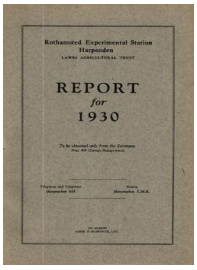
*This work is licensed under a Creative Commons Attribution 4.0 International License.*

Thank you for using eradoc, a platform to publish electronic copies of the Rothamsted Documents. Your requested document has been scanned from original documents. If you find this document is not readible, or you suspect there are some problems, please let us know and we will correct that.

# Report for 1930

*Full Table of Content*




# Use of Grassland

## Rothamsted Research

Rothamsted Research (1931) *Use of Grassland ;* Report For 1930, pp 43 - 46 **- DOI: https://doi.org/10.23637/ERADOC-1-63**

This work is licensed under a Creative Commons Attribution 4.0 International License.



In all the tests so far made superphosphate has put more phosphorus into the herbage in the first year after application than any other phosphatic fertiliser; the next in order has been high soluble basic slag, and the least effective low soluble slag and mineral phosphate. In no case however, is much of the added phosphate recovered; so far not more than 10 per cent at best. Up to a certain point the increased uptake of phosphorus goes on whether the yield increases or not.

The yields of hay and of protein per acre come out in the same order as phosphorus uptake, superphosphate being best, high soluble slag next, then low soluble slag and mineral phosphate.

Certain new basic slags have recently been produced which, although of low solubility, were said to be more effective than the old ones. Pot and field experiments have not supported this claim; the new slags seem little better than the old ones. Like them they have a certain lime value on acid soils, being in our tests as effective as their own weight of calcium carbonate. On certain soils, however, they may, like other slags, so much stimulate the decomposition of the organic matter that the carbonic acid produced more than balances their lime effects on the soil reaction.

No new areas were sown down to grass during 1930, nor is it at present proposed to lay down any more. The characteristic feature of the year was the filling up of the bare space which in 1929 amounted to about 30 per cent, and is now down to 5 or 10 per cent, the steady increase in the amount of wild white clover as the season advanced, the very high proportion of rye grass in the spring falling off later as the wild white clover increased, and the steadiness of the cocksfoot which neither increased nor decreased.

These three plants now dominate Sawyers pasture, and the timothy and rough stalked meadow grass are much reduced, even allowing for the fact that some of the identifications are uncertain. The results of the survey are given in Table IV; the method of survey is being improved this year. Of the other fields laid down in 1928, those sown on a fallow in August without a nurse crop (Sawyers and Harpenden) have given the best result, having now nearly caught up to Little Knott, and those sown in September immediately after a cereal crop (New Zealand, West Barnfield) are the worst; some of the spring sown seeds in cereals have also done badly (Great Knott and Stackyard). All, however, are improving and clover is increasing. Details of seeding are given in the 1928 Report, p. 101.

## USE OF THE GRASSLAND

Having obtained the grass, the next problem is to use it efficiently and economically. It has arrived at its present good state largely as a result of good grazing which has kept down all flower heads, stems and rough patches. Sheep have been much used, with a small number of calves and bullocks; it is hoped to extend this work considerably.

*Phosphatic Fertilisers for Grassland.* For several years the Chemistry Department has been engaged in conjunction with the Permanent Basic Slag Committee of the Ministry of Agriculture in an examination of the chemical nature and fertiliser value of the different types of basic slag available to the British farmer. The results have shown that there are two main types which may be

This work is licensed under a Creative Commons Attribution 4.0 International License.



TABLE X.

*Percentage Area covered by various species of plants*, 1930.
*Sawyer's Pasture, sown April 25th*, 1928.

| Name of Species. | Plot 1. Mixture I. May. | Plot 1. Mixture I. Oct. | Plot 2 Mixture VI. May. | Plot 2 Mixture VI. Oct. | Plot 3. Mixture VIII. May. | Plot 3. Mixture VIII. Oct. | Plot 4. Mixture VII. May. | Plot 4. Mixture VII. Oct. | Plot 5. Mixture IV. May. | Plot 5. Mixture IV. Oct. | Plot 6. Mixture V. May. | Plot 6. Mixture V. Oct. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perennial Rye Grass (*Lolium perenne*) .. | 77.5 | 44.6 | — | — | 53.7 | — | — | — | 57.4 | 35.3 | 61.7 | 43.4 |
| Italian Rye Grass (*Lolium italicum*) .. | — | — | 49.2 | 23.8 | | 30.1 | 57.5 | 25.9 | — | — | — | — |
| Cocksfoot (*Dactylis glomerata*) .. .. | 3.3 | 8.4 | 15.5 | 19.9 | 18.7 | 21.7 | 12.6 | 16.2 | 13.4 | 21.1 | 17.3 | 18.6 |
| Timothy (*Phleum pratense*) .. .. | 4.9 | 2.1 | 4.8 | 1.5 | 5.1 | 4.7 | 9.4 | 7.5 | 8.8 | 4.2 | 0.7 | 0.5 |
| Tall Fescue (*Festuca elatior*) .. .. | — | — | 3.2 | 8.6 | — | — | — | — | — | — | — | — |
| Meadow Fescue (*Festuca pratensis*) .. | 0.3 | 0.2 | — | — | 2.7 | 0.9 | 1.4 | — | — | — | — | 0.1 |
| Red Clover, late and early flowering (*Trifolium pratense*) .. .. .. | 2.1 | 8.1 | 5.2 | 8.9 | 6.6 | 14.1 | 6.4 | 7.7 | 6.6 | 12.2 | 0.2 | 0.7 |
| Wild White Clover (*Trifolium repens*) .. | 6.5 | 28.6 | 11.2 | 31.1 | 5.4 | 22.6 | 5.5 | 35.5 | 5.6 | 22.0 | 2.9 | 29.5 |
| Trefoil (*Medicago lupulina*) .. .. | — | — | — | — | — | 0.7 | 0.7 | — | — | — | — | — |
| Chicory (*Cichorium intybus*) .. .. | 1.4 | 3.4 | 5.3 | 2.6 | — | — | — | — | 0.3 | — | — | — |
| Weeds .. .. .. .. .. | 1.4 | 1.2 | 1.7 | 0.6 | 2.7 | 0.3 | 1.0 | 0.2 | 3.2 | 0.1 | 2.2 | 0.4 |
| Bent Grass (*Agrostis alba*) .. .. .. | 0.2 | 1.3 | — | 0.1 | — | — | — | 0.1 | — | — | — | — |
| Covered with vegetation .. .. .. | 97.6 | 97.9 | 96.1 | 97.1 | 94.9 | 95.1 | 94.5 | 93.1 | 95.3 | 94.9 | 85.0 | 93.2 |
| Bare Patches .. .. .. .. | 2.4 | 2.1 | 3.9 | 2.9 | 5.1 | 4.9 | 5.5 | 6.9 | 4.7 | 5.1 | 15.0 | 6.8 |

Average of ten samples each of area 1 square foot. For previous figures see 1929 Report, p. 24 ; for Mixtures see 1928 Report, p.101.

https://doi.org/10.23637/ERADOC-1-63 

This work is licensed under a Creative Commons Attribution 4.0 International License.



discriminated with sufficient accuracy by the old and conventional citric acid test. In 1930 the work was extended so as to test over a period of years not only the two main types of basic slag but the two alternative phosphatic fertilisers, superphosphate and ground mineral phosphate (Gafsa passing 120 mesh sieve). The tests are conducted in the laboratory, in the pot culture house, and in the field, on both grassland and arable land. Preliminary results on a series of hay experiments are given below to illustrate the extent to which moderate grassland may be improved not merely in the quantity of the hay but in its quality or feeding value. The results of other experiments under conditions more nearly approaching those of pastures are not yet complete.

Seven centres distributed throughout the country were selected and Latin square experiments with 25 plots were laid down in the spring of 1930. Some of them were conducted by the local agricultural authorities and others by the Rothamsted staff. The fertilisers were from single well mixed batches, and were added at the rate of 1 cwt. of phosphoric acid ($P_2O_5$) per acre. Samples of the produce from individual plots were analysed at Rothamsted for dry matter, nitrogen and phosphoric acid. The results for six centres are given in Table XI.

As only a few months elapsed between the application of the fertilisers and haymaking, little immediate benefit was to be expected from the less soluble and more slowly acting fertilisers. The first year results show only the effect of rapidly available phosphoric acid, and the results in the following years will probably differ considerably from these preliminary ones.

On the average of six centres superphosphate alone showed an appreciable increase in dry matter, though there was a slight benefit from the less soluble phosphates at some of the centres. The effects on the composition of the hay were, however, more striking and more consistent than those on yield. At four centres the average protein content of the dry matter was raised from 9 to 11 per cent by superphosphate, and at six centres the average phosphoric acid content of the dry matter was increased by 50 per cent. At one centre the total phosphoric acid content of the hay per acre was doubled. The hay was thus not merely increased in amount but also in protein and mineral content. In the two Essex centres the improvement in quality was particularly great even though at one of them nearly 3 tons of hay per acre were obtained on the unmanured land. The average gain from superphosphate at the two Essex centres was 6 cwt. of dry matter per acre, but at the same time the protein content of the hay per acre was raised by 1.5 cwt., an amount contained in about 18 cwt. of the unmanured hay. The increase was not merely hay but a richer material with a feeding value comparable with that of dried young grass, and approaching that of a concentrated feeding stuff.

This result illustrates the well known discrepancy between practical experience on the improvement of pastures and stock by slag or other phosphates, and the disappointing results often given by fertiliser trials when similar land is laid up for hay, and the experiment confined to the measurement of yield of hay.

In spite of the great improvement produced at some of these centres the actual recovery of the phosphoric acid added was small ;

*This work is licensed under a Creative Commons Attribution 4.0 International License.*



for superphosphate the maximum was 12 per cent and the average 6 per cent. Less than 3 per cent of the phosphoric acid added in high soluble slag was recovered and still smaller amounts were taken from the low soluble slag and mineral phosphate. The immediate availability of the phosphoric acid was closely related to its solubility.

TABLE XI.—Effect of Phosphatic Fertilisers on yield and composition of hay, 1930.

| | No Phosphate. | Mineral Phosphate. | Low Soluble Slag. | High Soluble Slag. | Super. |
|---|---|---|---|---|---|
| *Yield of Hay* (as cwts. of dry matter per acre)— | | | | | |
| Purleigh, Essex | 50.4 | 50.8 | 53.5 | 52.0 | 54.7 |
| Braintree, Essex | 19.3 | 20.1 | 20.2 | 23.5 | 27.3 |
| Badminton, Glos. | 28.5 | 28.5 | 28.5 | 28.8 | 30.6 |
| Lydbury, Salop | 28.7 | 31.1 | 29.7 | 29.6 | 31.3 |
| Chesterfield, Derby .. | 19.3 | 18.2 | 19.4 | 19.1 | 20.9 |
| Wetherby, Yorks | 28.8 | 31.2 | 32.4 | 31.1 | 28.0 |
| Mean .. | 29.2 | 30.0 | 30.4 | 30.7 | 32.1 |
| *Nitrogen as per cent. of dry matter*— | | | | | |
| Purleigh .. | 1.31 | 1.29 | 1.30 | 1.47 | 1.57 |
| Braintree .. | 1.55 | 1.72 | 1.69 | 1.70 | 2.21 |
| Badminton .. | 1.61 | 1.58 | 1.58 | 1.56 | 1.66 |
| Chesterfield .. | 1.42 | 1.48 | 1.38 | 1.47 | 1.49 |
| Mean .. | 1.47 | 1.52 | 1.49 | 1.55 | 1.73 |
| *Protein in hay in cwts. per acre*— | | | | | |
| Purleigh .. | 4.13 | 4.09 | 4.35 | 4.78 | 5.36 |
| Braintree .. | 1.87 | 2.16 | 2.14 | 2.50 | 3.77 |
| Badminton .. | 2.86 | 2.81 | 2.82 | 2.80 | 3.17 |
| Chesterfield .. | 1.72 | 1.68 | 1.67 | 1.75 | 1.95 |
| Mean .. | 2.64 | 2.68 | 2.74 | 2.96 | 3.56 |
| $P_2O_5$ *as per cent. of dry matter*— | | | | | |
| Purleigh .. | 0.46 | 0.46 | 0.50 | 0.51 | 0.62 |
| Braintree .. | 0.48 | 0.49 | 0.51 | 0.52 | 0.67 |
| Badminton .. | 0.43 | 0.46 | 0.44 | 0.54 | 0.60 |
| Lydbury .. | 0.52 | 0.60 | 0.59 | 0.61 | 0.71 |
| Chesterfield .. | 0.36 | 0.40 | 0.36 | 0.43 | 0.49 |
| Wetherby .. | 0.53 | 0.52 | 0.52 | 0.57 | 0.59 |
| Mean .. | 0.464 | 0.490 | 0.485 | 0.530 | 0.616 |
| *Phosphoric Acid in hay in cwts. per acre*— | | | | | |
| Purleigh .. | 0.23 | 0.24 | 0.27 | 0.27 | 0.34 |
| Braintree .. | 0.09 | 0.10 | 0.10 | 0.12 | 0.18 |
| Badminton .. | 0.12 | 0.13 | 0.13 | 0.16 | 0.19 |
| Lydbury .. | 0.15 | 0.19 | 0.18 | 0.18 | 0.19 |
| Chesterfield .. | 0.07 | 0.07 | 0.07 | 0.08 | 0.10 |
| Wetherby .. | 0.15 | 0.16 | 0.17 | 0.18 | 0.17 |
| Mean .. | 0.136 | 0.148 | 0.151 | 0.164 | 0.194 |
| Mean percentage recovery of added $P_2O_5$ .. | — | 1.2 | 1.5 | 2.8 | 5.8 |

https://doi.org/10.23637/ERADOC-1-63 