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Report 1921-22 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



[Full Table of Content](#)

Table of Results - the Classical Experiments

Rothamsted Research

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DATES OF SOWING AND HARVESTING (Harvest 1921).

Field.	Crop.	Variety.	Sowing began.	Sowing finished.	Cutting began.	Carting began.	Carting finished.	Yield per Acre.
Great Knott, east	Oats	Grey Winter	Oct. 6, '20	Oct. 9, '20	July 14	July 21	July 23	44 bush.
" west	Clover	Broad Red	Apr. 26, '20	Apr. 27, '20	June 13	June 21	June 23	21.5 cwt.
Little Knott	Grass Ley (3rd yr.)	Mixture...	Apr. 8, '18	Apr. 10, '18	June 28	June 30	July 1	17.0 cwt.
Fosters, east	Oats	Grey Winter	Oct. 9, '20	Oct. 14, '20	July 15	July 25	July 25	41.7 bush.
" west	{ Oats Barley	Grey Winter mended with Plumage Archer	Mar. 14, '21	Mar. 14, '21	July 29	Aug. 5	Aug. 5	33 bush.
West Barnfield	Clover	Broad Red	Apr. 26, '20	Apr. 26, '20	June 9	June 15	June 15	31.3 cwt.
Long Hoos, east	Wheat	{ Red Standard Danish Svalof... }	Nov. 9, '20	Nov. 11, '20	July 28	Aug. 6	Aug. 9	30.2 bush.
" west	Wheat	{ Red Standard Swedish Iron Marshall Foch }	Oct. 21, '20	Oct. 23, '20	July 30	Aug. 6	Aug. 9	
Great Harpenden	Wheat	Red Standard	Oct. 15, '20	Oct. 20, '20	July 26	Aug. 2	Aug. 3	22 bush.
New Zealand	Wheat	Red Standard	Nov. 6, '20	Nov. 9, '20	July 27	Aug. 4	Aug. 4	30.2 bush.
Stackyard	Barley	Plumage Archer	Mar. 11, '21	Mar. 30, '21	Aug. 3	Aug. 12	Aug. 12	35.5 bush.
Sawpit	Potatoes	{ Arran Chief Kerr's Pink }	Apr. 8, '21	Apr. 11, '21	...	Sept. 26	Oct. 10	1.5 tons ware
Broadbalk	Wheat	Red Standard	Apr. 12, '21	Apr. 13, '21	...	Oct. 30	Nov. 5	1.1 .. small
Little Hoos	Barley	Plumage Archer	Nov. 4, '20	Nov. 5, '20	July 27	Aug. 9	Aug. 10	see p. 85
Hoos	{ Barley Wheat	Plumage Archer	Mar. 9, '21	Mar. 9, '21	Aug. 4	Aug. 12	Aug. 12	" 90
		Plumage Archer	Feb. 19, '21	Feb. 21, '21	July 30	Aug. 11	Aug. 11	" 89
		Red Standard	Nov. 5, '20	Nov. 5, '20	July 28	Aug. 10	Aug. 10	see pp. 87 and 88
Barnfield	Mangolds	Prizewinner Yellow Globe	Apr. 27, '21	Apr. 27, '21	...	Nov. 15	Dec. 2	see p. 81
Agdell	Barley	Plumage Archer	Feb. 23, '21	Feb. 23, '21	Aug. 5	Aug. 12	Aug. 12	" 79
Great Field	Pasture	—	...	...	...	...	...	...
Park	Hay	—	...	...	June 23	June 27	June 28	see p. 82

DATES OF SOWING AND HARVESTING (Harvest 1922).

Field.	Crop.	Variety.	Sowing began.	Sowing finished.	Cutting began.	Carting began.	Carting finished.	Yield per Acre.
Great Knott, east	Wheat	Red Standard	Oct. 24, '21	Oct. 26, '21	Aug. 29	Sept. 11	Sept. 21	18 bush.
" west	Clover	Red	Apr. 26, '20	Apr. 27, '20	June 9	not carted		
Little Knott	Grass Ley (4th yr.)	Mixed	Apr. 8, '18	Apr. 10, '18	June 17	June 20	June 23	11 cwt.
Foster's, east	Wheat	Red Standard	Oct. 24, '21	Oct. 26, '21	Aug. 24	Sept. 6	Sept. 7	16 bush.
" west	Wheat	Red Standard	Oct. 24, '21	Oct. 26, '21	Aug. 24	Sept. 6	Sept. 7	16 bush.
West Barnfield	Clover	Red	Apr. 26, '20	Apr. 26, '20	June 16	June 21	June 22	12 cwt.
Long Hoos, east	Oats	Grey Winter	Sept. 24, '21	Sept. 26, '21	Aug. 2	Aug. 16	Aug. 18	48 bush.
" west	Barley	Plumage Archer	Mar. 30, '22	Apr. 1, '22	Sept. 12	Sept. 29	Sept. 30	33 bush.
Great Harpenden	Mangolds	Prizewinner Yellow Globe	May 2, '22	May 12, '22	...	Oct. 25	Nov. 22	19½ tons.
	Potatoes	Kerr's Pink	Apr. 22 '22	Apr. 24, '22	...	Oct. 10	Oct. 26	see pp. 94 and 98
New Zealand	Swedes	Hurst's Monarch	May 19, '22	May 26, '22	...	Oct. 4	Nov. 14	27½ tons.
Stackyard	Wheat	Red Standard	Nov. 10, '21	Nov. 11, '21	Sept. 4	Sept. 21	Sept. 26	28 bush.
Sawpit	Barley	Plumage Archer	Mar. 25, '22	Mar. 28, '22	Sept. 5	Sept. 22	Oct. 3	33 bush.
Sawyers	Wheat	Red Standard	Oct. 18, '21	Dec. 8, '21	Aug. 23	Sept. 2	Sept. 16	24 bush.
	{ Vetches and Oats mixed	Winter Vetches	Sept. 17, '21	Sept. 19, '21	Aug. 5	Sept. 8	Sept. 9	{ 7½ bush. { 8 bush.
Broadbalk	Wheat	Red Standard	Oct. 28, '21	Oct. 28, '21	Aug. 29	Sept. 18	Sept. 20	see p. 86
Little Hoos	Barley	Plumage Archer	Mar. 25, '22	Mar. 25, '22	Sept. 7	Sept. 21	Sept. 23	90
Hoos	{ Barley { Wheat	Plumage Archer	Mar. 18, '22	Mar. 18, '22	Sept. 6	Sept. 25	Sept. 26	89
Barnfield	Mangolds	Red Standard	Oct. 29, '21	Oct. 29, '21	Sept. 6	Sept. 26	Sept. 26	87
Agdell	Clover	Prizewinner Yellow Globe	May 1, '22	May 1, '22	...	Nov. 1	Nov. 9	81
Great Field	Hay	Red	Apr. 21, '21	Apr. 22, '21	June 21	July 12	July 12	79
Park	Hay	{ 1st Crop { 2nd Crop	...	...	June 22	June 30	July 1	95
	Hay	...	...	...	June 26	July 1	July 10	82
	Hay	...	...	...	Oct. 5	Oct. 16	Oct. 17	82

CROP YIELDS ON THE EXPERIMENTAL PLOTS

NOTES.—In each case the year refers to the harvest, *e.g.*, Wheat harvested in 1921.
In the tables, total straw includes straw, cavings and chaff. In previous reports the figures for total straw only have been given.

CONVERSION TABLE

1 acre	=	0·404 Hectare	0·963 Feddan.
1 bushel (Imperial)	=	0·346 Hectolitre (36·346 litres) ...	0·184 Ardeb.
1 lb. (pound avoirdupois)	=	0·453 Kilogramme	1·009 Rotls.
1 cwt. (hundredweight)	=	50·8 Kilogrammes	{ 113·0 Rotls. 1·366 Maunds
1 metric quintal ...	=	{ 100·0 Kilogrammes 220·46 lb.	
1 bushel per acre ...	=	0·9 Hectolitre per Hectare ...	0·191 Ardeb per Feddan.
1 lb. per acre ...	=	1·12 Kilogramme per Hectare ...	1·049 Rotls per Feddan.
1 cwt. per acre ...	=	125·60 Kilogrammes per Hectare or 1·256 metric Quintals per Hectare	117·4 Rotls per Feddan.

In America the Winchester bushel is used = 35·236 litres. 1 English bushel = 1·032 American bushels.

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

Year.	CROP.	O. Unmanured.		M. Mineral Manure.		C. Complete Mineral and Nitrogenous Manure.	
		5.	6.	3.	4.	1.	2.
		Fallow.	Clover or Beans.	Fallow.	Clover or Beans.	Fallow.	Clover or Beans.
AVERAGE OF THE FIRST EIGHTEEN COURSES, 1848-1919.							
	Roots (Swedes) cwt.*	33·4	11·8	176·4	191·3	360·7	317·4
	Barley—						
	Dressed Grain bush.	23·3	21·9	24·4	24·4	33·4	37·5
	Total Straw ... cwt.	14·1	14·0	14·3	16·1	20·2	22·9
	Beans—						
	Dressed Grain bush.	—	13·1	—	18·2	—	22·3
	Total Straw ... cwt.	—	9·2	—	13·2	—	15·3
	Clover Hay ... cwt.	—	30·7	—	58·6	—	60·2
	Wheat—						
	Dressed Grain bush.	24·6	22·7	29·0	31·4	30·1	31·6
	Total Straw ... cwt.	23·9	21·4	29·1	30·3	31·8	30·7
PRESENT COURSE (19th), 1920-22.							
1920	Roots (Swedes) ... cwt.	20·5	2·1	163·9	270·0	262·1	56·4†
1921	Barley—						
	Dressed Grain bush.	13·0	2·4†	12·8	26·3	10·9	25·7
	Offal Grain ... lb.	57·0	42·0	45·0	58·0	39·0	65·0
	Straw lb.	891·0	601·0	596·0	1124·0	444·0	1444·0
	Total Straw ... cwt.	10·9	7·8	7·9	14·2	6·3	17·7
	Wght. of Dressed } Grain per bush. } lb.	55·1	51·0	56·5	56·8	56·4	56·7
	Proportion of Total } Grain to 100 of } Total Straw }	63·0	19·0	86·3	97·5	92·2	77·1
1922	Clover Hay ... cwt. (1 crop only)	—	4·4	—	9·7	—	3·5

* Plots 1, 3 and 5 based upon 17 years. Plots 2, 4 and 6 based upon 16 years.

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

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

METEOROLOGICAL RECORDS, 1921 and 1922.

	Rain.		Drainage through soil.			Bright Sunshine.	Temperature (Mean).				
	Total Fall. $\frac{1}{1000}$ Acre Gauge.	No. of Rainy Days. (0.01 inch or more) $\frac{1}{1000}$ Acre Gauge.	20 ins. deep.	40 ins. deep.	60 ins. deep.		Max.	Min.	1 ft. in ground.	Solar Max.	Grass Min.
	Inches.	No.	Inches.	Inches.	Inches.	Hours.	°F.	°F.	°F.	°F.	°F.
1921											
Jan. ...	2.452	18	2.103	2.202	2.087	42.9	48.8	39.7	42.8	69.7	35.5
Feb. ...	0.214	7	0.016	0.068	0.053	77.9	45.2	34.0	39.6	78.9	27.8
Mar. ...	1.065	12	0.005	0.028	0.028	132.1	51.8	36.4	43.0	99.5	29.6
April ...	1.568	10	0.114	0.120	0.110	195.7	55.2	37.3	46.1	111.1	30.7
May ...	1.445	14	0.065	0.113	0.120	228.8	62.0	43.3	53.7	122.7	36.0
June ...	0.194	2	—	0.005	0.009	216.0	67.4	47.5	59.1	125.4	41.6
July ...	0.179	5	—	0.003	0.006	240.0	76.8	53.4	64.9	132.1	47.1
Aug. ...	1.113	10	—	—	—	145.2	69.2	52.7	61.9	122.8	48.5
Sept. ...	2.733	6	0.925	0.893	0.850	174.0	67.6	49.0	58.4	114.8	43.5
Oct. ...	0.787	8	—	—	—	154.2	63.6	46.4	54.0	106.6	40.5
Nov. ...	2.435	11	0.969	0.966	0.796	68.9	43.9	33.3	42.6	69.2	28.3
Dec. ...	1.908	16	1.569	1.586	1.420	47.3	47.9	36.7	41.8	67.1	32.8
Total or Mean	16.093	119	5.766	5.984	5.479	1723.0	58.3	42.5	50.7	101.7	36.8
1922											
Jan. ...	3.148	21	2.811	2.862	2.638	53.7	43.5	32.7	38.5	65.7	28.6
Feb. ...	2.507	16	1.734	1.718	1.612	104.9	44.9	33.6	38.2	76.1	28.6
Mar. ...	2.285	14	1.349	1.477	1.406	113.5	45.2	34.8	40.9	89.8	30.1
April ...	3.520	19	1.458	1.535	1.390	149.8	48.7	34.7	41.8	105.7	29.2
May ...	1.579	7	0.144	0.224	0.235	280.2	65.4	45.0	53.1	120.8	37.2
June ...	1.038	8	—	0.016	0.022	228.8	65.9	48.1	59.8	121.6	41.2
July ...	4.605	19	1.661	1.748	1.599	149.5	63.7	49.7	57.8	120.4	43.6
Aug. ...	2.930	16	0.675	0.698	0.651	127.3	63.2	49.2	57.9	117.8	42.8
Sept. ...	2.882	15	1.085	1.111	1.010	102.6	60.5	46.3	54.8	110.2	40.5
Oct. ...	0.764	13	0.175	0.194	0.159	140.0	52.8	40.0	48.4	99.7	33.5
Nov. ...	1.433	8	0.813	0.854	0.751	56.8	47.0	34.7	41.5	71.3	28.4
Dec. ...	3.091	18	2.719	2.741	2.572	55.5	45.4	36.3	40.5	66.6	30.9
Total or Mean	29.782	174	14.624	15.178	14.045	1562.6	53.9	40.4	47.8	97.1	34.6

RAIN AND DRAINAGE.
MONTHLY MEAN FOR 52 HARVEST YEARS, 1870-1—1921-2.

	Rainfall.	Drainage.			Drainage % of Rainfall.			Evaporation.		
		20-in. Gauge	40-in. Gauge	60-in. Gauge	20-in. Gauge	40-in. Gauge	60-in. Gauge	20-in. Gauge	40-in. Gauge	60-in. Gauge
	Ins.	Ins.	Ins.	Ins.				Ins.	Ins.	Ins.
September	2.334	0.751	0.714	0.655	32.2	30.6	28.1	1.583	1.620	1.679
October ...	3.153	1.788	1.742	1.617	56.7	55.2	51.3	1.365	1.411	1.536
November	2.769	2.095	2.127	2.006	75.7	76.8	72.4	0.674	0.642	0.763
December	2.845	2.417	2.505	2.393	84.9	88.0	84.1	0.428	0.340	0.452
January...	2.381	1.914	2.096	2.015	80.4	88.0	84.6	0.467	0.285	0.366
February	1.983	1.457	1.558	1.487	73.5	78.6	75.0	0.526	0.425	0.496
March ...	2.086	1.130	1.264	1.195	54.2	60.6	57.3	0.956	0.822	0.891
April ...	2.032	0.658	0.731	0.697	32.4	36.0	34.3	1.374	1.301	1.335
May ...	2.006	0.461	0.523	0.489	23.0	26.1	24.4	1.545	1.483	1.517
June ...	2.307	0.572	0.592	0.572	24.8	25.7	24.8	1.735	1.715	1.735
July ...	2.656	0.685	0.710	0.659	25.8	26.7	24.8	1.971	1.946	1.997
August ...	2.693	0.725	0.726	0.683	26.9	27.0	25.4	1.968	1.967	2.010
Year ...	29.245	14.653	15.288	14.468	50.1	52.3	49.5	14.592	13.957	14.777

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

MANGOLDS, BARN FIELD, 1921 and 1922.

Roots since 1856. Mangolds since 1876.

Produce per Acre.

Strip.	Strip Manures.	Cross Dressings.				
		O.	N.	A.	A.C.	C.
		None.	Nitrate of Soda	Ammon. Salts.	Ammon. Salts and Rape Cake.	Rape Cake.
	1921.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Dung only	{ R. 16·25	24·82	15·50	13·71	17·44
		{ L. 2·46	3·56	2·49	2·62	3·12
2	Dung, Super., Potash ...	{ R. 22·60	31·01	25·44	25·20	25·75
		{ L. 3·42	4·99	4·95	5·33	4·68
4	Complete Minerals ...	{ R. 6·07 ^a	{ R. 19·18 *	14·62	23·27	16·69
		{ L. 1·11 ^b	{ L. 4·63			
			{ R. 16·08	3·41	5·03	3·50
			{ L. 4·30			
5	Superphosphate only ...	{ R. 5·36	12·35	3·57	3·19	4·43
		{ L. 1·07	3·14	1·69	1·54	1·66
6	Super. and Potash ...	{ R. 5·46	17·20	13·58	18·37	14·04
		{ L. 1·27	4·03	3·54	4·38	3·31
7	Super., Sulphate of Mag., and Sodium Chloride	{ R. 5·74	18·33	13·94	14·37	13·24
		{ L. 1·33	4·29	3·20	4·45	3·56
8	None	{ R. 3·60	7·53	2·57	2·87	1·20
		{ L. 1·07	3·02	1·63	1·53	1·34
9	Sodium Chloride, Nit. Soda, Sulph. Potash, and Sulph. Mag. ...	{ R. 20·15				
		{ L. 4·53				
	1922†.					
1	Dung only	{ R. 14·90	18·54	14·25	26·37	26·11
		{ L. 3·35	3·98	3·52	5·57	5·46
2	Dung, Super., Potash ...	{ R. 18·15	12·46	9·29	31·55	30·35
		{ L. 3·51	2·67	2·20	6·34	5·40
4	Complete Minerals ...	{ R. 3·32 ^x	{ R. 2·27 *	0·54	28·46	21·89
		{ L. 0·95 ^b	{ L. 0·80			
			{ R. 2·49	0·25	5·34	3·49
			{ L. 0·83			
5	Superphosphate only ...	{ R. 1·90	3·38	0·35	10·53	11·39
		{ L. 0·66	1·06	0·16	3·67	4·00
6	Super. and Potash ...	{ R. 2·28	3·64	0·67	21·96	19·56
		{ L. 0·80	1·13	0·30	5·55	3·73
7	Super., Sulphate of Mag., and Sodium Chloride	{ R. 2·13	2·65	0·67	18·45	18·97
		{ L. 0·79	0·85	0·33	5·12	3·81
8	None	{ R. 1·72	0·93	0·40	6·93	7·65
		{ L. 0·69	0·49	0·22	2·95	3·13
9	Sodium Chloride, Nit. Soda, Sulph. Potash and Sulph. Mag. ...	{ R. 2·89				
		{ L. 1·04				

R. = roots. L. = leaves.

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

† In 1922 the top dressings of Nitrate of Soda and Sulphate of Ammonia were omitted from plots 4-8 on series N and A as the plant had failed. The plant on Series A, N, O and plot 9, was badly attacked by *Atomaria* (pigmy mangold beetle).

HAY. THE PARK GRASS PLOTS. 1921, 1922.

Plot.	Manuring per acre.	1921.		1922.				Plot.		
		Yield of Hay per acre.	Dry Matter per acre.	Yield of Hay per acre.		Dry Matter per acre.				
				1st Crop.	2nd Crop.	1st Crop.	2nd Crop.		Total.	
1	Single dressing Amm. Salts (= 43 lb. N.); (with Dung also 8 years 1856-63)	15.9 18.5	1474 1637	9.7 19.0	29.2 18.7	38.9 37.7	650 1255	2143 1403	2793 2658	1
2	Unmanured; (after Dung 8 years, 1856-63)	11.4 14.7	991 1227	16.7 18.3	16.5 15.2	33.2 33.5	1112 1178	1213 1047	2325 2225	2
3	Unmanured	8.8 10.3	727 839	14.8 12.4	13.1 11.7	27.9 24.1	952 816	1010 787	1962 1603	3
4-1	Superphosphate of Lime	17.1 14.6	1398 1199	15.0 13.1	13.9 13.1	33.5 28.1	1245 995	1058 910	2303 1905	4-1
4-2	Superphosphate of Lime and double dressing Amm. Salts (= 86 lb. N.)	23.4 23.7	1866 2081	2.3 25.9	11.9 24.8	14.2 50.7	154 1805	839 1924	993 3729	4-2
5-1	(N. half) Unmanured; following double dressing Amm. Salts (= 86 lb. N.) 1856-97	14.3	1125	4.6	8.2	12.8	296	638	934	5-1
5-2	(S. half) Super., Sulphate of Potash; following double dressing Amm. Salts (= 86 lb. N.) 1856-97	21.5	1955	11.3	12.0	23.3	811	919	1730	5-2
6	Complete Mineral Manure as plot 7; following double dressing Amm. Salts (= 86 lb. N.) 1856-68	27.9	2534	20.9	21.6	42.5	1420	1681	3101	6
7	Complete Mineral Manure	25.7 23.4	2376 2088	23.4 21.2	23.4 17.4	46.8 38.6	1520 1571	1605 1359	3125 2930	7
8	Mineral Manure without Potash	21.0	1822	19.2	16.0	35.2	1209	1194	2403	8
9	Complete Mineral Manure and double dressing Amm. Salts (= 86 lb. N.)	14.0	1269	14.8	14.1	28.9	1056	1074	2130	9
10	Mineral Manure (without Potash) and double dressing Amm. Salts (= 86 lb. N.)	43.8	3887	7.5	33.9	41.4	483	2349	2832	10
11-1	Complete Mineral Manure and treble dressing Amm. Salts (= 129 lb. N.)	52.7	4692	46.9	21.8	68.7	3652	1869	5521	11-1
11-2	As plot 11-1 and Silicate of Soda	35.2	3069	9.9	25.5	35.4	672	2028	2700	11-2
		38.2	3510	32.6	19.2	51.8	2725	1543	4268	
		65.9	5301	15.0	28.7	43.7	972	1935	2907	
		64.5	5494	55.3	27.6	82.9	4072	2398	6470	
		63.6	5402	42.3	31.9	74.2	2832	2174	5006	
		57.1	5220	59.5	30.1	89.6	4525	2636	7161	

12	Unmanured	15.1	1355	17.7	12.1	29.8	1119	843	1962	12
13	Dung in 1905, and every fourth year since (omitted in 1917). Fish Guano in 1907 and every fourth year since	{ not limed } { limed ... }	37.6 3408	41.5 26.7	23.1 18.5	64.6 45.2	2789 2009	1835 1361	4624 3370	13
14	Complete Mineral Manure and double dressing Nitrate of Soda (=86 lb. N.)	{ not limed } { limed }	52.9 4348	49.8 39.7	25.4 18.6	75.2 58.3	3638 2928	1745 1086	5383 4014	14
15	Complete Mineral Manure as plot 7; following double dressing Nitrate of Soda (=86 lb. N.)	{ not limed } { limed ... }	23.6 1711	22.2 12.9	22.7 19.7	44.9 32.6	1519 1050	1539 1237	3058 2287	15
16	Complete Mineral Manure and single dressing Nitrate of Soda (=43 lb. N.)	{ not limed } { limed ... }	31.3 2432	37.0 25.5	24.2 21.6	61.2 47.1	2395 1773	1577 1317	3972 3090	16
17	Single dressing Nitrate of Soda (=43 lb. N.)	{ not limed } { limed ... }	19.1 20.2	22.2 20.4	22.8 22.2	45.0 42.6	1182 1340	1602 1352	2784 2692	17
18	Potash, Sulphate of Soda, Magnesia, and double dressing Sulphate of Amm. (=86 lb. N.) 1905 and since; following Minerals and Amm. Salts, supplying the constituents of 1 ton of Hay, 1865-1904	{ not limed } { limed } { (6788 lb.) } { limed } { (3951 lb.) }	25.7 29.7	2349 2682	5.2 18.9	36.0 32.3	401 1338	2141 2210	2542 3548	18
19	Farmyard Dung in 1905 and every 4th year since (omitted in 1917); following Nitrate of Soda (=43 lb. N.) and Minerals, 1872-1904	{ not limed } { limed } { (3150 lb.) } { limed } { (570 lb.) }	30.3 33.8	2746 3040	16.3 23.3	27.1 31.1	1133 1669	1893 1723	3026 3392	19
20	Farmyard Dung in 1905 and every 4th year since (omitted 1917); each intervening year, plot 20 receives Sulphate of Potash, Superphosphate and Nitrate of Soda (=26 lb. N.); following Nitrate of Potash and Superphosphate, 1872-1904	{ not limed } { limed } { (2772 lb.) } { limed } { (570 lb.) }	23.3 25.7	2128 2218	8.7 16.6	23.6 22.9	683 1142	1395 1462	2078 2604	20

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

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

1st and 2nd Hay Crops, 1922, were carted in very bad condition owing to the wet weather, some plots being much wetter than others. The Dry Matter figures give a truer indication of the relative yields of the different plots.

In 1921 there was no second crop.

The Park Grass Plots—contd.
 BOTANICAL COMPOSITION, PER CENT. 1920 1st Crop.

Plot.	Manuring.	Liming.	Gramineae.	Leguminosae.	Other Orders.	"Other Orders" consist largely of	Plot.
3	Unmanured	Limed ...	61.20	11.75	27.06	Centaurea nigra	3
5-1	Unmanured, following double Amm. Salts, 1856-97	Not limed	51.50	10.36	38.14	Centaurea nigra	5-1
5-2	Super. and Sulph. Potash following double Amm. Salts, 1856-97	Not limed	73.43	1.36	25.20	Centaurea nigra	5-2
7	Complete Mineral Manure	Limed ...	60.15	9.94	29.62	Luzula campestris (noticeable)	7
8	Mineral Manure (without Potash)	Not limed	42.82	44.21	12.98	Centaurea nigra	8
9	Complete Mineral Manure and double Amm. Salts	Limed ...	42.85	28.37	28.79	Achillea millefolium	9
10	Mineral Manure (without Potash) and double Amm. Salts	Not limed	56.96	13.80	29.25	Centaurea nigra	10
14	Complete Mineral Manure and double Nitrate of Soda	Limed (sun)	48.46	17.22	34.33	Plantago lanceolata, Achillea millefolium and Centaurea nigra	14
15	As plot 7 following double Nitrate of Soda, 1858-75	Not limed	96.01	0.69	3.30	Rumex acetosa	15
16	As plot 7 and single Nitrate of Soda	Limed ...	95.04	—	4.97	Rumex acetosa	16
17	Single Nitrate of Soda	Limed ...	99.63	—	0.37	Rumex acetosa	17
18	Potash, Sulphate Soda, Magnesia, and double Sulphate of Amm. 1905 and since	Not limed	99.06	—	0.93	Rumex acetosa	18
19	Farmyard Dung in 1905 and every 4th year since, omitted in 1917	Limed (shade)	95.13	0.89	3.97	Taraxacum vulgare	19
20	Farmyard Dung in 1905 and every 4th year since (omitted 1917), each intervening year Sulphate Potash, Super., and Nitrate of Soda	Not limed	93.16	5.84	0.99	Taraxacum vulgare	20
		Limed ...	97.88	—	2.13	Taraxacum vulgare	
		Limed ...	72.64	11.49	15.86	Achillea millefolium, Plantago lanceolata	
		Not limed	60.95	18.20	20.84	Achillea millefolium, Centaurea nigra	
		Limed ...	92.47	1.54	5.98	Achillea millefolium	
		Not limed	83.35	5.98	10.68	Taraxacum vulgare	
		Limed ...	67.23	1.80	30.96	Centaurea nigra	
		Not limed	62.46	0.29	37.26	—	
		limed 6788 lb.	78.05	—	21.95	Rumex acetosa	
		" 3951 lb.	81.28	—	18.72	Rumex acetosa	
		Not limed	87.66	0.14	12.20	Rumex acetosa	
		limed 3150 lb.	84.98	9.38	5.63	Achillea millefolium, Ranunculus spp.	
		" 570 lb.	71.47	18.63	9.91	Centaurea nigra, Ranunculus spp.	
		Not limed	76.38	15.25	8.36	Ranunculus spp.	
		limed 2772 lb.	86.32	4.66	9.02	Centaurea nigra, Achillea millefolium, Anthriscus sylvestris	
		" 570 lb.	78.70	15.30	6.01	Centaurea nigra	
		Not limed	86.80	4.51	8.70	Achillea millefolium, Centaurea nigra	

WHEAT. BROADBALK FIELD, 1921.

Plot.	Manurial Treatment.	Top Portion.						Bottom Portion.					
		Dressed Grain.		Ofal Grain per Acre. lb.	Straw per Acre. lb.	Total Straw per Acre. cwt.	Proportion of Total Grain to 100 of Total Straw.	Dressed Grain.		Ofal Grain per Acre. lb.	Straw per Acre. lb.	Total Straw per Acre. cwt.	Proportion of Total Grain to 100 of Total Straw.
		Yield per Acre. Bush.	Weight per Bushel. lb.					Yield per Acre. Bush.	Weight per Bushel. lb.				
2A	Farmyard Manure ...	24.8	65.4	215	2457	29.1	56.4	26.2	65.8	200	2587	31.4	54.8
2B	Farmyard Manure ...	27.0	64.8	252	2811	37.4	47.8	26.4	66.0	229	2853	37.5	47.0
3	Unmanured ...	10.4	64.0	103	712	8.7	78.5	8.0	63.3	97	462	6.9	77.7
5	Complete Mineral Manure ...	7.9	63.3	83	518	6.8	76.4	7.7	63.5	91	484	6.5	79.5
6	As 5, and Single Amm. Salts ...	14.9	64.3	162	1418	17.6	56.7	12.2	64.3	138	996	13.5	61.0
7	As 5, and Double Amm. Salts ...	19.5	65.3	232	2302	28.8	46.6	16.1	64.8	258	1833	23.5	49.6
8	As 5, and Treble Amm. Salts ...	17.9	65.6	251	2422	33.4	38.1	19.8	65.3	311	2242	30.5	46.9
9	As 5, and Single Nitrate of Soda ...	15.9	64.3	145	1756	20.5	50.9	14.0	63.5	135	1574	18.1	50.4
10	Double Amm., Salts alone ...	16.5	63.9	184	1584	17.9	61.6	12.1	63.5	186	1130	14.3	59.8
11	As 10, and Superphosphate ...	9.4	62.8	239	1488	18.4	40.3	5.8	62.0	247	1090	15.7	34.5
12	As 10, and Super. and Sulph. Soda ...	16.0	63.5	259	2024	23.6	48.2	10.4	63.3	237	1500	19.8	40.2
13	As 10, and Super. and Sulph. Potash ...	20.2	64.4	205	2382	27.8	48.3	11.1	63.9	201	1710	24.0	33.8
14	As 10, and Super. and Sulph. Magnesia ...	17.8	64.1	301	2020	24.5	52.4	11.1	63.5	249	1460	19.8	43.1
15	Double Amm. Salts in Autumn and Minerals ...	22.6	64.8	277	2408	29.9	52.0	14.2	64.3	197	1472	21.3	46.5
16	Double Nitrate and Minerals ...	24.4	65.0	248	2942	34.1	48.0	17.2	64.8	246	2300	29.5	41.3
17	Minerals alone, or double Amm. Salts alone in alternate years ...	8.6	62.9	78	524	7.5	73.9	10.1	63.1	135	772	9.9	69.8
18	Rape Cake alone ...	22.8	64.8	246	2252	26.7	57.4	20.3	64.8	210	2068	24.7	55.1
19	Mineral Manure (without Super.) and Amm. Salts ...	16.3	64.1	244	1538	19.3	59.5	15.4	64.1	216	1554	20.1	53.3
20	Mineral Manure (without Super.) and Amm. Salts ...	10.9	63.9	210	1627	20.7	39.1	—	—	—	—	—	—

WHEAT. BROADBALK FIELD, 1922.

Plot.	Manurial Treatment.	Top Portion.						Bottom Portion.				71 year Average 1852-1922.			
		Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Straw to Total of 100.	Dressed Grain.	Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Straw to Total of 100.	Dressed Grain per Acre.	Total Straw per Acre.	
		Yield per Acre.	Weight per Bushel.												Yield per Acre.	Weight per Bushel.
2A	Farmyard Manure ...	32.9	61.2	241	2204	31.8	63.2	24.7	62.0	727	2010	32.0	63.0	28.4*	32.8*
2B	Farmyard Manure ...	36.0	61.3	255	2296	35.2	62.4	29.5	61.7	603	2070	35.9	60.2	34.3	34.6
3	Unmanured ...	9.0	60.5	98	704	8.8	65.3	6.2	60.5	101	476	6.6	64.8	12.1	9.9
5	Complete Mineral Manure ...	10.5	61.1	94	820	10.2	64.4	8.3	60.8	106	598	9.1	60.1	13.9	11.7
6	As 5, and Single Amm. Salts ...	17.3	60.8	132	1386	17.4	60.5	11.7	61.2	132	858	11.7	64.3	22.3	20.7
7	As 5, and Double Amm. Salts ...	29.0	60.8	246	2290	30.1	59.6	13.1	61.1	470	1702	23.7	47.8	30.9	32.2
8	As 5, and Treble Amm. Salts ...	25.4	60.8	439	1954	37.4	47.3	16.5	59.9	339	1416	29.4	40.4	35.1	40.2
9	As 5, and Single Nitrate of Soda ...	24.8	58.9	180	1878	23.4	62.5	13.7	59.2	142	920	14.3	59.4	24.5†	24.7†
10	Double Amm. Salts alone ...	9.2	59.4	305	850	15.1	50.3	4.3	58.8	306	634	11.9	41.7	19.1	18.0
11	As 10, and Superphosphate ...	4.2	57.6	327	974	18.9	26.7	1.3	57.3	189	478	13.3	17.7	21.5	21.7
12	As 10, and Super. and Sulph. Soda ...	7.4	59.0	371	1114	20.4	35.4	3.3	57.5	307	756	17.6	25.3	27.6	27.2
13	As 10, and Super. and Sulph. Potash ...	24.4	60.7	232	1968	26.9	56.9	14.5	61.1	300	1456	21.2	49.7	29.8	31.0
14	As 10, and Super. and Sulph. Magnesia ...	4.7	57.4	318	716	16.4	31.9	7.6	58.0	358	762	19.4	36.8	27.3	27.2
15	Double Amm. Salts in Autumn and Minerals ...	14.3	60.4	277	1420	23.1	44.0	8.1	60.2	300	1220	20.8	33.8	28.4	28.7
16	Double Nitrate and Minerals ...	27.0	60.7	405	2147	33.1	55.2	18.0	61.0	441	1868	31.0	44.2	30.7†	35.8†
17	Minerals alone, or Double Amm. Salts alone in alternate years ...	21.1	59.8	242	1786	23.5	57.2	17.1	59.8	280	1568	22.6	51.4	28.6	28.6
18	Rape Cake alone ...	13.3	59.9	101	995	13.4	59.7	9.4	60.3	259	970	14.1	52.1	14.3	12.4
19	Mineral Manure (without Super.) and Amm. Salts	14.5	58.9	377	1212	21.1	52.0	9.5	58.3	338	1326	20.9	38.0	22.0†	22.7†
20	Mineral Manure (without Super.) and Amm. Salts	20.8	60.3	302	1419	21.6	64.3	—	—	—	—	—	—	18.6§	19.8§

* 23 years only, 1900-1922. † 30 years only, 1893-1922. § 15 years only, 1906-1922 (no crop in 1912 and 1914).

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

Hay, Dry Matter, and Nitrogen per Acre, 1921 and 1922.

Year.	No. of Cuttings.	As Hay.	Dry Matter.	Nitrogen.	Seed Sown.
1921	2	lb. 307	lb. 256	lb. 7	1921, March 31st, re-sown 1922, May 12th, mended
1922	2	2399	1999	61	
Averages :					
25 years, 1854—1878		7664	6387	179	
25 years, 1879—1903		3924	3270	101	
50 years, 1854—1903		5794	4829	140	
15 years, 1904—1918		2888	2407	70	
4 years, 1919—1922		2001	1668	51	

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

Hoos Field, 1921 and 1922.

	1921.	1922.	Average 67 years 1856-1922.
Dressed Grain { Yield per Acre—Bushels	15.20	6.93	15.22
{ Weight per Bushel—lb.	64.5	60.4	59.6
Offal Grain per Acre—lb.	110	189	52
Straw per Acre—lb.	1082	686	—
Total Straw per Acre—cwt.	13.2	10.3	13.1
Proportion of Total Grain to 100 of Total Straw	73.5	52.5	—

AVERAGE WHEAT YIELDS of VARIOUS COUNTRIES

Country.	Mean Yield per Acre 1901-10. Bushels.	Country.	Mean Yield per Acre 1901-10. Bushels.
Great Britain	31.6	Denmark	41.3
England	31.7	Argentina	10.6
Hertfordshire	30.5	Australia	10.1
France	20.2	Canada	19.5
Germany	29.1	United States	14.3
Belgium	35.1	Russia—European	10.0

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

PERMANENT BARLEY PLOTS. Hoos Field, 1921, 1922.
PRODUCE PER ACRE.

Plot.	Manuring.	1921.					1922.					70 years Average Yield 1852-1922.†			
		Yield per Acre.	Weight per Bushel.	Offal Grain per Acre.	Straw per Acre.	Total Straw to 100 of Total Grain	Yield per Acre.	Weight per Bushel.	Offal Grain per Acre.	Straw per Acre.	Total Straw to 100 of Total Grain	Dressed Grain per Acre.	Total Straw per Acre.		
1 O	Unmanured	7.6	55.8	95	253	4.6	100.4	11.8	50.7	66	396	5.7	104.6	Bush. 14.0	cwt. 8.0
2 O	Superphosphate only	17.9	55.6	128	561	8.2	122.7	16.6	51.0	74	487	9.3	88.7	19.6	9.9
3 O	Alkali Salts only	13.0	56.4	114	440	7.5	101.3	11.9	49.8	55	459	8.0	71.9	15.0	8.8
4 O	Complete Minerals	16.7	56.3	125	630	9.5	99.8	15.1	52.0	74	608	9.0	85.4	19.8	11.1
5 O	Potash and Superphosphate	11.2	57.6	77	374	4.9	132.9	9.9	50.8	37	319	4.5	108.1	16.2	9.6
1 A	Ammonium Salts only	11.1	53.5	189	451	7.9	88.9	13.5	49.7	83	402	6.3	107.4	24.8	14.1
2 A	Superphosphate and Amm. Salts	27.1	54.8	396	1229	16.5	102.1	20.4	50.8	130	602	9.4	110.7	37.0	20.9
3 A	Alkali Salts and Amm. Salts	10.6	56.0	191	547	9.8	71.2	16.0	50.5	114	765	11.0	75.0	27.0	16.3
4 A	Complete Minerals and Amm. Salts	30.3	56.5	188	1411	18.4	92.1	30.7	51.5	90	921	13.1	114.2	40.6	24.0
5 A	Potash, Super. and Amm. Salts	22.7	57.9	85	1023	13.8	90.9	33.0	51.7	64	1205	14.4	109.8	34.9	22.2
1 AA	Nitrate of Soda only	7.9	53.3	215	457	8.2	69.7	14.1	50.3	109	517	8.8	82.9	25.3*	15.6*
2 AA	Super. and Nitrate of Soda	33.7	54.8	267	1441	17.9	105.2	30.6	51.9	88	957	13.7	109.7	39.9*	23.5*
3 AA	Alkali Salts and Nitrate of Soda	8.2	54.3	157	484	9.2	58.7	12.8	50.7	113	704	12.9	53.0	25.9*	16.8*
4 AA	Complete Minerals and Nitrate of Soda	33.2	56.6	171	1546	19.7	93.2	32.9	52.4	93	1260	17.1	94.6	39.2*	23.9*
1 AAS	As Plot 1 AA and Silicate of Soda	13.7	55.0	231	600	9.6	91.2	20.1	50.8	116	891	12.5	81.0	31.6*	18.7*
2 AAS	" " 2 AA "	33.0	55.3	243	1430	19.3	95.9	32.0	52.7	89	1100	14.5	109.1	41.0*	24.5*
3 AAS	" " 3 AA "	11.8	55.6	160	644	12.1	60.4	18.4	51.1	111	1161	15.4	60.9	32.9*	20.4*
4 AAS	" " 4 AA "	28.9	57.8	133	1342	19.6	81.9	36.8	53.2	87	1342	22.3	81.9	41.5*	26.0*
1 C	Rape Cake only	23.3	54.9	189	954	12.9	101.5	27.1	52.6	109	844	13.0	105.6	36.5	20.9
2 C	Superphosphate and Rape Cake	30.1	55.7	158	1139	15.0	109.2	33.8	51.8	74	974	13.6	119.9	38.8	22.3
3 C	Alkali Salts and Rape Cake	16.0	56.3	85	633	9.4	93.3	27.5	51.6	74	960	12.5	106.9	35.0	20.9
4 C	Complete Minerals and Rape Cake	18.1	57.1	75	673	10.6	93.5	34.2	52.2	70	1152	15.1	109.6	38.5	22.9
7-1	Unmanured (after dung 20 years, 1852-71)	11.0	56.0	107	394	7.5	85.6	17.7	52.1	72	631	9.0	98.1	24.0†	14.1†
7-2	Farmyard Manure	28.6	58.2	94	1509	20.4	76.7	31.4	52.0	99	1403	19.9	77.6	46.0	28.5
6-1	Unmanured	7.9	55.6	129	314	5.7	88.8	8.1	51.4	51	343	4.6	91.1	15.4	8.9
6-2	Ashes from Laboratory furnace	8.5	54.0	129	398	6.0	87.2	6.3	49.9	49	314	4.6	70.4	16.3	9.5
1 N	Nitrate of Soda only	8.4	52.5	184	490	7.6	73.2	13.7	51.0	95	616	9.3	76.3	30.0§	18.3§
2 N	" " "	21.4	55.4	206	979	13.5	92.2	25.6	51.0	86	963	12.4	100.3	33.8§§	20.4§§

† 1912, all plots were fallowed. * 54 years, 1868-1922. † 50 years, 1872-1922. § 63 years, 1859-1922.