ROTHAMSTED RESEARCH

Yields of the Field Experiments 1876

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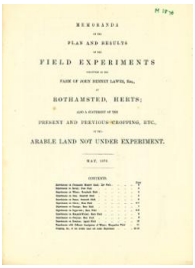

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Rothamsted Research

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MEMORANDA

OF THE

PLAN AND RESULTS

OF THE

FIELD EXPERIMENTS

CONDUCTED ON THE

FARM OF JOHN BENNET LAWES, Esq.,

AT

ROTHAMSTED, HERTS;

ALSO A STATEMENT OF THE

PRESENT AND PREVIOUS CROPPING, ETC.,

OF THE

ARABLE LAND NOT UNDER EXPERIMENT.

MAY, 1876.

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https://doi.org/10.23637/ERADOC-1-240

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.

(Area under experiment, about 7 acres.)

		Produce per Acre, Weighed as Hay.						
		Average per Annum.			Twentieth Season, 1875 [13].			
Plots.	Manures, per acre, per Annum.	10 Years, 1856–65.	10 Years, 1866–75. [14]	20 Years, 1856–75. [14]	First Crop.	Second Crop.	Total.	Plots.
		Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	
1	1856–63, 8 years, 14 tons Farmyard Manure, and 200 lbs. Ammonia-salts [1]; average produce 49½ cwts. 1864 and since, 200 lbs. Ammonia-salts alone; average produce (16 years, 1864–71) 40⅞ cwts.	48⅜	37¾	43	33⅜	17½	51⅛	1
2	1856–63, 8 years, 14 tons Farmyard Manure; average produce 42⅞ cwts. 1864 and since, unmanured; average produce (16 years, 1864–71) 33¼ cwts.	41⅝	32	36⅞	26¾	11¾	38½	2
3	Unmanured, continuously	22½	20	21¼	20	12⅜	32⅜	3
4 (1)	3½ cwts. Superphosphate of Lime [2]	23¼	21¼	22¼ [9]	21	15⅜	36⅜	1
4 (2)	3½ cwts. Superphosphate of Lime, and 400 lbs. Ammonia-salts	33⅞	30½	32¼ [9]	36⅝	14⅜	51	2 4
5	400 lbs. Ammonia-salts	30½	22	26¼	24⅛	18	42⅛	5
[3] 6	1856–68, 13 years, 400 lbs. Ammonia-salts; average produce 30½ cwts. 1869 and since, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphos.; av. prod. (6 yrs., 1869–74) 32½ cwts.	31⅜	30¼	30¾	35¾	15	50¾	6
7	300 lbs. Sulphate Potass, 100 lbs. [4] Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	33⅞	36¾	35¼	40¾	24	64¾	7
[3] 8	1856–61, 6 years, 300 lbs. Sulph. Potass, 200 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, and 3½ cwts. Superphosphate; average produce 36 cwts. 1862 and since, 250 lbs. [5] Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate; average produce (15 years, 1862–76) 24½ cwts.	33⅝	26¼	30⅛	28⅜	16	44⅜	8
9	300 lbs. Sulphate Potass, 100 lbs. [4] Sulphate Soda, 100 lbs. Sulphate Magnesia, 3½ cwts. Superphosphate, and 400 lbs. Ammonia-salts	53⅝	48½	51	52	24½	76½	9
[3] 10	1856–61, 6 yrs. 300 lbs. Sulph. Potass, 200 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphos., 400 lbs. Amm.-salts; av. prod. 55½ cwts. 1862 and since, 250 lbs. [5] Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphos., 400 lbs. Amm.-salts; av. prod. (15 yrs., 1862–76) 43⅜ cwts.	52¾	39⅝	46⅛	43	24¼	67¼	10
11 (1)	300 lbs. Sulph. Potass, 100 lbs. [6] Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosph., 800 lbs. [6] Ammonia-salts	61⅜	53⅝	57⅝	46⅜	50⅜	97⅜	1
11 (2)	300 lbs. Sulph. Potass, 100 lbs. [6] Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosph., 800 lbs. [6] Ammonia-salts, and 400 lbs. Silicate Soda [7]	63¼	61⅜	62½	60	41	101	2 11
12	Unmanured continuously	25	22⅞	24	23½	14¼	37¾	12
13	300 lbs. Sulph. Potass, 100 lbs. [6] Sulph. Soda, 100 lbs. Sulph. Magnesia, 3½ cwts. Superphosph., 400 lbs. Ammonia-salts, 2000 lbs. Cut Wheat-straw	55¼	59⅛	57½	65	30½	95½	13
14	550 lbs. Nitrate of Soda [8], 300 lbs. Sulphate Potass, 100 lbs. [4] Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	53⅛	60½	57	62¾	17⅝	80⅜	14
15	1858–75, 18 years, 550 lbs. Nitrate Soda 1876, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	36⅛	35	35⅜ [10]	29⅓	13⅛	42⅜	15
16	275 lbs. Nitrate of Soda, 300 lbs. Sulphate Potass, 100 lbs. [4] Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	45¼	47⅜	46½ [10]	45	16⅜	61⅜	16
17	275 lbs. Nitrate of Soda	34¼	33½	33⅞ [10]	30	13	43	17
18	Mixture supplying the quantity of Potass, Soda, Lime, Magnesia, Phosphoric acid, Silica, and Nitrogen, contained in 1 ton of Hay (commencing 1865)	21	33¼	32⅛ [11]	34⅜	15⅜	50⅛	18
19	275 lbs. Nitrate of Soda, 290 lbs. Sulphate of Potass, and 3½ cwts. Superphosphate (commencing 1872)	..	..	38⅜ [12]	41¼	20⅛	61⅜	19
20	327 lbs. Nitrate of Potass, and 3½ cwts. Superphosphate (commencing 1872)	..	..	36½ [12]	42⅜	21⅛	63½	20

1 acre = (about)	0·40 Hectare or 1·59 Prussian Morgen.
1 lb. (pound avoir.) = (about)	0·45 Kilogramme or 0·91 Zollverein Pfund.
1 cwt. (hundredweight) = (about)	51·0 Kilogrammes or 1·02 Centner.
1 ton = (about)	1016·0 Kilogrammes or 20·33 Centner.
1 lb. per acre = (about)	1·12 Kilogramme per Hectare or 0·57 Zollv. Pfd. per Pr. Morgen.
1 cwt. per acre = (about)	125·5 Kilogrammes per Hectare or 0·64 Centner per Pr. Morgen.
1 ton per acre = (about)	2510·0 Kilogrammes per Hectare or 12·82 Centner per Pr. Morgen.

(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) 200 lbs. 1856–63 inclusive.
(5) 500 lbs. in 1862 and 1863.
(6) Only 400 lbs. in 1859–60–61.
(7) The application of Silicates did not commence until 1862.
(8) 550 lbs. Nitrate of Soda is reckoned to contain the same amount of Nitrogen as 400 lbs. of "Ammonia-salts."
(9) The manures specified were first applied in 1859 (previously, 1856–7 and 8, Sawdust only).
(10) Averages of 8 years, 10 years, and 18 years, as these experiments did not commence until 1858.
(11) Averages of (1 year), 10 years, and 11 years, as the experiment only commmenced in 1865.
(12) Averages of 4 years only, 1872–75.
(13) In previous years the second crop has either been fed off by sheep, without other food, or mown and left on the ground; but in the twentieth season, 1875, it was so unusually heavy, that it was cut, weighed as hay, and removed.
(14) The second crop of the twentieth season (1875) is not included in these averages, as in all other years the first crop only was weighed and removed.

HOOS FIELD.

EXPERIMENTS ON THE GROWTH OF **BARLEY** YEAR AFTER YEAR ON THE SAME LAND, WITHOUT MANURE, AND WITH DIFFERENT KINDS OF MANURE.

Previous Cropping—1847, Swedish Turnips, with Dung and **Superphosphate of Lime**, the Roots carted off; 1848, Barley; 1849, Clover; 1850, Wheat; 1851, Barley manured with Ammonia-salts.
First Experimental Barley Crop in 1852. Barley every year **since**; and, unless stated to the contrary in the Table, or in the foot-notes, the same Manure has been applied year after year to the same Plot.

(Area under experiment, about 4¼ acres.)

1 acre	= (about)	0·40 Hectare	or 1·59 Prussian Morgen.
1 bushel	= (about)	0·36 Hectolitre	or 0·66 Prussian Scheffel.
1 lb. (pound avoir.)	= (about)	0·45 Kilogramme	or 0·91 Zollverein Pfund.
1 cwt. (hundredweight)	= (about)	51·0 Kilogrammes	or 1·02 Centner.
1 bushel per acre	= (about)	0·9 Hectolitre per Hectare	or 0·42 Pr. Scheffel per Pr. Morgen.
1 lb. per acre	= (about)	1·12 Kilogramme per Hectare	or 0·57 Zollv. Pfd. per Pr. Morgen.
1 cwt. per acre	= (about)	125·5 Kilogrammes per Hectare	or 0·64 Centner per Pr. Morgen.

PLOTS.	Manures, per acre, per annum.	PRODUCE PER ACRE. Average per Annum. Dressed Corn. Quantity. 12 Years, 1852–63.	Dressed Corn. Quantity. 12 Years, 1864–75.	Dressed Corn. Quantity. 24 Years, 1852–75.	Dressed Corn. Weight per Bushel. 12 Years, 1852–63.	Dressed Corn. Weight per Bushel. 12 Years, 1864–75.	Dressed Corn. Weight per Bushel. 24 Years, 1852–75.	Total Straw. 12 Years, 1852–63.	Total Straw. 12 Years, 1864–75.	Total Straw. 24 Years, 1852–75.	Twenty-Fourth Season, 1875. Dressed Corn. Quantity.	Dressed Corn. Weight per Bushel.	Total Straw.	PLOTS.
		Bushels.	Bushels.	Bushels.	lbs.	lbs.	lbs.	Cwts.	Cwts.	Cwts.	Bushels.	lbs.	Cwts.	
1 O.	Unmanured continuously	21⅞	15⅞	18⅝	51½	53¼	52½	12⅞	9⅛	11	12⅓	50⅞	6⅝	1 O.
2 O.	3½ cwts. Superphosphate of Lime (1)	27⅞	20⅝	24¼	52¾	54⅜	53¼	14¾	10⅛	12⅜	14⅜	52⅛	6⅜	2 O.
3 O.	200 lbs. (2) Sulphate Potass, 100 lbs. (3) Sulphate Soda, 100 lbs. Sulphate Magnesia	24⅜	17¾	21⅛	52	54¼	53⅛	13⅓	9¼	11⅜	14⅞	50½	7¼	3 O.
4 O.	200 lbs. (2) Sulphate Potass, 100 lbs. (3) Sulphate Soda, 100 lbs. Sulphate Magnesia, 3½ cwts. Superphosphate	30⅜	21½	25⅞	52½	54½	53½	15⅞	10⅝	13⅜	17½	51¼	8⅜	4 O.
1 A.	200 lbs. Ammonia-salts (4)	34½	29	31⅝	51½	53¼	52¼	19⅞	15⅜	17⅝	27½	51¼	15	1 A.
2 A.	200 lbs. Ammonia-salts, and 3½ cwts. Superphosphate	47⅜	45⅜	46⅜	52¼	54⅝	53½	28¾	24½	26⅜	37	52	17⅜	2 A.
3 A.	200 lbs. Ammonia-salts, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Magnesia	36½	32⅝	34⅜	51½	54¼	52⅞	22⅜	17⅝	20	29⅜	50½	16⅞	3 A.
4 A.	200 lbs. Ammonia-salts, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos.	47⅛	44	45½	52⅜	55⅜	54¼	29⅜	26½	27⅝	36	54⅛	21⅜	4 A.
(5) 1 AA.	275 lbs. Nitrate Soda	39⅞	32¼	36	51	53⅜	52¼	23⅞	18⅜	21⅛	29⅜	51¼	17⅜	1 AA.
(5) 2 AA.	275 lbs. Nitrate Soda, and 3½ cwts. Superphosphate	50⅛	47⅛	48⅝	51¾	55	53⅜	31⅞	27½	29½	38⅝	53¼	21½	2 AA.
(5) 3 AA.	275 lbs. Nitrate Soda, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Magnesia	39¾	32⅜	36⅜	51½	53⅞	52½	25⅞	20	23	27⅜	50⅛	16⅞	3 AA.
(5) 4 AA.	275 lbs. Nitrate Soda, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos.	50⅜	46⅜	48⅜	51¾	55½	53⅜	34⅝	28	31¼	42⅜	53⅜	25⅞	4 AA.
(6) 1 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda (6)	..	37⅜	..	..	54¼	..	..	21⅜	..	36	51⅞	19⅝	1 AAS.
(6) 2 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, and 3½ cwts Superphosphate (1)	..	47½	..	..	55⅜	..	..	27⅜	..	42⅛	52½	20⅞	2 AAS.
(6) 3 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag.	..	42	..	..	54⅜	..	..	24⅛	..	40⅞	52	23⅜	3 AAS.
(6) 4 AAS.	275 lbs. Nitrate Soda, 400 lbs. Silicate Soda, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag. and 3½ cwts. Superphosphate	..	48⅝	..	..	55¼	..	..	30⅜	..	42⅞	53¼	25⅜	4 AAS.
(7) 1 C.	1000 lbs. Rape-cake	47	42	44½	52¼	55⅜	53⅜	29	22⅜	25⅞	38¾	52⅞	20¼	1 C.
(7) 2 C.	1000 lbs. Rape-cake, and 3½ cwts. Superphosphate	48¼	44⅛	46¼	52⅜	55½	54	30½	24¼	27⅜	42⅝	52½	20⅜	2 C.
(7) 3 C.	1000 lbs. Rape-cake, 200 lbs. (3) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Magnesia	44½	41¼	42⅝	52¼	55⅜	53⅞	28½	23½	26	33⅜	53⅛	19⅞	3 C.
(7) 4 C.	1000 lbs. Rape-cake, 200 lbs. (2) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos.	47⅞	45½	46¾	52⅛	55½	53¾	31	25¾	28⅜	44¼	53⅛	22⅝	4 C.
(8) 1 N.	275 lbs. Nitrate of Soda	38¾	35⅜	37 / 41 (11)	51⅝	53⅝	52⅜ / 52⅝ (11)	24⅛	20⅞	22½ / 25⅛ (11)	28½	50½	19⅞	1 N.
(8) 2 N.	275 lbs. (9) Nitrate of Soda	43⅜	39⅛		51¼	54⅜		27¾	23		35⅞	51⅜	19⅜	2 N.
5 O.	200 lbs. (2) Sulphate of Potass, 3½ cwts. Superphosphate (10)	24⅜	18⅝	21⅜ / 43⅜ (11)	52⅛	54⅞ / 55⅜ (11)	53½ / 54 (11)	13⅜	9⅝	11½ / 27⅜ (11)	13⅜	51½	5½	5 O.
5 A.	200 lbs. (2) Sulphate of Potass, 3½ cwts. Superphosphate, and 200 lbs. Ammonia-salts	45½	42⅛		52¼			29	25⅜		40	51⅜	22½	5 A.
M.	100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, and 3½ cwts. Superphosphate	22⅜	18½	19⅞ (12)	52⅜	54⅛	53⅜ (12)	13¼	10⅜	11½ (12)	20	50¾	9⅝	M.
6 1	Unmanured continuously	24⅜	16⅜	20⅜	51⅝	53½	52⅛	13⅜	9⅓	11⅝	12⅝	51⅜	7⅜	1 / 2 6
6 2	Ashes (burnt soil and turf)	24	18	22	51⅞	53¾	52¾	13	9¼	11⅜	12⅞	51	6	
7 1	Farmyard Manure 14 tons, 20 years, 1852–1871; unmanured since	48¼	41⅛	47⅛ (13)	51½	54¾	54⅜ (13)	28¼	22⅞	27⅜ (13)	32⅓	53⅝	19⅜	1 / 2 7
7 2	Farmyard Manure 14 tons, every year; av. produce, 20 years, 1852–71, 48¼ bush.; 4 years, 1872–5, 50¾ bush.	46⅜	50¾	48¾	53½	55½	54⅜	27⅜	20⅜	28¾	45⅔	53¼	29¼	

(1) The "Superphosphate of Lime" is, in all cases, made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid sp. gr. 1·7 (and water).
(2) 300 lbs. per annum for the first six years, 1852–7.
(3) 200 lbs. per annum for the first six years, 1852–7.
(4) The "Ammonia-salts"—in all cases equal parts Sulphate and Muriate of Ammonia of Commerce.
(5) First 6 years, 1852–7, instead of Nitrate of Soda, 400 lbs. Ammonia-salts per annum; next 10 years, 1858–67, 200 lbs. Ammonia-salts per annum; 1868, and since, 275 lbs. Nitrate of Soda per annum. 275 lbs. Nitrate of Soda is reckoned to contain the same amount of Nitrogen as 200 lbs. "Ammonia-salts."
(6) The application of Silicates did not commence until 1864; in 1864-5-6 and 7, 200 lbs. Silicate of Soda and 200 lbs. Silicate of Lime were applied per acre, but in 1868, and since, 400 lbs. Silicate of Soda, and no Silicate of Lime. These plots ("AAS") comprise, respectively, one half of the original "AA" plots, and, excepting the addition of the Silicates, have been, and are, in other respects, manured in the same way as the "AA" plots.
(7) 2000 lbs. Rape-cake per annum for the first six years, and 1000 lbs. only, each year since.
(8) 300 lbs. Sulphate of Potass, and 3½ cwts. Superphosphate of Lime, without Nitrate of Soda, the first year (1852); Nitrate alone each year since.
(9) 550 lbs. Nitrate of Soda for 1853-4-5-6, and 7; and 275 lbs. only, each year since.
(10) Ammonia-salts also the first year, but not since.
(11) Averages of 11 years, 12 years, and 23 years.
(12) Averages of 6 years, 12 years, and 18 years.
(13) Averages of 20 years (with dung), 4 years (unmanured), and 24 years.

... year after year, the land, though more worked, was so wet that it could not be got into favourable condition for sowing, and the plant was very irregular.

BROADBALK FIELD.

EXPERIMENTS ON THE GROWTH OF **WHEAT** YEAR AFTER YEAR ON THE SAME LAND; WITHOUT MANURE, AND WITH DIFFERENT KINDS OF MANURE.

Previous Cropping—1839, Turnips, with Farmyard Manure; 1840, Barley; 1841, Peas; 1842, Wheat; 1843, Oats; the last four Crops Unmanured.

First Experimental Wheat Crop in 1844. Wheat every year since; and, with some exceptions, nearly the same description of Manure on the same Plots each year—especially during the last 24 years (1852 and since). Unless otherwise stated, the Manures are sown in the Autumn before the seed.

(Area under experiment, about 13 acres.)

1 acre .. .. .. = (about)	0·40 Hectare .. .. or 1·59 Prussian Morgen.
1 bushel .. .. = (about)	0·36 Hectolitre .. .. .. or 0·66 Prussian Scheffel.
1 lb. (pound avoir.) = (about)	0·45 Kilogramme .. .. .. or 0·91 Zollverein Pfund.
1 cwt. (hundredweight) = (about)	51·0 Kilogrammes .. .. .. or 1·02 Centner.
1 bushel per acre .. = (about)	0·9 Hectolitre per Hectare .. or 0·42 Pr. Scheffel per Pr. Morgen.
1 lb. per acre .. = (about)	1·12 Kilogramme per Hectare or 0·57 Zollv. Pfd. per Pr. Morgen.
1 cwt. per acre .. = (about)	125·5 Kilogrammes per Hectare or 0·64 Centner per Pr. Morgen.

PLOTS.	Manures, per acre, per annum.	PRODUCE PER ACRE. Average per Annum. Dressed Corn. Quantity. 12 Years, 1852–63.	12 Years, 1864–75.	24 Years, 1852–75.	Weight per Bushel. 12 Years, 1852–63.	12 Years, 1864–75.	24 Years, 1852–75.	Total Straw. 12 Years, 1852–63.	12 Years, 1864–75.	24 Years, 1852–75.	Thirty-Second Season, 1875. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	PLOTS.
		Bushels.	Bushels.	Bushels.	lbs.	lbs.	lbs.	Cwts.	Cwts.	Cwts.	Bushels.	lbs.	Cwts.	
0	Superphosphate of Lime (three times as much as on No. 5 and succeeding Plots)	18½	16¼	17¼	57½	59¼	58½	16½	13	14¾	10⅜	59⅜	10¼	0
1	Sulphates of Potass, Soda, and Magnesia (twice as much as on No. 5 and succeeding Plots)	16⅜	12¼	14⅜	57¼	59⅛	58¼	15¾	10⅜	13	8⅛	58½	7¾	1
2	Farmyard Manure (14 tons every year)	35⅜	35	35¼	59¼	60⅝	60	34⅝	32⅝	33⅝	28⅞	60½	33¼	2
3	Unmanured continuously	15½	12⅜	14	56½	59	57¾	14⅞	9¾	12⅜	8⅝	60	9	3
4	Unmanured for Crop of 1852, and since; previously Superphos. (made with Muriatic Acid), and Sulph. Ammonia	17	13	15	57¼	59½	58¼	15½	10½	13	7⅝	59⅝	8⅛	4
5 (*a* and *b*)	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Magnesia, 3½ cwts. Superphosphate of Lime (3) ..	18½	13¾	16⅛	57⅞	59¾	58⅞	16⅞	11⅛	14⅛	9¼	59⅜	10	5 (*a* and *b*)
6 (*a* and *b*)	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Mag., 3½ cwts. Superphos., 200 lbs. Amm.-salts (4) ..	28⅜	22⅜	25⅜	58⅝	60⅛	59½	26⅞	20¼	23½	16⅜	60⅜	17⅞	6 (*a* and *b*)
7 (*a* and *b*)	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Mag., 3½ cwts. Superphos., 400 lbs. Amm.-salts ..	36⅜	32⅛	34¼	58½	60¼	59¾	37½	31⅝	34⅝	25⅞	59½	30⅛	7 (*a* and *b*)
8 (*a* and *b*)	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Mag., 3½ cwts. Superphos., 600 lbs. Amm.-salts ..	38	37	37⅛	57¾	60¼	59	42⅛	40¼	41¼	29⅞	58⅛	38⅝	8 (*a* and *b*)
9 {*a*	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Mag., 3½ cwts. Superphos., 550 lbs. Nitrate Soda (5)	34½	30⅛	36⅞	57	59⅞	58½	39⅜	44⅝	42⅛	30½	57⅝	42⅜	9 {*a*
9 *b*}	550 lbs. Nitrate of Soda (5). (The Nitrate for both 9*a* and 9*b* always sown in the Spring.)	25⅞	24½	25¼	55¼	57⅝	56½	28½	26⅛	27¼	16½	55⅝	21⅛	9 *b*}
10 {*a*	400 lbs. Ammonia-salts alone, for 1845, and each year since; Mineral Manure in 1844	22⅝	21⅛	21⅞	55⅞	58	56⅞	23¼	18⅛	20⅞	12⅜	54⅛	14	10 {*a*
10 *b*}	400 lbs. Ammonia-salts alone, for 1845, and each year since (except 1846 and 1850); Mineral Manure 1844, '48, '50 ..	27	23	25	57	58⅜	57⅜	27⅜	20⅛	23¾	14⅝	55⅞	15⅞	10 *b*}
11 (*a* and *b*)	400 lbs. Ammonia-salts, 3½ cwts. Superphosphate	29⅜	25⅜	27½	56½	58⅛	57⅜	28⅞	22⅞	25⅞	17⅜	55	20½	11 (*a* and *b*)
12 (*a* and *b*)	400 lbs. Ammonia-salts, 3½ cwts. Superphosphate, and 366½ lbs. (6) Sulphate of Soda	35⅛	31⅛	33⅛	58¾	59⅜	59⅛	35¼	28	31⅝	25¼	57⅝	27⅛	12 (*a* and *b*)
13 (*a* and *b*)	400 lbs. Ammonia-salts, 3½ cwts. Superphosphate, and 200 lbs. (6) Sulphate of Potass	34⅝	32⅛	33⅜	58½	60¾	59⅝	35⅝	30⅜	33⅛	27⅛	60¼	29⅛	13 (*a* and *b*)
14 (*a* and *b*)	400 lbs. Ammonia-salts, 3½ cwts. Superphosphate, and 280 lbs. (6) Sulphate of Magnesia	35	31¼	32⅛	58⅜	60⅛	59¼	35¾	28⅜	32	26¼	58½	27⅝	14 (*a* and *b*)
15 {*a*	200 lbs. (1) Sulph. Pot., 100 lbs. (2) Sulph. Sod., 100 lbs. Sulph. Mag., 3½ cwts. Superphos. (7); 400 lbs. Amm.-salts, in Spring (8)	33¼	31¼	32¼	58⅜	60¾	59⅜	33⅞	29⅛	31⅜	23⅝	59⅞	26	15 {*a*
15 *b*}	200 lbs. (1) Sulph. Pot., 100 lbs. (2) Sulph. Sod., 100 lbs. Sulph. Mag., 3½ cwts. Superphos. (7); 400 lbs. Amm.-salts, in Spring (9)	34⅜	32⅛	33¼	58⅜	60⅞	59¾	35⅞	30¾	33⅜	27½	60¼	31⅛	15 *b*}
16 (*a* and *b*)	1852–64, 13 years, 200 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos., and 800 lbs. Ammonia-salts; average produce 39½ bush. Corn, 46⅜ cwts. Straw .. .. 1865 and since, unmanured; average produce (9 years, 1865–73) 17 bushels Corn, 1⅞ cwts. Straw	38½	19½	29	57½	60¼	59	46	17⅞	31⅞	10⅛	59⅜	10⅝	16 (*a* and *b*)
(10) 17 (*a* and *b*)	400 lbs. Ammonia-salts	32⅜	28⅞	30¾(12)	58⅜	60⅞	59½(12)	33⅞	27⅜	30¾(12)	11⅜	59¼	12 (14)	17 (*a* and *b*)
18 (*a* and *b*)	200 lbs. (1) Sulphate Potass, 100 lbs. (2) Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	18⅞	14⅞	16⅞(13)	58	59⅜	58⅞(13)	17⅞	12⅞	15⅜(13)	25⅜	59	26⅞(15)	18 (*a* and *b*)
19	3½ cwts. Superphosphate of Lime (11), 300 lbs. Sulphate of Ammonia, and 500 lbs. Rape-cake	31⅜	28⅜	30⅛	58⅛	58⅞	58½	31½	25⅛	28¼	22⅞	56½	22¼	19
20	Unmanured continuously	15⅝	12	13⅞(16)	57	58½	57¾(16)	15⅜	11⅛	13¼(16)	8⅛	57	9⅛	20
21	200 lbs. (1) Sulph. Potass, 100 lbs. (2) Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos., 100 lbs. Muriate Amm. ..	22¼	19⅜	20¾	57⅞	59⅝	58¾	20⅞	16⅜	18⅝	13	59¾	12¼	21
22	200 lbs. (1) Sulph. Potass, 100 lbs. (3) Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphos., 100 lbs. Sulphate Amm. ..	21¾	19⅜	20½	57¾	59⅝	58¾	20⅝	16	18⅜	13¾	60¼	13¼	22

(1) 300 lbs. per annum for Crop of 1858, and previously.
(2) 200 lbs. per annum for Crop of 1858, and previously.
(3) "Superphosphate of Lime"—in all cases, excepting for Plot 19, made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid sp. gr. 1·7 (and water).
(4) The "Ammonia-salts," in all cases, equal parts Sulphate and Muriate of Ammonia of Commerce.
(5) 9*a* 475 lbs. Nitrate Soda in 1852, 275 lbs. in 1853 and 1854, 550 lbs. each year since; 9*b* 475 lbs. in 1852, 550 lbs. each year since; 550 lbs. is reckoned to contain the same amount of Nitrogen as 400 lbs. "Ammonia-salts."
(6) For 1858, and previously—1½ time as much.
(7) For 1872 and previously, made with Muriatic instead of Sulphuric Acid.
(8) For 1872 and previously, 400 lbs. Sulphate Ammonia, sown in the Autumn.
(9) For 1872 and previously, 300 lbs. Sulphate Ammonia and 500 lbs. Rape-cake, sown in the Autumn.
(10) The Manures of Plots 17 and 18 are, year by year, transposed.
(11) Made with Muriatic instead of Sulphuric Acid.
(12) Averages of Ammonia-salts, alternated with Mineral Manures.
(13) Averages of Mineral Manures, alternated with Ammonia-salts.
(14) Plots 17 had the Mineral Manures for the Crop of 1875.
(15) Plots 18 had the Ammonia-salts for the Crop of 1875.
(16) Averages of 12 years, 11 years, and 23 years only; as, in 1868, owing to a mistake in carting, the produce could not be ascertained.

The Plots marked "(*a* and *b*)" are divided into duplicate portions, "*a*" and "*b*," respectively, which are manured alike; excepting that, for the crops of 1864-5-6 and 7, the "*a*" portions of plots 5, 6, 7, 8, 9, 16, and 17 (or 18), received a mixture of soluble Silicates in addition to the other Manures, but, hitherto, without any material effect; and for the crops of 1868, and since, cut straw (that produced in the previous season) has been applied (instead of Silicates) on the "*a*" portions of plots 5, 6, 7, 8, 11, 12, 13, 14, and 17 (or 18); also for the crop of 1874, and since, the straw of the previous season has been cut up and applied to the "*a*" portion of plot 15.

GEESCROFT FIELD.

EXPERIMENTS ON THE GROWTH OF **OATS** YEAR AFTER YEAR ON THE SAME LAND; WITHOUT MANURE, AND WITH DIFFERENT KINDS OF MANURE.

Previous Cropping—1847 and 1848, Clover, Experimental Manures; 1849—1859, Beans, Experimental Manures; 1860, Fallow; 1861 and 1862, Wheat, Unmanured; 1863, Fallow; 1864, Beans, Dunged; 1865, Wheat, Unmanured; 1866, Beans, Unmanured; 1867 and 1868, Wheat, Unmanured.

First Experimental Oat Crop in 1869.

(Area under Experiment, ¾ acre.)

PLOTS.	MANURES, PER ACRE, PER ANNUM.	PRODUCE PER ACRE. 1ST SEASON, 1869. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	2ND SEASON, 1870. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	3RD SEASON, 1871. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	4TH SEASON, 1872. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	5TH SEASON, 1873. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.	AVERAGE PER ANNUM 5 YEARS, 1869–1873. Dressed Corn. Quantity.	Weight per Bushel.	Total Straw.
		Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.
1	Unmanured	36⅜	36¾	19¼	16⅜	35	9⅛	20½	33½	11¼	15	36¼	7⅛	10¾	27⅛	5⅜	19⅞	33¾	10⅜
2	200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate of Lime (1)	45	38½	24½	19⅛	35⅛	9⅝	22	35¼	13½	19½	37¾	10⅜	17	28⅜	8⅜	24½	35	13⅜
3	400 lbs. Ammonia-salts (2)	56⅛	37½	36⅞	30	34⅞	17¼	57⅛	36⅜	40⅝	55¾	37½	30⅝	36½	32⅝	16¾	47	35⅞	28½
4	400 lbs. Ammonia-salts, 200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	75¼	39¼	54	50⅝	36	28⅜	58⅜	35⅜	50	62⅜	39½	45⅛	48¼	34¾	27⅜	59	37	41⅛
5	550 lbs. Nitrate of Soda (3)	62¼	38½	42¾	36½	35¼	23	55	36⅜	34¾	42⅛	36⅝	20⅝	39¾	30¼	16½	47⅛	35½	27½
6	550 lbs. Nitrate of Soda, 200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	69⅜	38½	49⅞	50	35¾	28¾	60¼	33¾	48⅜	44⅝	37¼	24	63⅝	33⅜	24	57½	35¾	35

SECOND 5 YEARS; MINERAL MANURES AS BEFORE, AMMONIA-SALTS AND NITRATE OF SODA ONLY HALF AS MUCH AS PREVIOUSLY.

		6TH SEASON, 1874.			7TH SEASON, 1875.			8TH SEASON, 1876.			9TH SEASON, 1877.			10TH SEASON, 1878.			AVERAGE PER ANNUM 5 YEARS, 1874–1878.		
		Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.	Bushels.	lbs.	cwts.
1	Unmanured	12	31⅓	7	12½	29⅜	5⅞												
2	200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate of Lime (1)	13⅝	31¼	6½	13⅛	29¾	6⅞												
3	200 lbs. Ammonia-salts (2)	37¼	33¼	22⅞	30⅜	32⅞	15⅜												
4	200 lbs. Ammonia-salts, 200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	46¾	34⅝	24⅜	30⅝	34⅞	20¼												
5	275 lbs. Nitrate of Soda (3)	35⅛ (4)	30 (4)	16½ (4)	23½ (4)	31¼ (4)	11⅜ (4)												
6	275 lbs. Nitrate of Soda, 200 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia, and 3½ cwts. Superphosphate	28½ (4)	33½ (4)	16⅜ (4)	28⅜ (4)	33⅜ (4)	14½ (4)												

(1) "Superphosphate of Lime"—in all cases, made from 200 lbs. Bone-ash, 150 lbs. Sulphuric Acid sp. gr. 1·7 (and water).

(2) "Ammonia-salts"—in each case, equal parts Sulphate and Muriate of Ammonia of Commerce.

(3) 550 lbs. Nitrate of Soda is reckoned to contain the same amount of Nitrogen as 400 lbs. "Ammonia-salts."

(4) On these plots, where large quantities of Nitrate of Soda had been applied year after year, the land, though more worked, was so wet that it could not be got into favourable condition for sowing, and the plant was very irregular.

EXPERIMENTS ON THE GROWTH OF LEGUMINOUS CROPS.

I.—Beans, Peas, and Tares—Geescroft Field.

Experiments on the growth of Leguminous corn-crops (beans, peas, and tares), with different descriptions of manure, were commenced in 1847, about nine acres being devoted to the purpose.

Experiments with Beans were continued for thirteen consecutive seasons, to 1859 inclusive; but, during the later years, the crop fell off very much, and the land became very foul.

In 1860 the land was fallowed.

In 1861 a crop of wheat, without manure, was taken.

In 1862 beans were again sown, but with some variation in the manuring.

In 1863 the land was fallowed.

In 1864, 5, 6, 7, 8, and 9, beans were grown, with much the same manures on the same plots, each year, as in 1862.

In the winter of 1869-70, 5000 lbs. of fresh burnt lime were applied per acre, over all the plots.

In 1870 beans were grown with the same manures on the respective plots as in 1864-69.

In October 1870 winter beans were sown (without manure), but the plants were to so great an extent destroyed by the severe weather which followed, that, in April 1871, the crop was ploughed up, and the land left fallow.

During the winter and early spring of 1871-2, the land was so wet that it could not be prepared in time for sowing. It was therefore left fallow for 1872, at the end of May subsoiled to a depth of about 12 inches, and re-ploughed in July. The winter and early spring of 1872-3 were also so extremely wet, that it was again impossible to prepare the land in time for sowing; it was, however, ploughed up towards the end of March, again left fallow, and re-ploughed in July and October (1873). On February 2, 1874, the land was again set with Beans, but without manure. In 1875 Beans were re-sown, with the same manures on the respective plots as in 1864-1870; but owing to the wetness of the land in the first instance, and the subsequent hindrance by other spring sowing, they were not put in until April 1 and 2. The wetness of the winter 1875-6, again prevented the preparation of the land in due time; and, though the manures were sown, and the land ploughed, it now (May 1876) remains fallow.

The general result of the experiments with Beans has been, that mineral constituents used as manure (more particularly potass), increased the produce very much during the early years; and, to a certain extent, afterwards, whenever the season was favourable for the crop. Ammonia-salts, on the other hand, produced very little effect; notwithstanding that a Leguminous crop contains two, three, or more times as much nitrogen as a Graminaceous one grown under similar conditions as to soil, &c. Nitrate of soda has, however, produced marked effects. But Leguminous crops grown too frequently on the same land seem to be peculiarly subject to disease, which no conditions of manuring that we have hitherto tried seem to obviate.

Experiments with Peas were soon abandoned, owing to the difficulty of keeping the land free from weeds, and an alternation of Beans and Wheat was substituted; the beans being manured much as in the experiments with the same crop grown continuously as above described. But the wetness of the winter of 1871-72 prevented the sowing of the Beans for the season of 1872; and again the wetness of the autumn and winter of 1872-3 prevented the sowing of the wheat until April 4, 1873, when Nursery wheat was put in, which, however, did not come to maturity, but was cut in the middle of September, yielding about 27 cwts. of gross produce per acre, containing too little corn to be worth thrashing. The land was ploughed in October 1873, and sown with beans February 3, 1874. On October 23, 1874, wheat was sown without manure. Beans should have been sown this year (1876), indeed the manures were sown, but for the reason stated above the land at present remains fallow.

In alternating Wheat with Beans, the remarkable result had been obtained, that nearly as much wheat, and nearly as much nitrogen, were yielded in eight crops of wheat in alternation with the highly nitrogenous beans, as in sixteen crops of wheat grown consecutively without manure in another field, and also nearly as much as were obtained in a third field in eight crops alternated with bare fallow.

Experiments with Tares, like those with Peas, were soon abandoned, and for the same reasons. Beans were at first substituted, with some variation in the description of the manures employed; but this experiment has likewise been abandoned for some years.

II.—Red Clover (*Trifolium pratense*)—Hoos Field.

Experiments on the growth of Clover, with many different descriptions of manure, were commenced in 1849, and, with the occasional interposition of a corn-crop, or fallow, have been continued up to the present time.

As with other *Leguminous* crops, the result was, that mineral constituents applied as manure (particularly potass) considerably increased the early crops; whereas ammonia-salts had little or no beneficial effect, and were sometimes injurious. It may be added that, even up to the present time, the beneficial effects of long previous applications of potass are apparent whenever there is any growth at all. To go a little more into detail:—

In the first year, 1849, the crops were throughout very heavy; especially with mineral, and without nitrogenous manure.

In autumn 1849 wheat was sown, and in spring 1850 Red Clover. In 1851 small cuttings were taken; and in 1852, though the crops were not heavy, there was by no means a failure. Since that time, however, all attempts to grow clover year after year on the same land have failed to give anything like a full crop, or a plant which would stand the usual time on the ground. Small cuttings were obtained in the autumns of 1855 and 1859 from seed sown in the spring of those years, and small but rather heavier cuttings in June and August 1865, from seed sown in 1864.

On two occasions (1851 and 1854) heavy dressings of Farmyard dung were applied to some of the plots; and in 1854 some received a dressing of 20 tons of dung, and 5000 lbs. of lime, per acre.

On some portions of the land Clover-seed was sown 10 times during the 23 years, 1848–1870 inclusive, and more frequently alone than with a corn-crop; but in 7 out of the last 8 trials the plant died off in the winter and spring succeeding the sowing the seed.

In view of these failures in the field, it is a fact of much interest, that in 1854 Red Clover was sown in a garden, only a few hundred yards distant from the experimental field, on soil which has been under ordinary garden cultivation for probably two or three centuries, and it has every year since shown very luxuriant growth. Seed was re-sown in 1860, 1865, 1868, and 1871. A small cutting was taken in the autumn of 1871, two cuttings in 1872, and two in 1873. Notwithstanding some injury from dodder in 1873, there still remained too much plant to break up; and, accordingly, fresh seed was sown between the rows on May 4, and this failing, again on July 7, 1874. Small cuttings were taken June 11, July 22, and September 30, 1874. A small cutting was again taken on June 22, 1875. On July 13 the old plants were dug in, and seed again sown, and this failing, seed was re-sown September 22; and now (May 1876) there is luxuriant growth, but an uneven and deficient plant. This (1876) is, therefore, the 23rd season of the growth of Clover, year after year, on this plot of garden ground.

In reference to the field experiments, it may be added that, in 1864, a portion of the land was trenched 2 feet deep, and one-third of the manure was mixed with the layer from 24 to 16 inches, one-third from 16 to 8 inches, and the remainder from 8 inches upwards. Owing to the characters of the season, the mechanical condition of the land was at first very unfavourable after this treatment; but, although many years have now elapsed, and the excess of constituents supplied was in some cases considerable, the plant has died off as completely on these plots as elsewhere.

Again, in the winter of 1867-8 small portions of the experimental land were dug, some to the depth of 9 inches, some to the depth of 18, some to the depth of 27, and some to the depth of 36 inches, and sown to the respective depths with different mixtures; supplying in some cases very large amounts of potass, soda, lime, magnesia, phosphoric acid, sulphuric acid, nitrate of soda, &c. From other similar sized plots, the soil was removed to the depths of 9, 18, and 27 inches respectively, and replaced by soil taken at the same depths from the garden border, on a portion of which clover had been grown successfully since 1854, as above referred to. In April 1868 clover was sown over the whole of these small plots, and on some other portions of the land not so treated; but the plant for the most part died off during the following winter.

In April 1869 the same portions were re-sown, small quantities of clover were cut in September of that year, but the plant again died off in the winter.

In April 1870 Clover was sown over the whole of the experimental land, this time in conjunction with Barley; but on those

https://doi.org/10.23637/ERADOC-1-240

portions which had also been sown in 1868 and 1869 the plant again died off during the winter and early spring; whilst from those which had not been sown in 1868 and 1869 two small cuttings were taken in 1871. In the spring of 1872, the plant being then almost entirely gone, the land was ploughed up. It was again ploughed in July 1872, and in March 1873; the intention being to sow some other Leguminous crop; but owing to the wetness and lateness of the season this was not done; the land was again left fallow, and re-ploughed in the beginning of June and the end of July (1873). On May 4, 1874, the land was again ploughed, and sown with Red Clover seed, May 5, without manure. The plant came up well, and was very forward in September, when the flowering stems were cut down, but left on the land. During the winter and early spring the plant on those portions from which cuttings had been taken in 1871 almost entirely failed, and the land was ploughed up in May, and again in August (1873); whilst on those from which none had been taken since 1869 a fair plant remained, and two small cuttings were obtained, namely on June 23, and on August 9 and 12 (1875). On September 22, this portion of the land was ploughed up. In May (1876) the whole was re-ploughed, and at present remains fallow.

In the spring of 1871 the *small* plots in the field were again re-sown, and those of the garden-soil were entirely enclosed, both around and above, by galvanised wire netting. Small cuttings were taken from these small beds in July 1872, and (excepting from the garden-soil plots, which had yielded considerably more than the others in 1872) larger cuttings were taken in July 1873. The produce was the largest where potass and nitrate of soda were employed, and where they were applied in the largest quantity, and at the greatest depths. In April 1874 there was still some healthy plant on all the plots, but it was considered to be too irregular to preserve. It was, therefore, dug in. The artificially-manured plots were remanured as before, but only to the depth of 9 inches, and seed was sown on May 4th, July 6th, and October 22nd; each time the plant coming up well, but subsequently dying off. On the Garden soil plots, the plant from the first sowing (May 4), for the most part stood; requiring only to be made good here and there on July 6; and in September small cuttings were taken. In May, 1875, the plant was entirely gone on the artificially-manured plots, which were then dug up, and prepared for resowing. On the garden soil plots, though the rows were imperfect, some healthy plants still remained, and gave a small cutting on June 22. On July 24 these plots were dug up; and they, as well as the artificially manured ones just referred to, were re-sown with seed. All came up well, but at this time (May 1876), the plants on the garden soil plots are entirely gone, and those on the artificially manured ones nearly so, and all will shortly be dug up. More small plots were arranged in the spring of 1874; on which the manures were dug in, at the various depths, on May 11th to 14th, and the seed sown on May 16th. One series received sulphate of potass only, another nitrate of soda only, and a third the two together. The plants came up fairly well, but there were some blanks in the rows, which were re-sown on October 22 (1874). A cutting was taken on June 22 and 23 (1875); the blanks in the rows were re-sown on July 24; a second cutting taken on August 17; and the blanks again re-sown on September 22 (1875). The plant was the most even on the plots with sulphate of potass, less so on those with nitrate of soda, and less still on those with both together. The amount of produce was also greater with each of the manures used separately, than with the mixture of the two. The plants on these new artificially manured plots, like those on the older ones, are at the present date (May 1876), nearly gone, and these plots also will shortly be dug up, and re-sown.

The general result of the experiments in the field has been—that neither organic matter rich in carbon as well as other constituents, nor ammonia-salts, nor nitrate of soda, nor mineral constituents, nor a complex mixture, supplied as manure, availed to restore the clover-yielding capabilities of the land; though, where some of these were applied in large quantity, and at considerable depths, the result was better than when they were used in only moderate quantities and applied only on the surface.

On the other hand, it is clear that the garden-soil has supplied the conditions under which clover can be grown year after year on the same land for many years in succession.

The results obtained on the garden-soil seem to show that what is called "clover-sickness," cannot be due to the injurious influence of excreted matters upon the immediately succeeding crop.

That Clover frequently fails coincidently with injury from parasitic plants, or insects, cannot be disputed; but it may be doubted whether such injury should be reckoned as the cause, or merely the concomitant and an aggravation, of the failing condition.

The results of the experiments seem, therefore, to exclude the supposition that the primary cause of failure is either destruction by parasitic plants or insects, injury from excreted matters, or the shade of a corn-crop, and to indicate that it must be looked for in exhaustion of the soil. Still there remain several open questions. Is it exhaustion of certain organic matters rich in carbon, of nitrogenous food, or of mineral constituents? Again: is there an absolute deficiency in the soil of some of the substances in question, or only an unfavourable condition of combination, or, so to speak, of *soil-digestion* of them, for the requirements of Leguminous plants? Or, is there only an unfavourable distribution of them within the soil, considered in relation to the extent and character of the root-range of the crop?

These various suggestions cannot be further considered within the limits of this brief notice, which may be concluded by the following quotation from Rothamsted papers on the subject ('Journal Royal Agricultural Society of England,' vol. xxi. Part I. p. 178; and 'Journal Royal Horticultural Society of London,' vol. iii. p. 86, 1872).

"When land is not what is called 'clover-sick,' the crop of clover may frequently be increased by top-dressings of manure containing potass and superphosphate of lime; but the high price of salts of potass, and the uncertainty of the action of manures upon the crop, render the application of artificial manures for clover a practice of doubtful economy.

"When the land is what is called 'clover-sick,' none of the ordinary manures, whether 'artificial' or natural, can be relied upon to secure a crop.

"So far as our present knowledge goes, the only means of insuring a good crop of Red Clover is to allow some years to elapse before repeating the crop upon the same land."

BARN FIELD.

EXPERIMENTS ON THE GROWTH OF ROOT-CROPS.

Experiments with Turnips were commenced in 1843. Eight acres, divided into numerous plots, were set apart for the purpose; and the crop was grown for ten consecutive years on the same land ("Norfolk Whites" 1843-1848, and "Swedes" 1849-1852); on some plots without manure, and on others with different descriptions of manure. Barley was then grown for three consecutive seasons (1853-1855) without manure, in order to test the comparative corn-growing condition of the different plots, and also to equalize their condition, as far as possible, by the exhaustion of some of the most active and immediately available constituents supplied by the previous manuring. A new series of experiments with Swedes was then arranged, having regard to the character of the manures previously applied on the different plots, and to the results previously obtained. This second series was commenced in 1856, and continued for 15 years—namely, to 1870 inclusive.

It is impossible adequately to state the bearing of the results in a few words, but the following are some of the most characteristic indications:—

1. Without manure of any kind, the produce of roots was reduced in a few years to a few cwts. per acre; but the diminutive plants (both root and leaf) contained a very unusually high percentage of nitrogen.

2. Of "mineral" constituents, phosphoric acid (in the form of superphosphate of lime) was by far the most effective manure; but, when this manure is used alone, the immediately available nitrogen of the soil is rapidly exhausted.

3. Really large crops of turnips can only be obtained when the soil supplies a liberal amount of nitrogenous (and carbonaceous?) matter, as well as mineral constituents; and when they are already available within the soil, or are supplied in the form of farmyard manure, rape-cake, Peruvian guano, ammonia-salts, &c., the rapidity of growth, and the amount of the crop, are greatly increased by the use of superphosphate of lime applied near to the seed.

During the last 5 years, 1871–75, the land has been devoted to experiments with sugar-beet; for particulars of which see pp. 8 and 9: and this year, 1876, experiments with mangold-wurzel are substituted.

https://doi.org/10.23637/ERADOC-1-240

Experiments on SUGAR BEET (Vilmorin's Green-top White Silesian)—BARN FIELD.

Grown year after year on the same Land, without Manure, and with different descriptions of Manure, commencing 1871.

Previous Cropping:—1843–'48 (6 Seasons), experiments on Norfolk White Turnips, with different descriptions of Manure.
1849–'52 (4 Seasons), experiments on Swede Turnips, with different descriptions of Manure.
1853–'55 (3 Seasons), Barley without Manure (with a view as far as possible to equalise the condition of the Plots).
1856–'70 (15 Seasons), experiments on Swede Turnips, with different descriptions of Manure, in which the arrangement of the Plots was the same, and that of the Manures very similar—in fact, exactly the same during the last 10 years—as in the first year of Sugar Beet, excepting that, during those 10 years, the Alkalies were omitted for the Swedes. For the second and subsequent years of Sugar Beet slight alterations in the Mineral Manures were made, and in the fourth and fifth years the Farmyard Manure, Nitrate of Soda, Ammonia-salts, and Rape-cake were omitted, as will be seen below. Seed dibbled on the flat; in rows 22 inches apart, and 11 inches apart in the rows; plants moulded up afterwards.

Area under experiment about 8 acres. The experiments are arranged as under, in 5 Series, each of which comprises 8 Plots.

Plots.	Manures, per Acre, per Annum. Series 1.	Series 2. Each Plot as Series 1, and Cross-dressed with 550 lbs. Nitrate Soda.	Series 3. Each Plot as Series 1, and Cross-dressed with 400 lbs. "Ammonia-salts."	Series 4. Each Plot as Series 1, and Cross-dressed with 2000 lbs. Rape-cake, and 400 lbs. "Ammonia-salts."	Series 5. Each Plot as Series 1, and Cross-dressed with 2000 lbs. Rape-cake.

First Season, 1871.

	Produce per Acre (Roots trimmed as for feeding, not as for Sugar-making).									
	Roots.	Leaves.	Roots.	Leaves.	Roots.	Leaves.	Roots.	Leaves.	Roots.	Leaves.
	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1 Farmyard Manure (14 tons)	18 3	3 5	27 13	6 19	22 1	5 6	26 4	6 14	28 18	5 14
2 Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1)	14 13	2 14	25 16	5 15	21 15	4 6	25 2	6 7	25 4	5 5
3 Without Manure (1846, and since)	7 11	2 0	22 3	5 12	15 6	4 16	19 18	7 0	20 16	4 12
4 3½ cwts. Superphosphate, 300 lbs. Sulph. Pot., 200 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia	7 11	1 5	22 15	4 8	17 10	3 5	22 15	6 3	21 7	3 19
5 3½ cwts Superphosphate	5 12	1 8	20 19	3 14	15 4	3 19	19 18	7 12	18 19	4 5
6 3½ cwts. Superphos., 300 lbs. Sulph. Potass	5 1	1 4	21 5	3 13	17 4	3 4	23 11	6 11	21 0	3 11
7 3½ cwts. Superphos., 300 lbs. Sulph. Pot., 36½ lbs. Amm.-salts (2)	5 18	1 5	20 19	3 18	18 8	4 3	21 0	5 0	21 7	3 17
8 Unmanured, 1853, and since; previously part Unman., part Superphos.	7 10	1 14	21 13	3 16	16 2	4 15	17 19	7 11	20 7	4 9

Second Season, 1872.

	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1 Farmyard Manure (14 tons)	15 13	4 2	23 9	7 19	22 14	9 0	26 8	9 11	22 5	6 1
2 Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1)	16 0	3 18	24 6	8 16	22 0	7 16	25 9	9 14	20 15	5 11
3 Without Manure (1846, and since)	7 17	1 13	21 7	6 6	15 3	4 13	20 8	10 1	16 3	3 11
4 3½ cwts. Superphosphate, 500 lbs. Sulph. Pot., 200 lbs. Chloride Sodium (common salt), 200 lbs. Sulph. Magnesia	6 14	1 10	20 2	5 19	15 10	3 7	23 8	7 13	17 18	3 15
5 3½ cwts. Superphosphate	6 17	1 8	19 6	6 4	14 5	4 13	18 11	10 4	15 18	3 16
6 3½ cwts. Superphos., 500 lbs. Sulph. Potass	6 6	1 5	16 16	5 14	14 7	3 19	22 16	9 9	15 17	3 14
7 3½ cwts. Superphos., 500 lbs. Sulph. Pot., 36½ lbs. Amm.-salts (2)	6 15	1 8	17 0	6 1	15 9	3 19	23 9	9 10	15 10	3 15
8 Unmanured, 1853, and since; previously part Unman., part Superphos.	5 4	1 5	15 6	5 19	13 10	4 1	19 12	9 17	15 0	4 6

Third Season, 1873.

	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1 Farmyard Manure (14 tons)	15 2	5 12	20 5	10 9	22 2	9 18	22 15	12 10	23 10	7 8
2 Farmyard Manure (14 tons) and 3½ cwts. Superphosphate (1)	14 6	5 2	21 10	11 0	19 4	8 9	23 7	13 6	21 18	6 18
3 Without Manure (1846, and since)	5 1	1 11	14 5	6 11	9 3	3 16	15 12	9 11	14 13	4 1
4 3½ cwts. Superphosphate, 500 lbs. Sulph. Pot., 200 lbs. Chloride Sodium (common salt), 200 lbs. Sulph. Magnesia	5 2	1 13	16 9	6 11	12 10	3 10	20 3	8 0	16 1	3 8
5 3½ cwts. Superphosphate	5 5	1 11	18 8	5 13	10 19	5 0	14 15	9 8	13 19	4 9
6 3½ cwts. Superphos., 500 lbs. Sulph. Potass	4 12	1 5	15 17	4 4	12 18	3 12	20 2	9 5	14 14	3 11
7 3½ cwts. Superphos., 500 lbs. Sulph. Pot., 36½ lbs. Amm.-salts (2)	5 19	1 12	16 14	5 3	13 0	4 15	19 16	9 0	15 17	4 4
8 Unmanured, 1853, and since; previously part Unman., part Superphos.	4 11	1 7	12 9	5 18	8 8	2 19	15 2	9 8	12 2	3 16

Fourth Season, 1874 (3). Mineral Manures as in 1872 and 1873; but no Farmyard Manure, or cross-dressings of Nitrate Soda, Ammonia-salts, or Rape-cake.

	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1 Without Manure, 1874 and 1875 (Farmyard Manure in '71, '72, '73)	10 16	5 6	11 14	8 9	11 7	8 3	13 7	9 17	14 10	7 8
2 3½ cwts. Superphosphate (with Farmyard Manure, '71, '72, '73)	13 3	5 9	7 9	4 16	9 5	5 17	12 5	7 7	13 1	6 4
3 Without Manure (1846, and since)	5 2	1 5	3 2	2 6	3 7	2 2	2 11	2 10	3 19	2 9
4 3½ cwts. Superphosphate, 500 lbs. Sulph. Pot., 200 lbs. Chloride Sodium (common salt), 200 lbs. Sulphate Magnesia	6 10	1 8	8 16	3 6	7 10	2 0	10 12	4 16	8 2	3 11
5 3½ cwts. Superphosphate	5 19	1 7	7 10	3 6	7 6	2 8	7 15	5 4	5 17	3 6
6 3½ cwts. Superphos., 500 lbs. Sulph. Potass	5 11	1 5	8 1	2 14	8 1	1 18	9 10	4 13	7 13	3 2
7 3½ cwts. Superphos., 500 lbs. Sulph. Pot., and Amm.-salts, '71, '72, '73	6 14	1 3	9 5	2 11	8 15	1 14	11 14	4 11	8 4	3 9
8 Unmanured, 1853, and since; previously part Unman., part Superphos.	5 0	1 2	7 13	2 16	6 10	2 0	7 6	4 7	3 12	2 1

Fifth Season, 1875. Mineral Manures as in 1872, 1873, and 1874; but no Farmyard Manure, or cross-dressings of Nitrate Soda, Ammonia-salts, or Rape-cake.

	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1 Without Manure, 1874 and 1875 (Farmyard Manure in '71, '72, '73)	17 5	2 11	19 18	2 14	21 0	3 6	22 7	3 12	19 13	2 11
2 3½ cwts. Superphosphate (with Farmyard Manure, '71, '72, '73)	15 11	2 2	19 18	2 18	18 17	2 18	20 9	3 5	18 10	2 1
3 Without Manure (1846, and since)	5 9	1 1	9 5	1 12	8 0	1 3	14 1	2 13	11 17	1 10
4 3½ cwts. Superphosphate, 500 lbs. Sulph. Pot., 200 lbs. Chloride Sodium (common salt), 200 lbs. Sulph. Magnesia	5 9	1 0	9 8	1 7	7 16	1 1	12 14	1 14	10 3	1 7
5 3½ cwts. Superphosphate	5 11	1 2	9 19	1 10	7 16	1 4	13 17	2 8	11 2	1 14
6 3½ cwts. Superphos., 500 lbs. Sulph. Potass	5 4	1 0	8 4	1 4	7 1	1 2	12 8	2 3	10 2	1 9
7 3½ cwts. Superphos., 500 lbs. Sulph. Pot. and Amm.-salts '71, '72, '73	5 11	1 1	8 2	1 6	7 6	1 1	11 17	1 17	10 6	1 11
8 Unmanured, 1853, and since; previously part Unman., part Superphos.	4 15	1 0	7 4	1 2	6 1	1 4	12 2	2 11	11 12	2 13

(1) "Superphosphate of Lime"—in all cases made from 200 lbs. Bone-ash, 150 lbs. Sulphuric Acid sp. gr. 1·7 (and water).
(2) "Ammonia-salts"—in each case equal parts Sulphate and Muriate of Ammonia of Commerce.
(3) Owing to the deficiency of Rain for some time after sowing a large proportion of the plants failed. Some were transplanted on plots 1, but not on the other plots; and eventually the plant was (excepting on plots 1) upon the whole very deficient and irregular, the remaining plants being larger than usual.

https://doi.org/10.23637/ERADOC-1-240

Experiments on **SUGAR BEET**—BARN FIELD—*continued.*

Abstract of Results illustrating the influence of the different Manures on the Amount of Produce, and on the Composition of the Roots.
Average of the First Three Seasons, 1871, 1872, and 1873.

	Manures per Acre per Annum.				
	Series 1. Manures as below only, No Cross-dressing.	Series 2. As Series 1, and Cross-dressed with 550 lbs. Nitrate Soda.	Series 3. As Series 1, and Cross-dressed with 400 lbs. "Ammonia-salts."	Series 4. As Series 1, and Cross-dressed with 2000 lbs. Rape-cake, and 400 lbs. "Ammonia-salts."	Series 5. As Series 1, and Cross-dressed with 2000 lbs. Rape-cake.
Plot 1 (Series I.), Farmyard Manure (14 Tons).					
Average produce per Acre:—					
Roots	Cwts. 326	Cwts. 476	Cwts. 446	Cwts. 502	Cwts. 498
Leaves	86	169	161	192	128
Total	412	645	607	694	626
Average Composition of the Roots:—	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Dry Matter	17·49	16·11	16·56	16·23	16·66
Mineral Matter (ash) in Dry Matter	5·00	6·11	5·83	6·55	5·61
Nitrogen in Dry Matter (1)	0·83	1·24	1·53	1·52	1·24
Sugar in Juice	13·14	11·58	12·05	11·10	12·01
Sugar in Roots, if 95, P. C. Juice	12·48	11·00	11·45	10·55	11·41
Means of Plots 4, 5, and 6 (Series I.), Superphosphate, with or without other Mineral Manures, every year.					
Average produce per Acre:—					
Roots	Cwts. 118	Cwts. 382	Cwts. 290	Cwts. 413	Cwts. 346
Leaves	28	102	76	165	76
Total	146	484	366	578	422
Average Composition of the Roots:—	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Dry Matter	18·53	15·93	17·43	15·93	17·66
Mineral Matter (ash) in dry Matter	4·30	5·73	4·81	5·98	4·50
Nitrogen in Dry Matter (1)	0·54	1·20	0·87	1·52	0·83
Sugar in Juice	14·45	12·12	13·35	11·56	13·45
Sugar in Roots, if 95, P. C. Juice	13·73	11·51	12·68	10·98	12·78

(1) The percentages of Nitrogen relate to the first year only; but the percentage of Nitrogen has been determined in the Juice, in selected cases, each year; and the results confirm the indications of the nitrogen in the roots in the first year.

Experiments on **MANGOLD WURZEL**.—BARN FIELD (after Sugar-beet); commencing 1876.

The arrangement of the Plots is precisely the same as previously for Sugar-beet, excepting that Plot 9, which was unmanured for Sugar-beet, and also previously for Swedes, is now added as a manured Plot. With this exception the manures are also substantially the same as previously for Sugar-beet; in fact, precisely the same as for the Sugar-beet in 1872 and 1873. Seed, Yellow Globe; dibbled on ridges, rows 26 inches apart; plants 11 inches apart in the rows (3).

Plots.	Manures per Acre per Annum. Series 1.	Series 2. As Series 1, and Cross-dressed with 550 lbs. Nitrate Soda.	Series 3. As Series 1, and Cross-dressed with 400 lbs. "Ammonia-salts."	Series 4. As Series 1, and Cross-dressed with 2000 lbs. Rape-cake and 400 lbs. "Ammonia-salts."	Series 5. As Series 1, and Cross-dressed with 2000 lbs. Rape-cake.
		Produce per Acre.			
		Roots. / Leaves.	Roots. / Leaves.	Roots. / Leaves.	Roots. / Leaves.	Roots. / Leaves.
		Tons. cwts. / Tons. cwts.	Tons. cwts. / Tons. cwts.	Tons. cwts. / Tons. cwts.	Tons. cwts. / Tons. cwts.	Tons. cwts. / Tons. cwts.
1	Farmyard Manure (14 Tons)					
2	Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1)					
3	Without Manure (1846, and since)					
4	3½ cwts. Superphosphate, 500 lbs. Sulph. Pot., 200 lbs. Chloride Sodium (common salt), 200 lbs. Sulph Magnesia					
5	3½ cwts. Superphosphate					
6	3½ cwts. Superphosphate, 500 lbs. Sulph. Potass					
7	3½ cwts. Superphos., 500 lbs. Sulph. Pot., 36½ lbs. Amm.-salts (2)					
8	Unmanured, 1853, and since; previously part Unman.: part Superphos.					
9	Farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 400 lbs. ammonia-salts, no cross-dressing (3)					

(1) "Superphosphate of Lime"—in all cases made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid, sp. gr.; 1·7 (and water).
(2) "Ammonia-salts"—in each case equal parts Sulphate and Muriate of Ammonia of Commerce.
(3) Plot 9 sown on the flat instead of on ridges; plants ridged up afterwards; rows 22 inches apart, plants 10 inches apart in the rows.

Experiments on **POTATOES**.—HOOS FIELD; commencing 1876.

The Land had been under experiments with Wheat, differently manured, from 1856 to 1874; and was fallowed in 1875.
Plots 1, 2, 3, and 4 had been unmanured for the Wheat. Plots 5 and 6 had received the same quantity of Ammonia-salts alone every year for the Wheat, as Plot 5 now receives for potatoes; Plot 6 now receiving the same amount of nitrogen, but as Nitrate of Soda, instead of Ammonia-salts. Plots 7 and 8 received the same amount of complex mineral manure and Ammonia-salts for the Wheat, as Plot 7 now receives for potatoes; and Plot 8 now receives the same complex mineral manures, and the same amount of nitrogen, but as Nitrate of Soda instead of Ammonia-salts. Plots 9 and 10 received the same complex mineral manures alone for the Wheat as Plot 10 is to receive for potatoes; Plot 9 to receive superphosphate only (3).

Plots.	Manures per Acre per Annum.	Produce per Acre. 1876. Tubers.	1876. Tops.	1877. Tubers.	1877. Tops.	1878. Tubers.	1878. Tops.
		Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.	Tons. cwts.
1	Unmanured						
2	Farmyard Manure (14 tons)						
3	Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1)						
4	Farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda						
5	400 lbs. Ammonia-salts (2)						
6	550 lbs. Nitrate of Soda						
7	400 lbs. Ammonia-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.						
8	550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.						
9	3½ cwts. Superphosphate						
10	3½ cwts. Superphosphate, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, and 100 lbs. Sulph. Magn.						

(1) "Superphosphate of Lime"—in all cases made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid, sp. gr. 1·7 (and water).
(2) "Ammonia-salts"—in each case equal parts Sulphate and Muriate Ammonia of Commerce.
(3) The complex mineral manure having been sown in October, 1874, but the wheat not put in, and therefore no crop taken in 1875, no mineral manures are sown afresh on Plots 7, 8, 9, and 10, for the first crop of potatoes, 1876

https://doi.org/10.23637/ERADOC-1-240

AGDELL FIELD.

Experiments on an actual Course of Rotation—Turnips, Barley, Leguminous Crop (or Fallow), and Wheat.

These Experiments were commenced in 1848; so that the present crop (1876) is the 29th experimental one, or the first crop of the Eighth Course.

One-third of the land has been continuously unmanured; one-third manured with Superphosphate of Lime alone once every four years, that is for the turnip-crop commencing each course; and one-third manured (also for the turnip-crop only) with a complex manure, as described in the foot-note, No. 2.

In the Second, Third, and Fourth Courses, clover was sown, but failed; and in them, and in the Fifth and Sixth Courses, beans were taken instead, on half of each plot, and the other half left fallow; for the third crop of the Seventh Course clover was again sown (spring 1873), on half of each plot, the other half being left fallow.

From half of each of the three plots the whole turnip-crop (roots and leaves) was removed; and on the other half the roots were eaten on the land by sheep, and the uneaten leaves spread and ploughed in. In the case of all the other crops, the total produce was removed from the land.

The abstract of the results given below relates to the portions of each plot from which the turnip-crops were entirely removed; and on which, in the second, third, fourth, fifth, and sixth courses, beans (not fallow) replaced the clover.

(Area under experiment, about 2½ acres.)

1 lb. (pound avoir.) per acre .. = (about) 1·12 Kilogramme per Hectare, or 0·57 Zollverein Pfund. per Prussian Morgen.
1 cwt. (hundredweight) per acre = (about) 125·5 Kilogrammes per Hectare, or 0·64 Centner per Pr. Morgen.

Years.	Description of Crop.	Produce per Acre. Plot 1. Unmanured continuously. Corn[3] (or Roots).	Straw (or Leaf).	Total Produce.[4]	Plot 2. Superphosphate of Lime,[1] alone, for the Turnip Crops only. Corn[3] (or Roots).	Straw (or Leaf).	Total Produce.[4]	Plot 3. Complex Manure,[2] for the Turnip Crops only. Corn[3] (or Roots).	Straw (or Leaf).	Total Produce.[4]
1st Course, 1848–51.										
1848	Norfolk White Turnips	65¼ cwts.	45⅝ cwts.	111¼ cwts.	225¾ cwts.	106¼ cwts.	332 cwts.	218 cwts.	151¾ cwts.	369¾ cwts.
1849	Barley	44⅜ bush.	2983 lbs.	5636 lbs.	29⅜ bush.	2111 lbs.	3841 lbs.	28⅞ bush.	2088 lbs.	3794 lbs.
1850	Clover (calc[d]. as hay)	..	..	54 cwts.	..	..	57⅜ cwts.	..	..	63 cwts.
1851	Wheat	28½ bush.	3431 lbs.	5389 lbs.	28 bush.	3371 lbs.	5253 lbs.	28⅞ bush.	3552 lbs.	5300 lbs.
2nd Course, 1852–55.										
1852	Swedish Turnips	26 cwts.	4¼ cwts.	30½ cwts.	223½ cwts.	20¼ cwts.	243¼ cwts.	396½ cwts.	36½ cwts.	433 cwts.
1853	Barley	34⅜ bush.	2430 lbs.	4465 lbs.	28⅛ bush.	1873 lbs.	3360 lbs.	38¼ bush.	2604 lbs.	4873 lbs.
1854	Beans	5½ bush.	1055 lbs.	1445 lbs.	5½ bush.	1103 lbs.	1534 lbs.	9½ bush.	1355 lbs.	2065 lbs.
1855	Wheat	35½ bush.	3619 lbs.	5859 lbs.	35½ bush.	3525 lbs.	5789 lbs.	37⅜ bush.	3942 lbs.	6371 lbs.
3rd Course, 1856–59.										
1856	Swedish Turnips	32 cwts.	2½ cwts.	34½ cwts.	136 cwts.	7½ cwts.	143½ cwts.	233¾ cwts.	12¼ cwts.	346¼ cwts.
1857	Barley	48½ bush.	2600 lbs.	5337 lbs.	28½ bush.	1475 lbs.	3076 lbs.	48 bush.	2435 lbs.	5163 lbs.
1858	Beans	6¼ bush.	1100 lbs.	1515 lbs.	6½ bush.	1155 lbs.	1605 lbs.	12⅜ bush.	1520 lbs.	2357 lbs.
1859	Wheat	35½ bush.	4030 lbs.	6262 lbs.	34⅔ bush.	3930 lbs.	6120 lbs.	39⅜ bush.	4610 lbs.	7754 lbs.
4th Course, 1860–63.										
1860	Swedish Turnips	1 cwt.	(6½ lbs.)	1 cwt.	29½ cwts.	1¼ cwt.	30¾ cwts.	87½ cwts.	3¼ cwts.	90¾ cwts.
1861	Barley	38⅜ bush.	2522 lbs.	4718 lbs.	30⅜ bush.	2000 lbs.	3775 lbs.	60½ bush.	3940 lbs.	7391 lbs.
1862	Beans	29 bush.	1840 lbs.	3661 lbs.	29⅝ bush.	2150 lbs.	4040 lbs.	43⅜ bush.	3230 lbs.	5990 lbs.
1863	Wheat	44⅞ bush.	3467 lbs.	6350 lbs.	34⅞ bush.	3390 lbs.	5619 lbs.	46½ bush.	4697 lbs.	7626 lbs.
5th Course, 1864–67.										
1864	Swedish Turnips	8¾ cwts.	0¾ cwt.	9½ cwts.	68 cwts.	4¾ cwts.	72¾ cwts.	176½ cwts.	8¾ cwts.	185 cwts.
1865	Barley	39 bush.	2154 lbs.	4182 lbs.	33½ bush.	1615 lbs.	3394 lbs.	47½ bush.	2595 lbs.	5148 lbs.
1866	Beans	10¼ bush.	1013 lbs.	1629 lbs.	7⅜ bush.	978 lbs.	1463 lbs.	20⅜ bush.	1990 lbs.	3343 lbs.
1867	Wheat	21 bush.	2143 lbs.	3473 lbs.	19⅜ bush.	1966 lbs.	3322 lbs.	23⅝ bush.	3003 lbs.	4567 lbs.
6th Course, 1868–71.										
1868	Swedish Turnips	Failed, and ploughed up.			Failed, and ploughed up.			Failed, and ploughed up.		
1869	Barley	24⅜ bush.	1948 lbs.	3358 lbs.	28⅜ bush.	2025 lbs.	3886 lbs.	42½ bush.	3309 lbs.	5800 lbs.
1870	Beans	13⅜ bush.	738 lbs.	1591 lbs.	15⅜ bush.	768 lbs.	1778 lbs.	24⅛ bush.	1056 lbs.	2664 lbs.
1871	Wheat	20⅜ bush.	2799 lbs.	4092 lbs.	23⅜ bush.	3048 lbs.	4521 lbs.	23 bush.	3440 lbs.	4883 lbs.
7th Course, 1872–75.										
1872	Swedish Turnips	34⅛ cwts.	8¾ cwts.	42⅞ cwts.	170⅝ cwts.	17⅜ cwts.	188 cwts.	339⅛ cwts.	35⅝ cwts.	375⅝ cwts.
1873	Barley	23½ bush.	1343 lbs.	2717 lbs.	20⅝ bush.	1565 lbs.	2875 lbs.	31½ bush.	1723 lbs.	3573 lbs.
1874	Clover	..	..	31¾ cwts.	..	..	62⅜ cwts.	..	..	84½ cwts.
1875	Wheat	21½ bush.	2430 lbs.	3784 lbs.	28¼ bush.	3536 lbs.	5328 lbs.	31½ bush.	4685 lbs.	6699 lbs.
Summary—Average of the First 7 Courses, 1848–1875.										
1848, '52, '56, '60, '64, '72	Swedish Turnips	27⅜ cwts.	10⅜ cwts.	38¼ cwts.	142⅛ cwts.	26½ cwts.	168⅝ cwts.	258¼ cwts.	41⅜ cwts.	300 cwts.
1849, '53, '57, '61, '65, '69, '73	Barley	36½ bush.	2283 lbs.	4348 lbs.	28⅜ bush.	1809 lbs.	3458 lbs.	42½ bush.	2671 lbs.	5107 lbs.
1850, '54 '58, '62, '66, '70, '74	Clover, 1850 and '74 (calc[d]. as hay)	..	..	42⅜ cwts.	..	..	55 cwts.	..	..	73⅜ cwts.
	Beans	12⅜ bush.	1149 lbs.	1980 lbs.	13 bush.	1231 lbs.	2084 lbs.	22⅛ bush.	1840 lbs.	3284 lbs.
1851, '55, '59, '63, '67, '71, '75	Wheat	30 bush.	3131 lbs.	5030 lbs.	29½ bush.	3252 lbs.	5122 lbs.	33 bush.	3990 lbs.	6114 lbs.

(1) First Course—100 lbs. Bone-ash, and 100 lbs. Sulphuric Acid (sp. gr. 1·7); Second Course—160 lbs. Bone-ash, 120 lbs. Sulphuric Acid; Third, Fourth, Fifth, Sixth, and Seventh Courses—200 lbs. Bone-ash, and 150 lbs. Sulphuric Acid, *per acre*.

(2) First Course—100 lbs. Pearl-ash, 100 lbs. Bone-ash, 100 lbs. Sulphuric Acid, 100 lbs. Sulphate of Ammonia, 100 lbs. Muriate of Ammonia, and 1000 lbs. Rape-Cake; Second Course—300 lbs. Sulphate of Potass, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 160 lb . Bone-ash, 120 lbs. Sulphuric Acid, 100 lbs. Sulphate of Ammonia, 100 lbs. Muriate of Ammonia, and 2000 lbs. Rape-cake; Third, Fourth, Fifth, Sixth, and Seventh Courses—300 lbs. Sulphate of Potass, 200 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 200 lbs. Bone-ash, 150 lbs. Sulphuric Acid, 100 lbs. Sulphate of Ammonia, 100 lbs. Muriate of Ammonia, and 2000 lbs. Rape-cake, *per acre*.

(3) The quantities given in *Bushels* represent the *Dressed* Corn only.

(4) The "Total Produce" of the Corn-crops includes Dressed Corn, Offal Corn, and Total Straw.

https://doi.org/10.23637/ERADOC-1-240

Experiments with Different Descriptions of WHEAT, in 1876; and Summary of Results obtained in previous Years.

Season 1876. Harfenden Field. 2 Cwt. Nitrate Soda; after Mangolds with Dung 1875, Carted off.	Dressed corn per acre. 1871; Sawpit Field; 3 cwts. Guano; after Mangolds, carted off.	1872; Foster's Field; 2 cwts. Superphosphate, 2 cwts. Nitrate Soda; after Roots, carted off.	1873; Long Hoos Field; 1½ cwt. Nitrate; after Mangolds (with Dung), carted off.	1874; Upper Harpenden Field; 2 cwts. Nitrate after Mangolds (with Dung) carted off.	1875; Little Knott Wood Field; 1½ cwt. Nitrate Soda; after Mangolds (with Dung), 1874, carted off.	1876; Harpenden Field; 2 cwts. Nitrate Soda; after Mangolds (with Dung) 1875, carted off.	Average.	Weight per bushel. 1871: Sawpit Field; 3 cwts. Guano; after Mangolds, carted off.	1872; Foster's Field; 2 cwts. Superphosphate; 2 cwts. Nitrate Soda, after Roots, carted off.	1873; Long Hoos Field; 1½ cwt. Nitrate; after Mangolds (with Dung), carted off.	1874; Upper Harpenden Field; 2 cwts. Nitrate after Mangolds (with Dung) carted off.	1875; Little Knott Wood Field; 1½ cwt. Nitrate Soda; after Mangolds (with Dung), 1874, carted off.	1876; Harpenden Field; 2 cwts. Nitrate Soda; after Mangolds (with Dung) 1875, carted off.	Average.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1. White-chaff (Red)	.. ..	.. ..	40⅝	55⅛	40¼		45¼	.. ..	.. ..	58½	61⅝	61		60⅜
2. Rivett's (Red)	.. ..	.. ..	48⅛	67	48⅜		54½	.. ..	.. ..	57⅛	58⅛	58⅛		57¾
3. Chubb Wheat (Red)	28⅜	40	35¾	50½	38¼		38½	60¼	61⅞	59⅛	61⅛	59½		60⅜
4. Red-chaff (White)	32¾	37	35¼	48¾	34½		37⅛	61⅝	62¼	60⅜	61⅛	60¼		61¼
5. Browick (Red)	35½	40½	38½	51⅛	38½		40⅜	60	61⅜	59½	61¾	59⅞		60⅜
6. Red Wonder	31¼	43⅜	37⅛	55⅛	33¼		40¼	59	60⅞	60	62¼	60⅜		60⅝
7. Burwell (Old Red Lammas)	31⅛	41¼	35⅛	47¼	38½		38⅜	62	63	61⅜	63½	61⅜		62½
8. Bristol Red	29⅜	44⅜	39½	53⅜	31⅝		39½	60⅞	61½	60½	61⅝	60¼		61
9. Red Nursery	34⅛	45¼	27⅛	41⅛	39		37¾	63	65	62	65¼	62¼		63½
10. Red Langham	30¾	43¾	34⅛	53⅛	34⅞		39¼	60⅜	61¼	60½	63	60⅜		61⅛
11. Woolly Ear (White)	31¼	42¾	37	51¼	36⅛		39⅛	61⅛	62⅛	61⅛	62¾	57¾		61
12. Hardcastle (White)	.. ..	46½	42	49⅝	33⅞		43	.. ..	61⅞	59¾	63	59⅞		61⅛
13. Golden Drop (Red), Hallett's	39½	49¾	44¼	51¾	38⅛		44½	61⅜	63	59¾	63	61⅛		61⅝
14. Victoria White, Hallett's	33⅜	45½	38¼	44¼	33¾		39	61	62⅜	59¾	62¼	61⅜		61⅜
15. Hunter's White, Hallett's	26⅞	39¾	38⅝	45⅜	26⅜		35½	59¼	61¾	57¼	61⅛	60½		60
16. Original Red, Hallett's	30	35½	36⅜	43⅝	26		34¼	58⅝	60	56⅛	60¾	58⅛		58¾
17. White Chiddam	26⅞	38¾	31¾	42	32⅜		34⅜	62¼	63	59¼	62¾	61¾		61¾
18. Red Rostock	37	.. ..	46¼	53¾	37⅜		43⅜	60⅛	.. ..	56¾	59⅞	59¾		59⅛
19. Casey's White	29⅞	42⅛	37⅛	52⅛	39		40⅛	60⅜	61½	58¾	60½	60		60⅜
20. Golden Rough-chaff (Red)	33	39½	38⅛	52⅛	38¾		40¼	61⅝	62½	59¾	62½	61¾		61⅝
21. Bole's Prolific (Red)	33⅝	42¾	45¼	48⅛	43¾		42⅝	61½	62⅜	57½	62	60⅞		60⅞
22. Club Wheat (Red)	36	45¾	47½	59⅝	46⅝		47⅛	60⅜	61⅞	58¼	61⅞	61¾		60¾
23. Stimson's White	.. ..	.. ..	.. ..	.. ..	35		35	.. ..	.. ..	.. ..	.. ..	62⅛		62⅛
24. Australian Wheat (White)	.. ..	.. ..	.. ..	.. ..	28		28	.. ..	.. ..	.. ..	.. ..	55½		55½
Mean	32¼	42¼	38⅞	50¾	36⅜		39⅞	60¾	62⅛	59¼	61⅞	60¼		60⅝

https://doi.org/10.23637/ERADOC-1-240

ROTHAMSTED

MAY,

SUMMARY STATEMENT OF THE PRESENT AND PREVIOUS

(14 Years, 1863–1876,

Name of Field.	Acres.	PREVIOUS CROPPING							
		1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
Thirty Acres	30	Wheat, Sheep-Folded, and 2 cwts. Guano.	Oats, 2 cwts. Guano, 1 cwt. Corn Manure.	Oats, 1 cwt. Guano, 3 cwts. Corn Manure.	Tares and Swedes, Dung and Artificial.	Oats, after Sheep-Folding.	Clover.	Wheat, 2 cwts. Guano.	Oats, 2 cwts. Guano.
Upper Harpenden	14	Red Clover, Unmanured.	Wheat, 1½ cwt. Guano, 1½ cwt. Corn Manure.	Oats, 1 cwt. Guano, 2 cwts. Corn Manure.	Oats, 2 cwts. Guano, 1 cwt. Sulph. Ammonia.	Tares, Dung. Swedes, Artificial.	Wheat, ⅔ths. 2½ cwts. Guano, ⅓th. Sheep-folded.	Oats, 2 cwts. Guano, 1 cwt. dried Blood, ½ cwt. Sulph. Ammonia.	Swedes, Dung and superphosphate.
Harpenden	22	Oats, 3 cwts. Guano.	Mangolds and Turnips, Dung and Artificial.	Wheat, Sheep-Folded.	Red Clover (peren.), Unmanured.	Wheat, 2½ cwts. Guano.	⅔rds {2 cwts. Guano, & 1 cwt. Nitr. Soda. ⅓rd {1 cwt. Nitr. Soda. and Sheep-folded. Oats,	Swedes, Dung and various Artificial Manures.	Wheat, 3 cwts. Guano.
Little Hoos	9	Barley, 3 cwts. Guano, 1 cwt. superphos.	Red Clover.	Wheat, 1½ cwt. Guano, 1 cwt. Nitrate Soda, 1 cwt. Corn Manure.	Mangolds, Dung and Artificial.	Wheat, Unmanured.	Oats, 2 cwts. Guano, 1 cwt. Nitrate of Soda.	Barley, 1 cwt. dried Blood, ½ cwt. Sulph. Ammonia, 1 cwt. superphosphate.	Barley, 2½ cwts. Guano.
Fosters' ..	18	Barley, 5½ cwts. Artificial Manure.	Swedes, Dung and Artificial.	Oats, 1 cwt. Guano, 1 cwt. Corn Manure.	Red Clover, Unmanured.	Wheat, 2 cwts. Guano, ½ cwt. Corn Manure.	Oats, 2 cwts. Guano, 1 cwt. Nitrate of Soda.	Barley, 1 cwt. dried Blood, ½ cwt. Sulph. Ammonia, 1 cwt. superphosphate.	Oats, 2 cwts. Guano, 3 cwts. Blood Manure.
Knott Wood	30	Oats, Sheep-Folded.	Red Clover (peren.).	Wheat, Sheep-Folded, 1 cwt. Guano.	Oats, 2 cwts. Guano, 1 cwt. Sulph. Ammonia.	Oats, 2 cwts. Guano, 1 cwt. Sulph. Ammonia.	Swedes, 2 cwts. Guano, 2½ cwts. superphosphate and Dung.	Wheat, 3 cwts. Guano (one-half), Unmanured (one-half), after Swedes ploughed up and Fallowed.	Oats, 3 cwts. Guano.
Little Knott Wood ..	14	Swedes, Dung and Artificial.	Wheat, Unmanured.	Red Clover (peren.), Unmanured.	Red Clover (peren.), Sheep-Folded.	Wheat, 1 cwt. Guano, ½ cwt. Corn Manure.	Oats, 2 cwts. Guano, 1 cwt. Nitrate Soda.	Mangolds, 12 tons Dung, 3 cwts. Guano.	Wheat, 3 cwts. Guano.
Sawpit ..	14	Tares and Oats, Sheep-Folded, and 2 cwts. Guano.	Barley, 1½ cwt. Guano, ½ cwt. superphos., 1 cwt. Corn Manure.	Mangolds and Turnips, Dung and Artificial.	Wheat, Unmanured.	Red Clover, Unmanured.	Wheat, 1 cwt. Guano, 1 cwt. Wheat Manure.	Wheat, 3 cwts. Guano.	Mangolds, Dung and 3 cwts. Guano.
Rick-yard	8	Wheat, Unmanured.	Wheat, Sheep-Folded, and 3 cwts. Guano.	Barley, 2 cwts. Guano, 1½ cwt. Corn Manure.	Red Clover, Sheep-Folded.	Wheat, Guano.	Barley, 2 cwts. Wheat Manure.	Tares, Dung.	Barley, 1 cwt. Guano.
Six Acres ..	6	Mangolds, Dung and Artificial.	Wheat, Unmanured.	Red Clover, Unmanured.	Wheat, 2 cwts. Guano, 2 cwts. Corn Manure.	Oats, 3 cwts. Guano.	Beans, Dung.	Wheat, 2 cwts. Guano, 1 cwt. Nitrate of Soda.	Barley, 2½ cwts. Guano.
Clay-Croft	12	Wheat, Dung.	Wheat, 2 cwts. Guano, 2 cwts. Corn Manure.	Oats, 2 cwts. Guano, 2 cwts. Corn Manure.	Oats, 2 cwts. Guano, 1 cwt. Sulph. Ammonia.	Beans, Dung.	Wheat, 2 cwts. Guano.	Oats, 2 cwts. Guano, 1 cwt. dried Blood, ½ cwt. Sulph. Ammonia.	Turnips, Dung and 3 cwts. superphosphate.
Ten Acres ..	10	Oats, 3 cwts. Guano.	Oats, 2 cwts. Guano, 1 cwt. Dried Blood.	Tares, Dung.	Turnips, Artificial.	Wheat, Guano.	Red Clover.	Wheat, 2 cwts. Guano.	Oats, 3 cwts. Guano.
Agdell ..	9	Barley, Sheep-Folded.	Barley, 1½ cwt. Guano, ½ cwt. superphos., 1 cwt. Corn Manure.	Red Clover, Unmanured.	Wheat, 1½ cwt. Guano, 1½ cwt. Corn Manure.	Oats, 2 cwts. Guano.	Tares, Dung.	Barley, Unmanured.	Barley, 1½ cwt. Guano, 1½ cwt. superphosphate.
Long Hoos	25	Fallow.	Swedes, Dung and Artificial.	Barley, 1 cwt. Guano, 1 cwt. Corn Manure.	Barley, 1½ cwt. Guano, 1 cwt. Corn Manure.	Mangolds and Swedes, 15 tons Dung, 3 cwts. Guano.	Wheat, 1 cwt. Guano.	Oats, 2 cwts. Guano, 1 cwt. dried Blood, ½ cwt. Sulph. Ammonia.	Sainfoin, Unmanured.
Sawyers' ..	25	Swedes and Fallow, Artificial.	Barley, 1 cwt. Guano, 1 cwt. Corn Manure.	Swedes, Dung and Artificial.	Wheat and Barley, Sheep-Folded.	Red Clover, Unmanured.	Wheat, 3 cwts. Guano.	Fallow.	Wheat, 4 cwts. Guano.
West Barn	32	Swedes, Dung and Artificial.	Oats, 1½ cwt. Guano, 1½ cwt. Corn Manure.	Red Clover (peren.), Sheep-Folded.	Wheat, 1½ cwt. Guano, 1½ cwt. Corn Manure.	Barley, 1 cwt. Blood Manure, 1 cwt. superphosphate, 1 cwt. Sulph. Ammonia.	Fallow.	Wheat, 3 cwts. Guano.	Sainfoin, Unmanured.

https://doi.org/10.23637/ERADOC-1-240

FARM.

1876.

CROPPING, &c., OF THE ARABLE LAND NOT UNDER EXPERIMENT.

inclusive.)

AND MANURING.

1871.	1872.	1873.	1874.	1875.	Crop, &c., Present Season, 1875-76.	Acres.	Name of Field.
Barley, 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda, (2½ acres experiment).	**Barley** (¾ with Grass-seeds). 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Grass** (¾), Folded, and 1 cwt. Nitrate. **Barley** (¼), 2 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Grass** (¾), Sheep-folded. **Tares** (¼) Dung.	**Grass** (¾), Compost. **Wheat** (¼), 1 cwt. Nitrate Soda.	30	Thirty Acres
Wheat, 2 cwts. Guano.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Mangolds,** Dung. (Carted off.)	**Wheat** (10 acres Varieties). 2 cwts. Nitrate Soda.	**Barley,** (½) 3 cwts. Guano, (½) 2 cwts. superphosphate, 2¼ cwts. Nitrate Soda.	**Barley** (with grass seeds), 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	14	Upper Harpenden.
Oats, 3 cwts. Guano, 1 cwt. Nitrate Soda. **Tares,** Dung.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda. **Tares,** Dung.	**Barley,** After Oats—2 cwts. superphosphate; 2 cwts. Nitrate. After Tares—1 cwt. superphosphate; 1 cwt. Nitrate.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Mangolds,** Dung, and 2 cwts. Guano. (Carted off.)	**Wheat** (Varieties), 2 cwts. Nitrate Soda.	22	Harpenden.
Barley, 3 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley** (with Clover). 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley** (½), Unmanured. **Clover** (½), Unmanured.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda (1 acre Unmanured).	**Barley,** where Barley 1873, 2 cwts. superphosphate, 2 cwts. Nitrate of Soda. where Clover 1873, Half quantities.	**Barley** (½ with Clover), 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	9	Little Hoos.
Roots, Tares, and Rape, Dung and Artificial.	**Wheat,** ⅓ Varieties of Wheat, 2 cwts. superphosphate, 2 cwts. Nitrate Soda, ⅔ Sheep-folded.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda (2 acres experiment).	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Barley,** (⅓) 3½ cwts. Guano, (⅓) 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda, (⅓) 1½ cwts. Guano, 1½ Nitrate.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	18	Fosters'.
Oats, 3 cwts. Guano, 1 cwt. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Tares** (¼), Dung. **Swedes** (¾), Dung, 2 cwts. superphosph.; 2 cwts. Nitrate Soda.	**Barley,** After Roots and Tares carted, 2 cwts. superphosphate, 2 cwts. Nitrate Soda, After Tares fed, 1 cwt. each.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 3 cwts. Nitrate Soda.	30	Knott Wood.
Oats, 3 cwts. Guano, 1 cwt. Nitrate Soda.	**Oats,** ½ Sheep-folded. All, 2½ cwts. superphos., 2½ cwts. Nitrate Soda.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Mangolds,** Dung. (Carted off.)	**Wheat** (Varieties), 1½ cwt. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 3 cwts. Nitrate Soda.	14	Little Knott Wood.
Wheat, 3 cwts. Guano.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Mangolds,** 25 tons Dung.	14	Sawpit.
Mangolds, Dung and 4 cwts. Cotton Cake.	**Wheat,** Unmanured.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Tares,** Dung. ½ followed by Turnips, 1 cwt. superphosphate, 1 cwt. Nitrate Soda.	**Barley,** 1 cwt. Nitrate Soda.	**Swedes,** Dung, and Superphosphate.	8	Rick-yard.
Barley, 3 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Barley,** 2 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley,** 2 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	6	Six Acres.
Wheat, Unmanured.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Clover,** Unmanured.	**Wheat,** 2 cwts. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	12	Clay-Croft.
Mangolds, Dung and 4 cwts. Cotton Cake.	**Wheat,** Unmanured.	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda (5 acres experiment).	**Oats,** 2 cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Turnips.**	10	Ten Acres.
Mangolds, Dung and 4 cwts. Cotton Cake.	**Wheat,** Unmanured (and part Roots).	**Clover,** Unmanured. **Barley,** Experiment.	**Wheat,** 1 cwt. Nitrate Soda (3 acres Experiment, ½ Clover, ½ Fallow).	**Barley,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda. **Wheat,** 3 acres, Experiment.	**Barley,** 2½ cwts. superphosphate, 3 cwts. Nitrate Soda. **Swedes,** 3 acres, Experiment.	9	Agdell.
Sainfoin, Unmanured. (Steam cultivated, July.)	**Mangolds,** Dung. (Carted off.)	**Wheat,** (½ Varieties of Wheat), 1½ cwt. Nitrate Soda.	**Oats,** 2 cwts. superphosphate, 2 cwts, Nitrate Soda.	**Oats,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats** (¾), 2½ cwts. superphosphate, 3 cwts. Nitrate Soda. **Tares** (¼), Dung.	25	Long Hoos.
Wheat, 4 cwts. Guano. 1 cwt. Nitrate Soda.	**Barley,** 2½ cwts. superphosphate, 2½ cwts. Nitrate Soda.	**Oats,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Mangolds and Swedes,** Dung.	**Barley after Swedes** (¾) 2 cwts. superphosphate, 2 cwts. Nitrate Soda. **Wheat after Mangolds** (¼) 1½ cwt. Nitrate Soda.	**Barley** (with Clover), 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	25	Sawyers'.
Sainfoin, Unmanured.	**Sainfoin,** Unmanured.	**Oats,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Wheat** (Oats fed off 1873), 1½ cwt. Nitrate Soda.	**Oats,** 2 cwts. superphosphate, 2 cwts. Nitrate Soda.	**Oats,** 2 cwts. superphosphate, (⅔) 1½ Nitrate Soda, (⅓) 2½ Nitrate Soda.	32	West Barn.

https://doi.org/10.23637/ERADOC-1-240