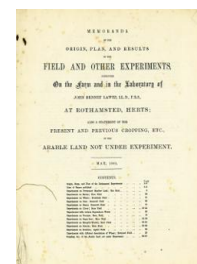


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Memoranda of the Field Experiments at Rothamsted: May 1881



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Experiments on Permanent Meadow Land; the Park

Rothamsted Research

Rothamsted Research (1882) *Experiments on Permanent Meadow Land; the Park* ; Memoranda Of The Field Experiments At Rothamsted: May 1881, pp 9 - 9 - DOI:
<https://doi.org/10.23637/ERADOC-1-245>

THE PARK.

EXPERIMENTS WITH DIFFERENT MANURES ON PERMANENT MEADOW LAND.

The Land has probably been laid down with Grass for some centuries. No fresh seed has been artificially sown within the last 40 years certainly; nor is there record of any having been sown since the Grass was first laid down. The experiments commenced in 1856, at which time the character of the herbage appeared uniform over all the Plots. Excepting as explained in the Table, and in the foot-notes, the same description of Manure has been applied year after year to the same Plot.

During the first 19 years of the experiments, 1856-1874, the first crop only, each year, was mown, made into hay, removed from the land, and weighed. As a rule, the second crop was fed-off by sheep having no other food, the object being not to disturb the condition of the manuring. A given number was allotted to each Plot, according to the amount of produce, penned upon a portion of it, and the area extended, day by day, until the whole was eaten down. Frequently, however, the animals suffered considerably; and in 1866, 1870, 1873, and 1874, the second crops (and third, if any) were cut, and spread on the respective Plots. In the twentieth season, 1875, the second crops being unusually heavy, and the weather favourable, they were, for the first time, cut, weighed as hay, and removed. In 1876 they were cut and spread on the Plots. In 1877 and 1878 the second crops were again made into hay, weighed, and removed. In 1879 the second crops were cut, sampled, carted, and weighed, green; the dry matter in the weighed samples was determined, and the produce reckoned into hay by adding one-fourth to the calculated dry matter per acre. In 1880 the second crops were again made into hay, weighed and removed. It is intended in future to adopt this plan whenever the weather will permit. Owing to this change in the treatment of the crops, the average produce per annum is given, separately, for the first 20 years, 1856-1875, first crops only, and for the succeeding 5 years, 1876-1880, first and second crops (15).

(Area under experiment, about 7 acres.)

PLOTS.		PRODUCE PER ACRE, WEIGHED AS HAY.										PLOTS.		
		Average per Annum, 20 Years, 1856-75. (First Crops only.)					Average per Annum, 5 Years, 1876-80. (First and Second Crops.)							
		10 Years, 1856-65.		10 Years, 1866-75.		20 Years, 1856-75.		First Crops.		Second Crops (15).			Total.	
		Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.		Cwts.	Cwts.
1	1 acre = (about) 0.40 Hectare or 1.59 Prussian Morgen. 1 lb. (pound avoird.) = (about) 0.45 Kilogramme or 0.91 Zollverein Pfund. 1 cwt. (hundredweight) = (about) 51.0 Kilogrammes or 1.02 Centner. 1 ton = (about) 10.0 Kilogrammes or 20.3 Centner. 1 lb. per acre = (about) 1.19 Kilogramme per Hectare or 0.57 Gall. Pld. per P. Morgen. 1 cwt. per acre = (about) 125.5 Kilogrammes per Hectare or 6.2 Centner per P. Morgen. 1 ton per acre = (about) 2510.0 Kilogrammes per Hectare or 12.93 Centner per P. Morgen.	1856-63, 8 years, 14 tons Farmyard Manure, and 200 lbs. Ammonia-salts (1); average produce 49½ cwt. a. } { 1864 and since, 200 lbs. Ammonia-salts alone; average produce (12 years, 1864-75) 38½ cwt. a. } { 1864 and since, unmanured; average produce (12 years, 1864-75) 32½ cwt. a. } Unmanured, continuously 3½ cwt. Superphosphate of Lime (2) 3½ cwt. Superphosphate of Lime, and 400 lbs. Ammonia-salts 400 lbs. Ammonia-salts (1856-68, 13 years, 400 lbs. Ammonia-salts; average produce 30½ cwt. a. } { 1868-78 300 lbs., 1879 and since, 500 lbs. Sul. Pot., 100 lbs. Sul. Soda, 100 lbs. Sul. Mag., 3½ cwt. Superph.; av. prod. (7 yrs., 1869-75) 31½ cwt. a. } { 1856-78 300 lbs., 1879 and since, 500 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwt. Superphosphate .. } { 1856-61, 6 years, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, and 3½ cwt. Superphosphate; average produce 36 cwt. a. } { 1862 and since, 250 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwt. Superphosphate; average produce (14 years, 1862-75) 27½ cwt. a. } { 1856-78 300 lbs., 1879 and since, 500 lbs. Sulph. Pot., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwt. Superph., and 400 lbs. Ammonia-salts .. } { 1856-61, 6 yrs. 300 lbs. Sulph. Potash, 200 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwt. Superph., 400 lbs. Amm.-salts; av. prod. 55½ cwt. a. } { 1862 and since, 250 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwt. Superph., 400 lbs. Amm.-salts; av. prod. (14 yrs., 1862-75) 42½ cwt. a. } { 1856-78 300 lbs., 1879 and since, 500 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwt. Superph., 800 lbs. Ammonia-salts } { 1856-78 300 lbs., 1879 and since, 500 lbs. Sul. Pot., 100 lbs. Sul. Soda, 100 lbs. Sul. Mag., 3½ cwt. Superph., 800 lbs. Am.-salts, and 400 lbs. Sul. Sod. (2) } Unmanured continuously { 1856-78 300 lbs., 1879 and since, 500 lbs. Sul. Pot., 100 lbs. Sul. Soda, 100 lbs. Sul. Mag., 3½ cwt. Superph., 400 lbs. Am.-salts, 2000 lbs. Cut Wheat-straw } { 550 lbs. Nit. of Soda (2), 1879 and since, 500 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., and 3½ cwt. Superph. } { 1856-75, 18 years, 550 lbs. Nitrate Soda } { 1876-78 300 lbs., 1879 and since, 500 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwt. Superph. } { 275 lbs. Nitrate of Soda, 1858-78 300 lbs., 1879 and since, 500 lbs. Sulph. Potash, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwt. Superph. } { 275 lbs. Nitrate of Soda } Mixture supplying the quantity of Potash, Soda, Lime, Magnesia, Phosphoric acid, Silica, and Nitrogen, contained in 1 ton of Hay (commencing 1865) { 275 lbs. Nitrate of Soda, 290 lbs. Sulphate of Potash, and 3½ cwt. Superphosphate (commencing 1872) } { 227 lbs. Nitrate of Potash, and 3½ cwt. Superphosphate (commencing 1872) }												

(1) "Ammonia-salts"—in all cases equal parts Sulphate and Muriate of Ammonia of Commerce. (2) The "Superphosphate of Lime" is, in all cases, made from 200 lbs. Bone-ash, 150 lbs. Sulphuric Acid Sp. Gr. 1.7 (and water). (3) Plots 6, 8, and 10, had, besides the Manures specified, 2000 lbs. Sawdust per acre per annum for the first 7 years, 1856-1862, but without effect. (4) 500 lbs. in 1862 and 1863. (5) Only 400 lbs. in 1859-60-61. (6) 200 lbs. 1856-1862 inclusive. (7) The application of Silicates did not commence until 1862; 9 years (1862-1870), 200 lbs. Silicate Lime, and 200 lbs. Silicate Soda; 1871, and since, 400 lbs. Silicate Soda. (8) As the second crops were not removed in 1876, those of 1875, which were, are brought in to give the 5 years, average of second crops. (9) 550 lbs. Nitrate of Soda is reckoned to contain the same amount of Nitrogen as 400 lbs. of Ammonia-salts. (10) The manures specified were first applied in 1859 (previously, 1856-7 and 8, Sawdust only). (11) Averages of 8 years, 10 years, and 18 years, as these experiments did not commence until 1858. (12) Averages of 4 years, 10 years, and 11 years, as the experiment only commenced in 1865. (13) Averages of 4 years only, 1872-75. (14) As the second crops were not removed in 1876, those of 1875, which were, are brought in to give the 5 years, average of second crops. (15) As the second crops were not removed in 1876, those of 1875, which were, are brought in to give the 5 years, average of second crops.