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Wheat Alternated With Fallow, and Wheat Grown Continuously

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EXPERIMENTS ON WHEAT ALTERNATED WITH FALLOW, AND WHEAT GROWN CONTINUOUSLY.

The results given in the following Table show the produce of wheat obtained on the Rothamsted soil for many years in succession, after bare fallow, compared with that of wheat grown continuously year after year on the same land, without the intervention of fallow; in both cases without manure.

Hoos-field, in which the experiments on alternate wheat and fallow are conducted, adjoins *Broadbalk-field*, in which wheat has now been grown continuously without manure (also with different descriptions of manure), for 55 years in succession; and the produce of the unmanured plot of that field, is compared with that grown in alternation with fallow, also without manure, in *Hoos-field*.

The description of seed sown has been the same in the two fields in the corresponding years; namely—for the crop of 1852 "Red Cluster"; for 28 years, 1854 to 1881 inclusive, "Red Rostock"; and for 1882 and since, "Club" or "Square Head" (Red).

During the first or preliminary period of 5 years, 1851-1855, the cropping of the acre set apart for the experiment on wheat alternated with fallow was as follows:—1851, Fallow (after wheat in 1850); 1852, Wheat; 1853, Fallow; 1854, Wheat; 1855, half Fallow, and half Wheat. From that time to the present the respective halves have been alternately fallow and wheat, giving therefore a crop of wheat succeeding fallow, on half the acre each year.

In the upper division of the Table are given the results for each of the five years of the preliminary period; and in the main division are recorded the results for each individual year of the exact experiment, from 1856 up to the present time.

In the first column of each main vertical division of the Table is given the produce per acre (Area under experiment, 1 acre.)

1852, on the half acre of wheat after fallow; and in the second column the produce per acre obtained in the adjoining field (*Broadbalk*), where wheat is grown year after year on the same land. Lastly, in the third column of each of the vertical divisions is given the amount of produce after fallow, + or - that grown year after year on the same land.

The results for the individual years show that during the earlier years of the experiments on alternate wheat and fallow, when the accumulations due to previous treatment were less exhausted, the produce after fallow was more in excess of that grown in the adjoining field year after year on the same land than afterwards. Referring to the two sets of averages at the foot of the Table, it is seen that if (as in the upper of the two divisions), the produce after fallow is reckoned at the yield per acre of the half in crop each year, it gives on the average several bushels more grain, and also more straw, per acre per annum, than where the crop is grown continuously. On the other hand, if the produce after fallow is reckoned (as in the bottom division) at the yield per acre of the whole area, half in crop and half fallow, it gives several bushels less grain, and also less straw, per acre per annum, than where the crop is grown year after year on the same land.

The conclusion to be drawn is, that although there is an increase of produce after fallow compared with that of wheat grown continuously, it is obtained at the sacrifice of a crop every other year; and that a given area of land yields more when the crop is grown year after year than when alternated with fallow. The explanation doubtless is, that much of the nitrogen brought into an available condition under the influence of the fallow, is lost by drainage during the long period that the land is without a crop.

Year	Dressed Grain.		Weight per Bushel.		Total Grain.		Total Straw.		Total Produce (Grain and Straw).	
	Wheat after Fallow each year.	Wheat after Fallow + or - after Wheat.	Wheat after Fallow each year.	Wheat after Fallow each year.	Wheat after Fallow each year.	Wheat after Fallow + or - after Wheat.	Wheat after Fallow each year.	Wheat after Fallow + or - after Wheat.	Wheat after Fallow each year.	Wheat after Fallow + or - after Wheat.
1851	Bushels. Fallow 37	Bushels. - 157	lbs. Fallow 61.1	lbs. Fallow 1083	lbs. Fallow 4934	lbs. Fallow 1627	lbs. Fallow 7022	lbs. Fallow 2710	lbs. Fallow - 2710	lbs. Fallow 1851
1852	Fallow 42	+ 23 1/2	Fallow 53.0	860	1228	1597	3337	2457	+ 4565	1852
1853	Fallow 42	+ 21	Fallow 60.5	359	359	1413	Fallow 1772	1772	+ 1772	1853
1854	Fallow 42	+ 21	Fallow 60.5	1359	4350	2137	2544	3496	+ 3758	1854
1855	Fallow 42	+ 0 1/2	Fallow 59.2	1072	1734	1787	2814	2859	- 45	1855
PERIOD OF EXACT COMPARISON.										
1856	21 1/2	+ 7 1/2	60.0	1388	496	1558	3501	2450	+ 1051	1856
1857	38	+ 18	58.3	2299	1063	1577	5374	2813	+ 2361	1857
1858	25 1/2	+ 7 1/2	60.4	1630	489	1670	4098	2811	+ 1287	1858
1859	34	+ 15 1/2	55.0	1376	925	2175	5662	3226	+ 2436	1859
1860	121	+ 0 1/2	52.5	697	41	1459	1923	2197	- 274	1860
1861	17 1/2	+ 6 1/2	57.4	1145	409	1254	3217	1990	+ 1227	1861
1862	22 1/2	+ 6 1/2	57.8	1361	365	1713	3655	2709	+ 946	1862
1863	32 1/2	+ 15 1/2	61.4	2090	963	1600	4990	2727	+ 2263	1863
1864	31 1/2	+ 14 1/2	61.7	2005	927	1350	4751	2428	+ 2323	1864
1865	24 1/2	+ 11	60.6	1440	612	1033	3590	1861	+ 1729	1865

1866	10 1/2	12 1/2	1 1/2	58.5	61.3	653	777	124	1146	1269	123	1799	2046	247	1866
1867	9 1/2	8 1/2	0	58.2	56.1	616	582	84	1126	973	133	1742	1505	237	1867
1868	25	10 1/2	4	63.4	61.0	1686	1054	193	2398	973	1425	4054	2027	2027	1868
1869	10 1/2	14 1/2	8	60.1	56.1	655	848	130	1019	1350	331	1674	2198	524	1869
1870	17 1/2	15	2 1/2	62.5	61.8	1101	956	145	1282	1046	286	2383	2002	881	1870
1871	9 1/2	10 1/2	0	58.5	54.8	605	615	10	1287	1100	187	1892	1715	177	1871
1872	12 1/2	11 1/2	2	58.3	59.0	780	705	75	1307	1152	155	2087	1857	230	1872
1873	2 1/2	11 1/2	9	42.0	57.0	181	701	520	875	902	27	1036	1608	547	1873
1874	21 1/2	11 1/2	10	60.0	58.3	1370	694	676	2000	1000	1010	3370	1684	1684	1874
1875	16 1/2	8 1/2	7 1/2	57.2	60.0	993	567	426	1725	1008	717	2718	1575	1143	1875
1876	10 1/2	8 1/2	2 1/2	58.7	59.0	635	500	135	790	642	148	1425	1142	283	1876
1877	10 1/2	8 1/2	1	60.5	58.9	649	543	106	829	748	81	1478	1291	187	1877
1878	19 1/2	12 1/2	7 1/2	57.9	59.0	1171	776	395	1684	1081	573	2325	1857	968	1878
1879	6	4 1/2	1	55.6	52.5	379	379	49	808	763	45	1187	1093	94	1879
1880	15 1/2	11 1/2	3	58.7	56.9	937	689	248	1665	1149	516	2602	1838	764	1880
1881	12 1/2	13 1/2	1 1/2	54.6	58.0	748	863	115	897	1146	249	1645	2009	364	1881
1882	11 1/2	11	0	58.6	58.7	719	679	40	1085	1095	10	1804	1774	30	1882
1883	18 1/2	13 1/2	4	61.2	61.2	1160	872	288	1301	1006	295	2461	1878	583	1883
1884	20 1/2	13	7	60.2	62.1	1240	824	416	1344	905	639	2784	1729	1055	1884
1885	23	15 1/2	7 1/2	57.9	59.0	1351	925	426	1812	1137	675	3163	2062	11101	1885
1886	9 1/2	9	0 1/2	62.2	61.5	588	564	24	657	570	87	1245	1134	111	1886
1887	19	14 1/2	4 1/2	59.9	59.8	1153	906	247	1212	895	317	2365	1801	564	1887
1888	12 1/2	10	2 1/2	56.1	58.8	735	614	121	1239	901	338	1974	1515	459	1888
1889	13	12 1/2	0	59.5	59.8	796	743	53	916	902	14	1645	1645	67	1889
1890	17 1/2	14	3 1/2	59.8	59.4	1088	849	239	1657	1004	653	2745	1853	892	1890
1891	23 1/2	13 1/2	9 1/2	58.9	57.4	1404	828	576	2241	1314	927	3645	2142	1503	1891
1892	11 1/2	9 1/2	2 1/2	60.2	59.6	731	589	142	1108	836	272	1839	1425	414	1892
1893	13 1/2	9 1/2	3 1/2	62.4	62.7	870	728	854	1724	609	245	1724	1251	473	1893
1894	18	18	2 1/2	59.7	60.2	953	1121	168	1483	1487	4	2436	2608	172	1894
1895	15 1/2	10	5 1/2	62.2	62.5	978	664	314	1151	720	431	2129	1884	745	1895
1896	16 1/2	16 1/2	0 1/2	60.7	61.4	1020	1087	67	1312	1309	3	2332	2396	64	1896
1897	7	8 1/2	1 1/2	59.5	60.3	460	592	132	710	867	157	1170	1459	289	1897

AVERAGES—PRODUCE AFTER FALLOW RECKONED AT THE YIELD PER ACRE OF THE HALF IN CROP EACH YEAR.

5 yrs. 1851-'55	19 1/2	14 1/2	4 1/2	55.8	56.7	1175	947	228	2243	1712	531	3418	2659	759	5 yrs. 1851-'55
10 yrs. 1856-'65	26 1/2	15 1/2	10 1/2	58.5	57.9	1603	982	621	2473	1539	934	4076	2521	1555	10 yrs. 1856-'65
10 yrs. 1866-'75	13 1/2	11 1/2	1 1/2	57.9	58.5	861	745	116	1417	1076	341	2378	1821	457	10 yrs. 1866-'75
10 yrs. 1876-'85	14 1/2	11 1/2	3 1/2	58.4	58.5	899	700	199	1238	967	271	2137	1667	470	10 yrs. 1876-'85
10 yrs. 1886-'95	15 1/2	12 1/2	3	60.1	60.2	930	752	178	1252	924	328	2182	1676	506	10 yrs. 1886-'95
40 yrs. 1856-'95	17 1/2	12 1/2	4 1/2	58.7	58.8	1073	795	278	1595	1127	468	2668	1921	747	40 yrs. 1856-'95

AVERAGES—PRODUCE AFTER FALLOW RECKONED AT THE YIELD PER ACRE OF THE WHOLE AREA, HALF IN CROP AND HALF FALLOW.

5 yrs. 1851-'55	9 1/2	14 1/2	5 1/2	58.7	58.8	587	947	360	1122	1712	590	1709	2659	950	5 yrs. 1851-'55
10 yrs. 1856-'65	13	15 1/2	2 1/2	80.2	80.2	802	982	180	1236	1539	303	2038	2521	488	10 yrs. 1856-'65
10 yrs. 1866-'75	6 1/2	11 1/2	5 1/2	430	430	430	745	315	709	1076	367	1139	1821	682	10 yrs. 1866-'75
10 yrs. 1876-'85	7 1/2	11 1/2	3 1/2	449	449	449	700	251	619	967	348	1068	1667	599	10 yrs. 1876-'85
10 yrs. 1886-'95	7 1/2	12 1/2	4 1/2	465	465	465	752	287	626	924	298	1091	1676	585	10 yrs. 1886-'95
40 yrs. 1856-'95	8 1/2	12 1/2	4 1/2	536	536	536	795	259	798	1127	329	1334	1921	587	40 yrs. 1856-'95