>E. | Series<br>F. | Series<br>G. |
|----------------------------------------------------------------------------|--------------|--------------|--------------|--------------|
| Control. Farmyard Manure 15 tons ... ..                                    | 7.2          | 8.2          | 8.4          | 7.6          |
| Basal Manure (Superphosphate 4 cwt., Sulphate of<br>Ammonia 1½ cwt.)... .. | 9.7          | 9.9          | 9.2          | 7.9          |
| Sulphate of Potash 191 lb., Basal Manure ... ..                            | 8.8          | 8.6          | 8.8          | 9.1          |
| Muriate of Potash 177 lb., Basal Manure ... ..                             | 9.1          | 8.6          | 8.7          | 8.4          |
| 20% Potash Manure Salts, 408 lb., Basal Manure ... ..                      | 9.4          | 9.5          | 8.6          | 9.4          |
| Sylvinite 566 lb., Basal Manure... ..                                      | 8.5          | 9.1          | 9.5          | 9.9          |

### † No Farmyard Manure Series.

|                                                                              | Series<br>W. | Series<br>X. | Series<br>Y. | Series<br>Z. |
|------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|
| Control. No Manure ... ..                                                    | 5.0          | 4.7          | 5.5          | 5.2          |
| Basal Manure (Superphosphate 6 cwt., Sulphate of<br>Ammonia 2 cwt.) ... ..   | 7.9          | 6.1          | 6.0          | 4.8          |
| Sulphate of Potash 255 lb., Basal Manure ... ..                              | 7.6          | 8.2          | 6.7          | 6.6          |
| Muriate of Potash 234 lb., Basal Manure ... ..                               | 7.8          | 7.4          | 6.2          | 7.2          |
| 20% Potash Manure Salts 544 lb., Basal Manure ... ..                         | 7.4          | 8.8          | 7.0          | 7.9          |
| Sylvinite 6¾ cwt., Basal Manure ... ..                                       | 7.8          | 8.0          | 8.1          | 7.6          |
| Sulphate of Potash 255 lb., Sulphate of Soda 830 lb.,<br>Basal Manure ... .. | 8.2          | 7.0          | 7.5          | 7.9          |
| Muriate of Potash 234 lb., Calcium Chloride 525 lb.,<br>Basal Manure ... ..  | 7.7          | 7.5          | 7.9          | 8.2          |

### § Potatoes (Kerr's Pink). Foster's Field, 1924.

|                                                                                           | Series<br>1. | Series<br>2. | Series<br>3. |
|-------------------------------------------------------------------------------------------|--------------|--------------|--------------|
| Control. No Manure ... ..                                                                 | 6.7          | 6.8          | 6.4          |
| Sulphate of Potash 256 lb., Superphosphate 6 cwt., Sulphate<br>of Ammonia 226 lb. ... ..  | 10.5         | 9.9          | 7.6          |
| Superphosphate 6 cwt., Sulphate of Ammonia 226 lb. ... ..                                 | 10.0         | 8.1          | 3.4          |
| Sulphate of Potash 512 lb., Superphosphate 12 cwt., Sulphate<br>of Ammonia 452 lb. ... .. | 11.9         | 9.3          | 10.5         |
| Sulphate of Potash 125 lb., Superphosphate 3 cwt., Sulphate<br>of Ammonia 113 lb. ... ..  | 9.1          | 8.1          | 6.2          |

\* Manures applied, May 5-6th.

† Manures applied, April 29th—May 5th.

§ Manures applied, May 15th.

## Potatoes (Kerr's Pink). Sawyer's Field, 1923.

| Manuring per Acre.                                                         | Yield per Acre. |           |           |
|----------------------------------------------------------------------------|-----------------|-----------|-----------|
|                                                                            | 1st Plot.       | 2nd Plot. | 3rd Plot. |
| With Dung, 15 tons per Acre.                                               |                 |           |           |
|                                                                            | Tons.           | Tons.     | Tons.     |
| Basal Manuring (Superphosphate 4 cwt., Sulphate of Ammonia 1½ cwt.) ... .. | 11·2            | 12·6      | 11·3      |
| Muriate Potash 144 lb., Sul./Mag. 171 lb., Salt 452 lb., Basal...          | 12·0            | 11·8      | 12·2      |
| Muriate Potash 144 lb., Sul./Mag. 171 lb., Basal ... ..                    | 12·6            | 12·3      | 14·2      |
| Muriate Potash 144 lb., Salt 452 lb., Basal ... ..                         | 10·6            | 11·7      | 12·4      |
| Muriate Potash (High Grade) 144 lb., Basal ... ..                          | 12·0            | 14·5      | 12·6      |
| Muriate Potash (Low Grade) 161 lb., Basal ... ..                           | 13·0            | 13·9      | 13·0      |
| Potash Manure Salts 30% 290 lb., Basal ... ..                              | 11·1            | 13·0      | 12·1      |
| Potash Manure Salts 20% 424 lb., Basal ... ..                              | 12·3            | 12·6      | 10·9      |
| Sulphate Potash 178 lb., Basal ... ..                                      | 11·1            | 12·9      | 13·4      |
| Sulphate Potash Mag. 328½ lb., Basal ... ..                                | 12·1            | 12·1      | 14·5      |
| Kainit 682 lb., Basal ... ..                                               | 12·4            | 10·3      | 12·2      |
| Sylvinite 527 lb., Basal ... ..                                            | 9·8             | 9·7       | 11·9      |
| No Artificial Manure ... ..                                                | 10·3            | 9·1       | 12·0      |
| Without Dung.                                                              |                 |           |           |
| Basal Manuring (Superphosphate 6 cwt., Sulphate of Ammonia 2 cwt. ... ..   | 9·9             | 12·1      | 7·2       |
| Muriate Potash 192½ lb., Sul/Mag. 228 lb., Salt 602½ lb. Basal             | 12·6            | 12·0      | 11·5      |
| Muriate Potash 192½ lb., Sul/Mag. 228 lb., Basal ... ..                    | 13·2            | 12·2      | 14·2      |
| Muriate Potash 192½ lb., Salt 602½ lb., Basal ... ..                       | 12·1            | 11·9      | 11·8      |
| Muriate Potash (High Grade) 192½ lb., Basal ... ..                         | 11·5            | 13·0      | 11·5      |
| Muriate Potash (Low Grade) 215 lb., Basal ... ..                           | 11·9            | 14·1      | 12·9      |
| Potash Manure Salts 30% 386 lb., Basal ... ..                              | 11·3            | 13·0      | 10·0      |
| Potash Manure Salts 20% 565 lb., Basal ... ..                              | 11·0            | 13·0      | 9·7       |
| Sulphate Potash 237 lb., Basal ... ..                                      | 12·7            | 12·3      | 11·7      |
| Sulphate Potash Mag. 438 lb., Basal ... ..                                 | 12·5            | 12·4      | 13·3      |
| Kainit 908 lb., Basal ... ..                                               | 12·7            | 10·9      | 10·2      |
| Sylvinite 702 lb., Basal ... ..                                            | 10·1            | 11·5      | 10·2      |
| No Manure ... ..                                                           | 6·9             | 8·4       | 8·6       |

NOTE: The potatoes when lifted were wet and dirty.

Manures applied May 2nd, 3rd and 4th.

## PHOSPHATIC TRIALS, 1923 AND 1924.

## Analyses of Manures used.

| No.                 | Description.                                                            | Total Phosphate as Tricalcic Phosphate. | Solubility % |
|---------------------|-------------------------------------------------------------------------|-----------------------------------------|--------------|
| Slag 1              | Open Hearth Low Grade, High Sol. ... ..                                 | 25·0                                    | 90·4         |
| " 2                 | Open Hearth Low Grade, Low Sol. ... ..                                  | 18·0                                    | 35·7         |
| " 8                 | Open Hearth L. G. and Nauru Mineral Phosphate                           | 53·1                                    | 25·5         |
| " 9                 | Open Hearth L. G., H. S. and Precipitated Bone Phosphate (4 : 1) ... .. | 31·5                                    | 92·8         |
| " 10                | Open Hearth L. G., H. S. and Gafsa Mineral Phosphate (3 : 7) ... ..     | 47·0                                    | 35·0         |
| " 12                | Talbot Process H. G., H. S. ... ..                                      | 37·0                                    | 80·7         |
| " 13                | Open Hearth L. G., H. S. ... ..                                         | 22·7                                    | 91·5         |
| " 14                | Open Hearth L. G., L. S. ... ..                                         | 22·6                                    | 29·0         |
| " 20                | Open Hearth L. G., H. S. ... ..                                         | 17·2                                    | 78·8         |
| " 21                | Open Hearth L. G., L. S. ... ..                                         | 21·3                                    | 31·4         |
| " 22                | Open Hearth L. G., H. S. ... ..                                         | 24·4                                    | 95·4         |
| " 23                | Open Hearth H. G., L. S. ... ..                                         | 30·3                                    | 20·3         |
| " 24                | Open Hearth H. G., H. S. ... ..                                         | 29·6                                    | 92·1         |
| " 25                | Talbot Process H. G., H. S. ... ..                                      | 37·1                                    | —            |
| Mineral Phosphates. | Gafsa (1921—1923 Expts.) ... ..                                         | 62·9                                    | —            |
|                     | Gafsa (1924 Expts.) ... ..                                              | 55·0                                    | —            |
|                     | Nauru ... ..                                                            | 83·0                                    | —            |
|                     | Tunisian ... ..                                                         | 64·8                                    | —            |
|                     | Florida ... ..                                                          | 74·8                                    | —            |

SLAG APPLIED IN SEASON OF GROWTH.  
Clover. Long Hoos Field, 1924.

| Manuring Per Acre.*                     | Produce Per Acre. |               |               |               |               |               | Dry Matter per Acre. |               |               |               |               |               |
|-----------------------------------------|-------------------|---------------|---------------|---------------|---------------|---------------|----------------------|---------------|---------------|---------------|---------------|---------------|
|                                         | 1st Crop.         |               |               | 2nd Crop.     |               |               | 1st Crop.            |               |               | 2nd Crop.     |               |               |
|                                         | A Series cwt.     | B Series cwt. | C Series cwt. | A Series cwt. | B Series cwt. | C Series cwt. | A Series cwt.        | B Series cwt. | C Series cwt. | A Series cwt. | B Series cwt. | C Series cwt. |
| Slag No. 21, 100 mesh, 1028 lb. ...     | 40.7              | 49.0          | 50.0          | 22.6          | 17.3          | 12.1          | 3956                 | 4628          | 4513          | 1845          | 1484          | 1025          |
| Slag No. 22, 100 mesh, 896 lb. ...      | 41.4              | 48.8          | 48.8          | 19.8          | 20.2          | 11.9          | 3963                 | 4686          | 4570          | 1693          | 1696          | 1047          |
| Superphosphate 596 lb. ...              | 42.6              | 49.2          | 60.4          | 21.8          | 13.5          | 11.1          | 3869                 | 4667          | 5350          | 1828          | 1160          | 931           |
| Gafsa Phosphate 398 lb. ...             | 43.8              | 48.0          | 48.9          | 23.8          | 15.9          | 11.9          | 3973                 | 4556          | 4372          | 2037          | 1346          | 1014          |
| Sulphate of Potash 1 cwt. (= Basal) ... | 42.7              | 46.3          | 50.0          | 18.6          | 21.3          | 11.1          | 4065                 | 4273          | 4447          | 1624          | 1764          | 950           |
| Control: No Manure ...                  | 40.9              | 46.2          | 40.0          | 17.6          | 21.0          | 13.4          | 3333                 | 4415          | 3642          | 1515          | 1770          | 1157          |

\* All plots (except Control) received a basal dressing of 1 cwt. Sulphate of Potash per acre. Phosphate Dressings are at the rate of 100 lb. P<sub>2</sub>O<sub>5</sub> per acre.  
Slags applied January 24th, 1924.

Swedes (Hurst's Monarch). Foster's Field 1924.  
Produce per Acre.

| Manurial Treatment.<br>Quantities per Acre.                               | Roots.         |                |                | Leaves.        |                |                |
|---------------------------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                                                           | A Series Tons. | B Series Tons. | C Series Tons. | A Series Tons. | B Series Tons. | C Series Tons. |
|                                                                           | Series.        | Series.        | Series.        | Series.        | Series.        | Series.        |
| Control: No Manure ...                                                    | 17.0           | 18.6           | 16.2           | 2.9            | 3.5            | 3.0            |
| Basal Manure (Sulphate of Ammonia 186 lb., Sulphate of Potash 93 lb.) ... | 18.7           | 19.3           | 19.3           | 3.2            | 3.9            | 3.8            |
| Slag No. 21, 100 mesh, 772 lb., Basal Manure ...                          | 19.5           | 19.5           | 17.0           | 3.7            | 4.1            | 3.3            |
| Slag No. 22, 100 Mesh, 672 lb., Basal Manure ...                          | 19.5           | 19.5           | 18.2           | 3.4            | 3.6            | 3.7            |
| Gafsa Phosphate 248 lb., Basal Manure ...                                 | 19.9           | 19.2           | 18.7           | 3.5            | 4.0            | 3.6            |
| Superphosphate 3½ cwt., Basal Manure...                                   | 20.9           | 21.6           | 19.2           | 3.8            | 4.4            | 3.6            |

Slags applied June 18th, 1924.

## Barley (Plumage Archer). Great Harpenden Field, 1924.

| Manurial Treatment.<br>Quantities per Acre.                                                                                                                                                                                                                                                                                | Dressed Grain.                |                |                |                             |                |                | Offal Grain per Acre. |                |                | Straw per Acre. |                |                |                      |                |                | Proportion of<br>Total Grain to 100 of<br>Total Straw. |                |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------|----------------|-----------------------------|----------------|----------------|-----------------------|----------------|----------------|-----------------|----------------|----------------|----------------------|----------------|----------------|--------------------------------------------------------|----------------|----------------|
|                                                                                                                                                                                                                                                                                                                            | Yield per Acre<br>in bushels. |                |                | Weight per Bushel<br>in lb. |                |                | lb.                   |                |                | Straw.          |                |                | Total Straw.<br>cwt. |                |                |                                                        |                |                |
|                                                                                                                                                                                                                                                                                                                            | 1st<br>Series.                | 2nd<br>Series. | 3rd<br>Series. | 1st<br>Series.              | 2nd<br>Series. | 3rd<br>Series. | 1st<br>Series.        | 2nd<br>Series. | 3rd<br>Series. | 1st<br>Series.  | 2nd<br>Series. | 3rd<br>Series. | 1st<br>Series.       | 2nd<br>Series. | 3rd<br>Series. | 1st<br>Series.                                         | 2nd<br>Series. | 3rd<br>Series. |
| Control: No Manure ...<br>Basal Manure (Sulphate of<br>Potash, 1 cwt.; Sulphate<br>of Ammonia, 107 lb.) ...<br>Slag No. 21, 100 mesh,<br>514 lb.; Basal Manure ...<br>Slag No. 22, 100 mesh,<br>447 lb.; Basal Manure ...<br>Superphosphate, 298 lb.;<br>Basal Manure ...<br>Gafsa Phosphate, 157 lb.;<br>Basal Manure ... | 16.1                          | 24.5           | 22.9           | 50.0                        | 50.6           | 51.8           | 158                   | 170            | 210            | 1000            | 1240           | 1160           | 12.5                 | 15.0           | 13.4           | 68.8                                                   | 83.9           | 93.0           |
|                                                                                                                                                                                                                                                                                                                            | 31.5                          | 25.7           | 31.0           | 51.5                        | 52.9           | 52.3           | 185                   | 315            | 215            | 1500            | 1420           | 1640           | 16.8                 | 17.9           | 18.4           | 96.0                                                   | 83.8           | 89.0           |
|                                                                                                                                                                                                                                                                                                                            | 26.8                          | 41.5           | 25.3           | 50.5                        | 51.8           | 52.0           | 315                   | 265            | 273            | 1560            | 1840           | 1640           | 17.3                 | 20.5           | 17.3           | 86.1                                                   | 104.8          | 81.8           |
|                                                                                                                                                                                                                                                                                                                            | 24.7                          | 41.3           | 27.3           | 51.5                        | 51.8           | 49.8           | 280                   | 215            | 328            | 1420            | 1960           | 1500           | 17.1                 | 22.0           | 18.4           | 80.7                                                   | 95.5           | 81.9           |
|                                                                                                                                                                                                                                                                                                                            | —                             | 33.6           | —              | —                           | 52.3           | —              | —                     | 220            | —              | —               | 1720           | —              | —                    | 19.3           | —              | —                                                      | 91.4           | —              |
|                                                                                                                                                                                                                                                                                                                            | 27.7                          | 29.9           | 26.7           | 50.5                        | 50.9           | 51.0           | 255                   | 263            | 280            | 1500            | 1480           | 1500           | 16.1                 | 17.0           | 17.1           | 91.9                                                   | 93.8           | 85.4           |
| Control. No Manure ...<br>Basal Manure (Sulphate of<br>Potash 1 cwt., Sulphate of<br>Ammonia 107 lb.) ...<br>Slag No. 23, 100 mesh,<br>360 lb., Basal Manure ...<br>Slag No. 24, 100 mesh,<br>370 lb., Basal Manure ...                                                                                                    | 14.7                          | 24.3           | 13.8           | 49.3                        | 50.5           | 51.0           | 220                   | 212            | 223            | 840             | 1180           | 880            | 12.0                 | 14.8           | 11.1           | 70.5                                                   | 86.7           | 74.8           |
|                                                                                                                                                                                                                                                                                                                            | 34.8                          | 27.1           | 29.4           | 50.4                        | 50.9           | 49.8           | 308                   | 293            | 283            | 1640            | 1440           | 1660           | 19.8                 | 16.6           | 18.4           | 92.9                                                   | 89.9           | 84.6           |
|                                                                                                                                                                                                                                                                                                                            | 23.2                          | 24.3           | 20.0           | 49.5                        | 50.3           | 49.0           | 325                   | 348            | 345            | 1380            | 1500           | 1280           | 15.9                 | 17.5           | 15.0           | 82.9                                                   | 80.0           | 78.9           |
|                                                                                                                                                                                                                                                                                                                            | 24.2                          | 21.9           | 27.0           | 49.0                        | 49.5           | 51.5           | 328                   | 398            | 245            | 1400            | 1200           | 1420           | 15.9                 | 14.1           | 16.6           | 85.0                                                   | 93.8           | 87.9           |

Slags applied December 21st, 1923.

## RESIDUAL EFFECT OF PHOSPHATES.

Hay. Great Field,\* 1923.

| No.<br>of<br>Plot. | Treatment of Plot and Quantities per Acre.       | Yield per<br>Acre.<br>cwt. |              | Dry Matter<br>per Acre.<br>lb. |              |
|--------------------|--------------------------------------------------|----------------------------|--------------|--------------------------------|--------------|
|                    |                                                  | Series<br>A.               | Series<br>B. | Series<br>A.                   | Series<br>B. |
| 1                  | High Grade Slag No. 12, 1170 lb. ...             | 33.0                       | 35.0         | 2755                           | 2929         |
| 2                  | Open Hearth Slag No. 13, 1925 lb. (High Soluble) | 28.3                       | 36.0         | 2382                           | 2948         |
| 3                  | Open Hearth Slag No. 14, 1930 lb. (Low Soluble)  | 30.9                       | 39.6         | 2518                           | 3219         |
| 4                  | Gafsa Phosphate, 750 lb. ...                     | 33.6                       | 37.4         | 2733                           | 3036         |
| C                  | No Manure ...                                    | 31.2                       | 39.5         | 2686                           | 3218         |
| C 1                | High Soluble Slag No. 1, 872 lb. ...             | 31.5                       |              | 2570                           |              |
| 2                  | Low Soluble Slag No. 2, 1225 lb. ...             | 38.3                       |              | 3011                           |              |
| 3                  | Gafsa Phosphate, 347 lb. ...                     | 39.9                       |              | 3051                           |              |
| 4                  | Tunisian Phosphate, 336 lb. ...                  | 37.8                       |              | 2782                           |              |
| 5                  | Florida Phosphate, 292 lb. ...                   | 35.5                       |              | 2911                           |              |
| 7                  | Nauru Phosphate, 263 lb. ...                     | 35.2                       |              | 2829                           |              |
| D 7                | Nauru Phosphate, 263 lb. ...                     | 36.4                       |              | 3058                           |              |
| C 8                | Slag Phosphate, Low Grade No. 8, 411 lb. ...     | 36.6                       |              | 3042                           |              |
| D 8                | Slag Phosphate, Low Grade No. 8, 411 lb. ...     | 41.1                       |              | 3215                           |              |
| C                  | Control. No Manure ...                           | 28.0                       |              | 2284                           |              |
| D                  | Control. No Manure ...                           | 38.4                       |              | 3059                           |              |

\* Manures on the A and B series applied in January, 1921.  
Manures on the C and D series applied in December, 1921.

Hay. Great Field, 1924.

| Plot. | Manurial Treatment.<br>Quantities per Acre. | Yield<br>per Acre.    |                         | Dry Matter<br>per Acre. |                        |
|-------|---------------------------------------------|-----------------------|-------------------------|-------------------------|------------------------|
|       |                                             | No<br>Potash.<br>cwt. | With<br>Potash.<br>cwt. | No<br>Potash.<br>lb.    | With<br>Potash.<br>lb. |
| 1 A   | High Grade Slag, No. 12, 1170 lb. ...       | 30.4                  | 29.5                    | 2807                    | 2661                   |
| 1 B   |                                             | 34.3                  | 30.5                    | 3082                    | 2717                   |
| 2 A   | Open Hearth Slag, No. 13, 1925 lb. ...      | 25.7                  | 28.2                    | 2365                    | 2555                   |
| 2 B   |                                             | 33.9                  | 26.6                    | 2965                    | 2406                   |
| 3 A   | Open Hearth Slag, No. 14, 1930 lb. ...      | 31.4                  | 27.5                    | 2794                    | 2422                   |
| 3 B   |                                             | 28.2                  | 26.1                    | 2454                    | 2399                   |
| 4 A   | Gafsa Phosphate 750 lb. ...                 | 39.6                  | 29.1                    | 3400                    | 2598                   |
| 4 B   |                                             | 29.3                  | 29.3                    | 2625                    | 2578                   |
| A C   | Control. No Manure ...                      | 27.7                  | 30.0                    | 2587                    | 2658                   |
| B C   |                                             | 36.8                  | 30.4                    | 3132                    | 2651                   |
| 7 C   | Nauru Phosphate 263 lb. ...                 | 30.5                  | 31.6                    | 2759                    | 2884                   |
| 7 D   |                                             | 30.5                  | 30.5                    | 2855                    | 2670                   |
| 8 C   | Nauru Slag Phosphate, No. 8, 411 lb. ...    | 29.6                  | 30.4                    | 2727                    | 2778                   |
| 8 D   |                                             | 25.5                  | 27.9                    | 2341                    | 2523                   |
| 1 C   | High Soluble Slag, No. 1, 872 lb. ...       | 28.4                  | 30.5                    | 2519                    | 2647                   |
| 2 C   | Low Soluble Slag, No. 2, 1225 lb. ...       | 29.8                  | 32.0                    | 2723                    | 2886                   |
| 3 C   | Gafsa Phosphate, 347 lb. ...                | 29.1                  | 32.7                    | 2672                    | 2839                   |
| 4 C   | Tunisian Phosphate, 336 lb. ...             | 29.1                  | 33.6                    | 2408                    | 2936                   |
| 5 C   | Florida Phosphate, 292 lb. ...              | 30.2                  | 31.6                    | 2767                    | 2777                   |
| C C   | Control. No Manure ...                      | 27.5                  | 32.0                    | 2454                    | 2827                   |
| D C   |                                             | 27.0                  | 26.6                    | 2455                    | 2404                   |

Kainit at 4 cwt. per acre, applied January 28th, 1924.

## Clover. New Zealand Field, 1923.

| No. of Plot. | Treatment of Plot and Quantities per Acre. | Yield per Acre.<br>cwt. | Dry Matter per Acre.<br>lb. |
|--------------|--------------------------------------------|-------------------------|-----------------------------|
| 8            | Slag Phosphate, No. 8, 376 lb. ... ..      | 34.1                    | 3502                        |
| 10           | Slag Phosphate, No. 10, 424 lb. ... ..     | 34.0                    | 3461                        |
| 12           | Low Grade, No. 20, 1176 lb. ... ..         | 32.6                    | 3241                        |
| 2            | Open Hearth Slag, No. 2, 1100 lb. ... ..   | 29.3                    | 2967                        |
| 9            | Slag, No. 9, 636 lb. ... ..                | 31.0                    | 3099                        |
| C            | Control. No Manure ... ..                  | 32.0                    | 3273                        |

| Clover. Stackyard Field, 1923. |                                        |      |      |
|--------------------------------|----------------------------------------|------|------|
| 5                              | Florida Phosphate ... ..               | 24.8 | 2431 |
| 3                              | Gafsa Phosphate ... ..                 | 22.9 | 2145 |
| 11                             | Phosphate, No. 25, 540 lb. ... ..      | 20.3 | 2073 |
| 4                              | Constantine Phosphate, 308 lb. ... ..  | 22.1 | 2253 |
| 7                              | Nauru Phosphate, No. 7, 241 lb. ... .. | 21.5 | 1951 |
| C                              | Control. No Manure ... ..              | 23.7 | 2411 |

Slags applied January 25th, 1923.

## Clover (after Barley 1922.) Long Hoos Field, 1923.

| Treatment of Plots in Spring 1922.       | Yield per Acre.<br>cwt. |                |                | Dry Matter per Acre.<br>lb. |                |                |
|------------------------------------------|-------------------------|----------------|----------------|-----------------------------|----------------|----------------|
|                                          | Slag<br>No. 20.         | Slag<br>No. 2. | Slag<br>No. 1. | Slag<br>No. 20.             | Slag<br>No. 2. | Slag<br>No. 1. |
|                                          |                         |                |                |                             |                |                |
| Basal Manuring, Slag, full quantity ...  | 36.4                    | 36.4           | 36.4           | 3648                        | 3553           | 3532           |
| Basal Manuring, Slag, half quantity;     | 44.6                    | 38.8           | 42.2           | 4376                        | 3736           | 4098           |
| Gafsa Phosphate, 87 lb. ... ..           | 38.6                    | 35.9           | 41.5           | 3747                        | 3508           | 4100           |
|                                          | 37.1                    | 43.8           | 41.7           | 3169                        | 4234           | 4064           |
| Basal Manuring, Gafsa Phosphate, 174 lb. | 37.1                    | 33.5           | 40.0           | 3630                        | 3235           | 3964           |
| Basal Manuring only ... ..               | 34.6                    | 40.9           | 45.5           | 3423                        | 3959           | 4392           |
| No Manure ... ..                         | 42.2                    | 35.1           | 36.8           | 4123                        | 3471           | 3531           |

Basal Manuring is 1 cwt. Sulphate of Potash; 1 cwt. Sulphate of Ammonia. Full Quantity Slag represents 636 lb. Slag No. 20, 602 lb. Slag No. 2 and 436 lb. Slag No. 1 per acre.

Date of application of Slags { No. 20, March 24th.  
Nos. 2 and 1, March 26th.

## Oats (Grey Winters). West Barnfield, 1923.

| No. of Plot. | Treatment of Plots in Season 1921 and Quantities per Acre. | Dressed Grain.           |           |                        |           | Offal Grain per Acre. |           | Straw per Acre. |           |                   |           | Proportion of Total Grain to 100 of Total Straw. |           |
|--------------|------------------------------------------------------------|--------------------------|-----------|------------------------|-----------|-----------------------|-----------|-----------------|-----------|-------------------|-----------|--------------------------------------------------|-----------|
|              |                                                            | Yield per Acre. Bushels. |           | Weight per Bushel. lb. |           | lb.                   |           | Straw. lb.      |           | Total Straw. cwt. |           | Total Straw.                                     |           |
|              |                                                            | Series A.                | Series B. | Series A.              | Series B. | Series A.             | Series B. | Series A.       | Series B. | Series A.         | Series B. | Series A.                                        | Series B. |
| 1            | High Grade Slag No. 12, 1170 lb. ...                       | 48.2                     | 53.1      | 42.0                   | 39.9      | 401                   | 549       | 2740            | 3195      | 31.6              | 36.9      | 68.6                                             | 64.5      |
| 2            | Open Hearth, High Soluble Slag No. 13, 1925 lb. ...        | 52.9                     | 51.1      | 39.5                   | 40.2      | 400                   | 475       | 3200            | 3255      | 36.9              | 35.9      | 60.3                                             | 62.8      |
| 3            | Open Hearth, Low Soluble Slag No. 14, 1930 lb. ...         | 52.7                     | 54.1      | 41.9                   | 40.4      | 543                   | 525       | 3090            | 3210      | 33.9              | 34.8      | 72.4                                             | 69.5      |
| 4            | Gafsa Phosphate, 750 lb. ...                               | 52.5                     | 50.9      | 41.3                   | 39.7      | 548                   | 568       | 3090            | 2770      | 33.8              | 29.5      | 71.9                                             | 78.4      |
| C            | No Manure ...                                              | 47.2                     | 54.0      | 41.0                   | 39.7      | 539                   | 554       | 3075            | 2990      | 35.8              | 32.3      | 61.7                                             | 74.5      |
| C            | No Manure ...                                              | 55.8                     |           | 40.8                   |           | 448                   |           | 3020            |           | 31.9              |           | 76.3                                             |           |

Slag applied, January 14th, 1921.

## Wheat (Red Standard) after Swedes. Great Harpenden Field, 1923.

| Manuring per Acre.<br>(applied in Spring, 1922).                                              | Dressed Grain.              |      |      |                           |      |      | Offal Grain<br>per Acre. |     |     | Straw per Acre. |      |      |                      |      |      | Proportion of<br>Total Grain<br>to 100 of<br>Total Straw. |      |      |      |
|-----------------------------------------------------------------------------------------------|-----------------------------|------|------|---------------------------|------|------|--------------------------|-----|-----|-----------------|------|------|----------------------|------|------|-----------------------------------------------------------|------|------|------|
|                                                                                               | Yield per Acre.<br>Bushels. |      |      | Weight per Bushel.<br>lb. |      |      | lb.                      |     |     | Straw.<br>lb.   |      |      | Total Straw.<br>cwt. |      |      |                                                           |      |      |      |
|                                                                                               | Slag<br>No.                 |      | No.  | Slag<br>No.               |      | No.  | Slag<br>No.              |     | No. | Slag<br>No.     |      | No.  | Slag<br>No.          |      | No.  | Slag<br>No.                                               |      | No.  | No.  |
|                                                                                               | 20.                         | 1.   |      | 20.                       | 1.   |      | 20.                      | 1.  |     | 20.             | 1.   |      | 20.                  | 1.   |      | 20.                                                       | 1.   |      |      |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt., Slag full quantity ... }                  | 19'4                        | 25'5 | 21'1 | 64'0                      | 63'6 | 63'6 | 272                      | 228 | 222 | 2200            | 2738 | 2125 | 23'6                 | 28'3 | 22'0 | 57'5                                                      | 58'4 | 63'5 | 63'5 |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt., Slag full quantity ... }                  | 20'9                        | 24'6 | 22'9 | 60'3                      | 63'8 | 63'0 | 177                      | 300 | 211 | 2000            | 2288 | 2425 | 20'8                 | 22'8 | 25'4 | 61'6                                                      | 73'1 | 58'1 | 58'1 |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt., Slag half quantity, }                     | 18'2                        | 22'7 | 21'7 | 63'0                      | 63'0 | 63'5 | 217                      | 228 | 214 | 2025            | 2538 | 2262 | 21'1                 | 26'5 | 23'9 | 57'7                                                      | 55'8 | 59'3 | 59'3 |
| Gafsa Phosphate 175 lb.                                                                       | 23'5                        | 22'5 | 23'4 | 62'8                      | 62'6 | 62'8 | 208                      | 187 | 219 | 2388            | 1888 | 2225 | 24'3                 | 19'3 | 24'3 | 61'6                                                      | 73'8 | 62'0 | 62'0 |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt., No. 7 Nauru Phos-<br>phate 262½ lb. ... } | 19'7                        | 22'7 | 23'8 | 62'8                      | 63'8 | 62'9 | 284                      | 231 | 212 | 2125            | 1975 | 2575 | 23'0                 | 20'6 | 27'4 | 58'9                                                      | 72'8 | 55'6 | 55'6 |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt., No. 3 Gafsa Phos-<br>phate 350 lb. ... }  | 22'9                        | 21'1 | 24'6 | 62'8                      | 59'1 | 63'8 | 284                      | 122 | 252 | 2750            | 1925 | 2225 | 29'0                 | 20'4 | 25'2 | 53'0                                                      | 59'8 | 64'4 | 64'4 |
| Sulphate Ammonia 2 cwt., Sulphate<br>Potash 1 cwt. ... }                                      | 26'0                        | 23'9 | 20'7 | 63'9                      | 63'4 | 63'1 | 186                      | 241 | 202 | 2500            | 2163 | 2338 | 27'0                 | 22'2 | 25'1 | 61'1                                                      | 70'6 | 53'7 | 53'7 |
| No Manure ... }                                                                               | 22'8                        | 19'2 | 23'0 | 64'3                      | 63'0 | 63'0 | 294                      | 208 | 217 | 2550            | 1950 | 2012 | 26'5                 | 20'5 | 20'8 | 59'4                                                      | 61'5 | 71'5 | 71'5 |

NOTE.—"Full Quantity" Slag is : No. 20, 1275 lb. per Acre. No. 2, 1225 lb. per Acre. No. 1, 875 lb. per Acre.  
Date of application of Slags, May 8th, 1922.

MISCELLANEOUS EXPERIMENTS.  
ORGANIC MANURE. GREEN MANURING.  
Oats (Black Winter). Produce per Acre. Great Knott Field, 1924.

| GREEN<br>MANURING                       | No.<br>of<br>Plot. | Basal Manuring.<br>Quantities per Acre.<br>Applied August 13th, 1923. | Dressed Grain.                 |            |                              |            | Offal Grain<br>per Acre.<br>lb. |            |            |            | Straw per Acre.         |            |            |            | Proportion of<br>Total Grain<br>to 100 of<br>Total Straw. |  |
|-----------------------------------------|--------------------|-----------------------------------------------------------------------|--------------------------------|------------|------------------------------|------------|---------------------------------|------------|------------|------------|-------------------------|------------|------------|------------|-----------------------------------------------------------|--|
|                                         |                    |                                                                       | Yield per<br>Acre.<br>bushels. |            | Weight<br>per Bushel.<br>lb. |            | lb.                             |            |            |            | Straw.<br>lb.           |            |            |            |                                                           |  |
|                                         |                    |                                                                       |                                |            |                              |            |                                 |            |            |            | Total<br>Straw.<br>cwt. |            |            |            |                                                           |  |
|                                         |                    |                                                                       | Plot<br>1.                     | Plot<br>2. | Plot<br>1.                   | Plot<br>2. | Plot<br>1.                      | Plot<br>2. | Plot<br>1. | Plot<br>2. | Plot<br>1.              | Plot<br>2. | Plot<br>1. | Plot<br>2. |                                                           |  |
| {<br>Mustard.*                          | M 1 & 4            | 10 Tons London Refuse                                                 | 51.5                           | 47.0       | 36.0                         | 36.9       | 100                             | 95         | 2840       | 2500       | 33.2                    | 30.4       | 52.6       | 53.8       |                                                           |  |
|                                         | M 2 & 5            | 5 Tons London Refuse                                                  | 48.9                           | 54.7       | 37.1                         | 35.9       | 90                              | 95         | 2300       | 2800       | 28.2                    | 33.6       | 60.3       | 54.9       |                                                           |  |
|                                         | M 3                | Control. No Manure ...                                                | 43.3                           | —          | 36.8                         | —          | 120                             | —          | 2200       | —          | 28.9                    | —          | 52.8       | —          |                                                           |  |
| {<br>No Green<br>Manuring.              | C 1 & 4            | 10 Tons London Refuse                                                 | 31.8                           | 33.8       | 36.0                         | 37.3       | 88                              | 80         | 2080       | 1840       | 27.7                    | 25.5       | 39.8       | 46.9       |                                                           |  |
|                                         | C 2 & 5            | 5 Tons London Refuse                                                  | 25.8                           | 32.8       | 36.0                         | 37.1       | 83                              | 88         | 1560       | 1900       | 21.8                    | 25.7       | 41.5       | 45.3       |                                                           |  |
|                                         | C 3                | Control. No Manure ...                                                | 27.5                           | —          | 37.5                         | —          | 80                              | —          | 1520       | —          | 20.4                    | —          | 48.7       | —          |                                                           |  |
| {<br>No Green <sup>†</sup><br>Manuring. | H 1 & 4            | 10 Tons London Refuse                                                 | 30.1                           | 26.8       | 36.8                         | 36.9       | 75                              | 73         | 1860       | 1500       | 23.4                    | 20.7       | 45.0       | 45.7       |                                                           |  |
|                                         | H 2 & 5            | 5 Tons London Refuse                                                  | 25.3                           | 24.4       | 36.5                         | 36.8       | 70                              | 83         | 1420       | 1480       | 18.6                    | 20.7       | 47.8       | 42.2       |                                                           |  |
|                                         | H 3                | Control. No Manure ...                                                | 22.5                           | —          | 36.8                         | —          | 65                              | —          | 1200       | —          | 17.5                    | —          | 45.4       | —          |                                                           |  |

\* The Mustard crop was sown August 20th, 1923, and ploughed on October 18th, 1923.

† Hubam Clover was sown on this series for Green Manure, but the plant failed.

## TOWN REFUSE EXPERIMENT.

Mangolds (Prizewinner Yellow Globe). Fosters Field, 1923.

| Treatment of Plots and Manuring per Acre. | Yield per Acre. |              |
|-------------------------------------------|-----------------|--------------|
|                                           | Roots.          | Leaves.      |
| Control. No Manure ... ..                 | Tons.<br>9'6    | Tons.<br>3'2 |
| Dung, 15 tons... ..                       | 13'2            | 3'9          |
| Hampstead Refuse, 15 tons... ..           | 14'0            | 3'4          |
| Walworth Refuse, 15 tons ... ..           | 13'9            | 3'5          |

Manures applied May 4th.

## PHOSPHAZOTE EXPERIMENT.

Potatoes (Kerr's Pink). Little Knott Field, 1923.

| Manuring per Acre.                                                                                              | Yield per Acre. |              |              |
|-----------------------------------------------------------------------------------------------------------------|-----------------|--------------|--------------|
|                                                                                                                 | 1st Plot.       | 2nd Plot.    | 3rd Plot.    |
| Control. No Manure ... ..                                                                                       | Tons.<br>10'8   | Tons.<br>9'4 | Tons.<br>8'2 |
| Sulphate of Potash $1\frac{1}{2}$ cwt. ... ..                                                                   | 12'4            | 9'8          | 10'1         |
| Sulphate of Potash $1\frac{1}{2}$ cwt., Superphosphate 3 cwt., Sulphate of Ammonia 266 $\frac{1}{2}$ lb. ... .. | 14'2            | 13'8         | 13'9         |
| Sulphate of Potash $1\frac{1}{2}$ cwt., Phosphazote $4\frac{1}{2}$ cwt. ... ..                                  | 12'8            | 13'2         | 12'7         |

Manures applied, May 12th-14th.

EFFECT OF STRAW AND MINERALS  
ON LEGUMINOSAE.

Produce per Acre. Little Hoos Field, 1923 and 1924.

| Manures per Acre.<br>Applied in 1923.                     | 1923.            |              |              | 1924.            |              |              |
|-----------------------------------------------------------|------------------|--------------|--------------|------------------|--------------|--------------|
|                                                           | Beans and Straw. |              |              | Wheat and Straw. |              |              |
|                                                           | 1st Series.      | 2nd Series.  | 3rd Series.  | 1st Series.      | 2nd Series.  | 3rd Series.  |
| 5 tons Chaff ... ..                                       | cwt.<br>29'9     | cwt.<br>25'9 | cwt.<br>33'5 | cwt.<br>27'2     | cwt.<br>21'4 | cwt.<br>29'5 |
| 400 lb. Superphosphate ... ..                             | 24'1             | 25'9         | 24'6         | 17'9             | 25'0         | 23'7         |
| 5 tons Chaff, 400 lb. Superphosphate ... ..               | 34'8             | 28'1         | 29'9         | 29'9             | 24'4         | 30'8         |
| 400 lb. Superphosphate, 200 lb. Sulphate of Potash ... .. | 32'1             | 37'0         | 29'0         | 20'5             | 32'1         | 25'9         |
| Control ... ..                                            | 25'0<br>24'6     | 26'3<br>—    | 26'8<br>—    | 18'8<br>27'2     | 21'9<br>—    | 21'0<br>—    |