ROTHAMSTED RESEARCH

Yields of the Field Experiments 1898

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Rotation; Agdell Field

Rothamsted Research

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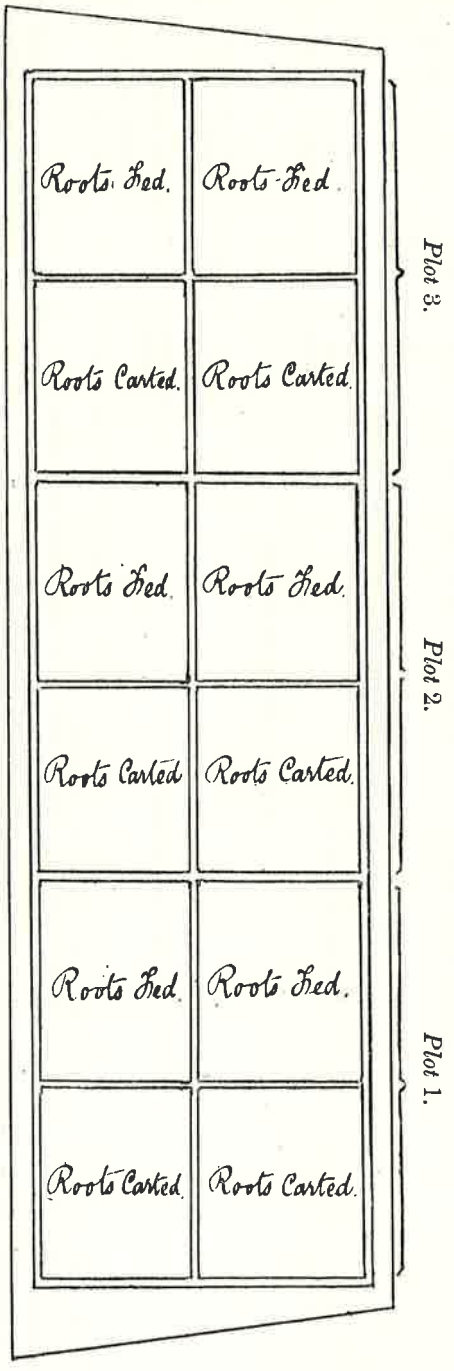
PLAN OF THE PLOTS IN AGDELL FIELD, ON WHICH EXPERIMENTS HAVE BEEN MADE ON FOUR-COURSE ROTATION.

51 years, commencing 1848.

[For brief summary of results and conclusions, see opposite page.]



Total area of ploughed land about 3 acres.
Area of each of the 12 divisions ¼ acre.

The 4 lower divisions, Unmanured continuously (Plot 1).
The 4 middle divisions, Mineral Manure, for the Roots, each Course (Plot 2).
The 4 upper divisions, Mineral and Nitrogenous Manure, for the Roots, each Course (Plot 3).
The 6 left-hand divisions, Clover (or Beans), 3rd year each Course.
The 6 right-hand divisions, Fallow, 3rd year each Course.
The double lines indicate division paths between plot and plot.

[For details of the manuring and produce, see pp. 100–109.]

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RESULTS OF EXPERIMENTS MADE IN AGDELL FIELD, ON THE ROTATION OF CROPS.

The experiments were commenced in 1848; so that 1898 is the 51st year of their continuance, and the third year of the 13th Course. In the experiments in other fields, some of the most important crops of rotation have been grown, each separately, for many years in succession—without manure, with farmyard manure, and with various artificial manures. But besides such experiments, others have been made on the growth of the crops in an actual course of rotation, without manure, and with different manures. The results with the individual crops throw much light on the characteristic requirements of each particular crop; whilst those on the growth of the crops in rotation serve to confirm and control those with the individual crops.

The rotation selected for investigation was the well known and typical four-course rotation of—1. Turnips; 2. Barley; 3. Leguminous Crops (or Fallow); 4. Wheat; that is, an alternation of Root-crops and of Leguminous Crops with cereals; which is the basis of most of the various rotations adopted in different parts of our own country, and also in many other countries. One portion of the land was left entirely without manure each course; another received mineral manure only, for the turnips of each course; and a third mixed mineral and nitrogenous manures, also only for the turnips of each course.

1. *The Swedish Turnips commencing each Course.*—When various root-crops were grown year after year on the same land without manure, they soon reverted to the uncultivated condition; and the experiments on rotation show that the Swedish turnips grown once in four years in unmanured rotation, came down to only about 1 ton per acre. The results further show, that mineral manures alone applied for the root-crops gave considerable increase, but that mineral and nitrogenous manures together gave more still. Without manure, the average produce of roots was less over the last 3 than over the preceding 8 courses; but with mineral manure alone (including potash in the last 3 courses) it was higher, and with mineral and nitrogenous manures together much higher, over the last 3 courses; the result being, however, largely due to more favourable seasons. Indeed, in 1888 and 1892, the years of root-crop in the 11th and 12th courses, although the produce without manure was less, that by each of the two descriptions of manure was considerably more than the average of the preceding courses; that is, both the reversion to the uncultivated condition without manure, and the increased growth with suitable manures, were very marked. In fact, without manure the produce of roots was as restricted in rotation as in continuous growth; with purely mineral manure it was greater in rotation than in continuous growth, the exhaustion of the available nitrogen of the soil being less under rotation; and with the mixed mineral and nitrogenous manure much more produce was obtained under rotation than with continuous growth. Lastly, the results conclusively show how artificial a product is the cultivated root-crop, and how dependent it is for its successful growth on an abundant supply of available food—nitrogenous as well as mineral—within the soil.

2. *The Barley Crops.*—Barley, without manure, succeeded the differently manured Swedish turnip crops of each course. Although the average produce of the root-crops was greater over the last 3 (10th, 11th, and 12th) than over the preceding 8 courses, the succeeding barley crops were much less over the last 3 courses. This was the case, not only where the root-crops had been carted off, but also where they had not been so removed. As, however, the produce of barley in the 3 years in question (1885, 1889, 1893) was also less than the average in Hoos Field where the crop is grown year after year, the result is doubtless mainly due to the seasons. Then, the average produce of barley over the 8 courses was actually less after the carted off roots grown by mineral manure (superphosphate) than after those grown without manure. The explanation is—that as there was practically no produce of roots without manure the unmanured plot was practically fallow for the barley; whilst with the mineral manure fair crops of roots were grown and removed, leaving the surface soil the more exhausted of its available nitrogen and other constituents. In the later years, however, after such long continued exhaustion, the unmanured plot has yielded less barley after the removal of the roots than the mineral manured plot. On the other hand, where the roots were not removed from the land, the mineral manured plot has generally yielded more barley than the unmanured. Further, under all conditions of treatment, the plots with mixed mineral and nitrogenous manure have yielded more barley than those with the mineral manure alone. In fact, the effects of the manurial and other treatment of the first crop of the course are clearly manifested in the produce of the second crop. Lastly, both without manure, and with the mineral manure alone, there was more produce of barley in rotation than in continuous growth, but with mixed mineral and nitrogenous manure there was more produce when the crop was grown continuously, the supply of nitrogen in that case being somewhat larger and annually applied for the crop.

3. *The Leguminous Crops (or Fallow).*—Under equal conditions as to manuring, the Leguminous crops, especially the clover, bring much more nitrogen into the course than either of the other crops. Further, the amount of nitrogen so brought into the rotation is much greater under the influence of mineral manures, and especially of potash manures, than without manure; whilst under the influence of the mixed mineral and nitrogenous manure the yield of nitrogen is greater still, the leguminous crop utilising the unexhausted nitrogenous manure- and crop-residue. For the successful growth of leguminous crops, however, a liberal supply of available mineral constituents within the soil, especially potash and lime, is essential. Judging from comparable cases, the amount of nitrogen accumulated by the Leguminous crops was much greater when they were grown in rotation, that is only occasionally, than when grown continuously. With fallow instead of a Leguminous crop, there is very much less nitrogen yielded in the rotation, and more liability to loss of it by drainage, and hence so much less brought into the circulation of the farm for food or manure. Lastly, most of the nitrogen of the leguminous crop is retained on the farm; and there is more or less, and sometimes much nitrogenous crop-residue left in the soil for succeeding crops.

4. *The Wheat Crops.*—There was very much more produce of wheat both without manure and with mineral manure, and considerably more with the mineral and nitrogenous manure, when it was grown in rotation than under comparable conditions continuously. Taking the quantities of produce by the mixed mineral and nitrogenous manure the result was that the two cereal crops produced approximately equal amounts of dry substance, and each considerably more than either of the assumed restorative crops—the roots or the leguminous crops. The supply of nitrogen within the soil available to the wheat crop is increased both by fallow and by the growth of a leguminous crop, especially of clover; and the accumulation is the greater when the soil and subsoil are not abnormally exhausted of organic nitrogen.

Upon the whole the results show that the benefits of rotation are very various. They depend on the varying requirements, habits of growth, and capabilities of gathering and assimilating the necessary constituents, of the different crops. The difference in the amounts available within the soil of the various mineral constituents, is one element in the explanation; but the facts relating to the amount, and to the sources, of the nitrogen of the different crops, are of still greater significance. The uses of the different crops have also to be taken into account. The cereals yield more produce for sale in the season of growth in rotation than when grown continuously. The crops alternated with them accumulate very much more of mineral constituents and of nitrogen in their produce; but by far the greater proportion of those constituents remains in circulation in the manure of the farm, whilst the remainder yields highly valuable products for sale in meat and milk. Again, with a variety of crops, the operations of the farm are better distributed over the year, and are therefore more economically performed. Lastly, the opportunities which alternate cropping afford for cleaning the land constitute a prominent element of advantage.

For details of the manuring and produce of the different plots, see pages 100–109.

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AGDELL FIELD.

(Area under experiment, about 3 acres.)

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 season (1898) is the 51st, and the growing crop (Beans) is the third of the Thirteenth Course.

One-third of the land has been continuously unmanured. One-third has, for the first Nine Courses, or 36 years, 1848–83, been manured with Superphosphate of Lime alone, once every four years, that is for the turnip-crop commencing each course; but for the Tenth, Eleventh, Twelfth, and Thirteenth Courses, a complex mineral manure has been applied, as described in foot-note, No. 2. Lastly, one-third has been manured (also for the turnip-crop only), with a complex mineral and Nitrogenous manure, as described in the foot-note No. 3.

From half of each of the three differently manured plots the turnip-crops (roots and leaves) are removed; and on the other half they are either consumed on the land by sheep, or spread and ploughed in. In the case of all the other crops, the total produce is removed from the land.

In the First Course, clover was sown over the whole of each of the three differently manured plots; but in each of the subsequent courses, a leguminous crop was grown on only half of each of the three plots, the other half being left fallow, in the third year of each course. 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. In the Seventh Course, clover was sown (spring 1873), and gave three cuttings in 1874. In the Eighth Course beans were grown. In the Ninth Course clover was sown (in the spring of 1881), and gave two cuttings in 1882. In the Tenth Course clover was sown (in the spring of 1885), and yielded two cuttings in 1886. In the Eleventh Course clover was sown (with the barley) in 1889, but failed during the winter, and in 1890 beans were grown instead. In the Twelfth Course clover was again sown in April 1893, and gave two cuttings in 1894. In the Thirteenth Course clover was sown (with the barley), April 1897, but failed during the winter, and in 1898 beans were grown instead.

TABLE I. (below), gives the results relating to the portions of each plot from which the turnip-crops were entirely removed; and on which clover or beans were grown.

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 (4) (or Roots).	Plot 1. Straw (or Leaf).	Plot 1. Total Produce.(5)	Plot 2. Superphosphate of Lime alone (1), Courses 1–9, Complex Mineral Manure (2), Courses 10–13, for the Turnip Crops only. Corn (4) (or Roots).	Plot 2. Straw (or Leaf).	Plot 2. Total Produce. (5)	Plot 3. Complex Mineral and Nitrogenous Manure, (3) for the Turnip Crops only. Corn (4) (or Roots).	Plot 3. Straw (or Leaf).	Plot 3. Total Produce. (5)
1st Course, 1848–51.										
1848	Norfolk White Turnips	65¼ cwts.	45¼ cwts.	111¼ cwts.	225½ cwts.	106½ cwts.	332 cwts.	218 cwts.	151¼ cwts.	369¾ cwts.
1849	Barley	44⅞ bush.	2983 lbs.	5656 lbs.	29⅛ bush.	2111 lbs.	3841 lbs.	28⅞ bush.	2088 lbs.	3794 lbs.
1850	Clover (calcd. as hay) (6)	..	..	52⅞ cwts.	..	..	56½ cwts.	..	..	61¾ cwts.
1851	Wheat	28½ bush.	3431 lbs.	5389 lbs.	28 bush.	3371 lbs.	5253 lbs.	28⅛ bush.	3552 lbs.	5500 lbs.
2nd Course, 1852–55.										
1852	Swedish Turnips	26 cwts.	4½ cwts.	30½ cwts.	223¾ cwts.	20½ cwts.	243½ cwts.	396½ cwts.	36½ cwts.	433 cwts.
1853	Barley	34⅜ bush.	2430 lbs.	4464 lbs.	28⅛ bush.	1873 lbs.	3560 lbs.	38½ bush.	2604 lbs.	4873 lbs.
1854	Beans	5⅛ bush.	1055 lbs.	1445 lbs.	5⅞ bush.	1103 lbs.	1534 lbs.	9⅞ bush.	1355 lbs.	2065 lbs.
1855	Wheat	35¼ bush.	3619 lbs.	5859 lbs.	35¾ bush.	3525 lbs.	5789 lbs.	37⅞ bush.	3942 lbs.	6371 lbs.
3rd Course, 1856–59.										
1856	Swedish Turnips	32 cwts.	2¼ cwts.	34½ cwts.	136 cwts.	7½ cwts.	143½ cwts.	333¾ cwts.	12½ cwts.	346¼ cwts.
1857	Barley	48½ bush.	2600 lbs.	5337 lbs.	28½ bush.	1475 lbs.	3076 lbs.	48 bush.	2435 lbs.	5168 lbs.
1858	Beans	6¼ bush.	1100 lbs.	1515 lbs.	6⅛ bush.	1155 lbs.	1605 lbs.	12⅜ bush.	1520 lbs.	2357 lbs.
1859	Wheat	35¼ bush.	4030 lbs.	6262 lbs.	34¾ bush.	3930 lbs.	6120 lbs.	39⅜ bush.	4610 lbs.	7154 lbs.
4th Course, 1860–63.										
1860	Swedish Turnips	1 cwt.	(6¼ lbs.)	1 cwt.	29¼ cwts.	1½ cwt.	30¾ cwts.	87½ cwts.	3½ cwts.	90¾ cwts.
1861	Barley	38⅜ bush.	2522 lbs.	4718 lbs.	30⅜ bush.	2000 lbs.	3775 lbs.	60⅜ bush.	3940 lbs.	7391 lbs.
1862	Beans	29 bush.	1840 lbs.	3661 lbs.	29⅝ bush.	2150 lbs.	4040 lbs.	43⅜ bush.	3280 lbs.	5990 lbs.
1863	Wheat	34⅓ bush.	3468 lbs.	5621 lbs.	34⅝ bush.	3390 lbs.	5619 lbs.	46¼ bush.	4698 lbs.	7627 lbs.
5th Course, 1864–67.										
1864	Swedish Turnips	8¾ cwts.	0¾ cwt.	9½ cwts.	68 cwts.	4¾ cwts.	72¾ cwts.	176¼ 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	10½ bush.	1013 lbs.	1689 lbs.	7⅜ bush.	978 lbs.	1463 lbs.	20¼ bush.	1990 lbs.	3343 lbs.
1867	Wheat	21 bush.	2143 lbs.	3473 lbs.	19¼ bush.	1966 lbs.	3222 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.	28¾ bush.	2025 lbs.	3686 lbs.	42⅞ bush.	3309 lbs.	5800 lbs.	
1870	Beans	13⅜ bush.	738 lbs.	1591 lbs.	15⅝ bush.	768 lbs.	1778 lbs.	24⅝ bush.	1056 lbs.	2664 lbs.	
1871	Wheat	20⅝ bush.	2799 lbs.	4092 lbs.	23¾ bush.	3048 lbs.	4521 lbs.	24 bush.	3440 lbs.	4942 lbs.	
7th Course, 1872–75.											
1872	Swedish Turnips . .	34½ cwts.	8¾ cwts.	42⅝ cwts.	170⅝ cwts.	17⅜ cwts.	188 cwts.	339⅞ cwts.	35¾ cwts.	375⅝ cwts.	
1873	Barley	23½ bush.	1343 lbs.	2717 lbs.	20¾ bush.	1565 lbs.	2875 lbs.	31⅛ bush.	1722 lbs.	3573 lbs.	
1874	Clover (calcd as hay) (7)	..	..	25⅜ cwts.	..	..	45½ cwts.	..	..	70⅝ cwts.	
1875	Wheat	21⅝ bush.	2430 lbs.	3784 lbs.	28½ bush.	3536 lbs.	5328 lbs.	31⅞ bush.	4685 lbs.	6699 lbs.	
8th Course, 1876–79.											
1876	Swedish Turnips . .	17¼ cwts.	5 cwts.	22¼ cwts.	189¼ cwts.	28½ cwts.	216¾ cwts.	356 cwts.	55½ cwts.	411½ cwts.	
1877	Barley	23½ bush.	1291 lbs.	2623 lbs.	24½ bush.	1174 lbs.	2558 lbs.	34⅜ bush.	1918 lbs.	3890 lbs.	
1878	Beans	8¾ bush.	740 lbs.	1301 lbs.	7⅜ bush.	1045 lbs.	1557 lbs.	20¼ bush.	1655 lbs.	2963 lbs.	
1879	Wheat	10⅜ bush.	1324 lbs.	1987 lbs.	14⅜ bush.	1771 lbs.	2729 lbs.	13 bush.	1658 lbs.	2493 lbs.	
9th Course, 1880–83.											
1880	Swedish Turnips . .	14 cwts.	2¼ cwts.	16¼ cwts.	199½ cwts.	11⅜ cwts.	211¼ cwts.	439½ cwts.	43½ cwts.	482¾ cwts.	
1881	Barley	26⅜ bush.	1484 lbs.	2922 lbs.	21⅓ bush.	1259 lbs.	2641 lbs.	35⅜ bush.	1853 lbs.	3857 lbs.	
1882	Clover (calcd. as hay) (6)	..	..	26½ cwts.	..	..	59⅜ cwts.	..	..	79½ cwts.	
1883	Wheat	29⅛ bush.	2280 lbs.	4175 lbs.	36½ bush.	3021 lbs.	5400 lbs.	45⅓ bush.	4024 lbs.	6921 lbs.	
10th Course, 1884–87.											
1884	Swedish Turnips . .	5 cwts.	3½ cwts.	8½ cwts.	173½ cwts.	20½ cwts.	193¾ cwts.	286⅜ cwts.	63¼ cwts.	350 cwts.	
1885	Barley	12⅝ bush.	1270 lbs.	1960 lbs.	19⅞ bush.	1441 lbs.	2538 lbs.	34⅜ bush.	2461 lbs.	4426 lbs.	
1886	Clover (weighed as hay) (8)	..	..	11½ cwts.	..	..	44 cwts.	..	..	29 cwts.	
1887	Wheat	25⅝ bush.	1859 lbs.	3483 lbs.	42½ bush.	3298 lbs.	5994 lbs.	42½ bush.	3423 lbs.	6103 lbs.	
11th Course, 1888–91.											
1888	Swedish Turnips . .	2¼ cwts.	1⅞ cwts.	4⅛ cwts.	207⅞ cwts.	21½ cwts.	228⅝ cwts.	472⅜ cwts.	45⅝ cwts.	518¼ cwts.	
1889	Barley	11 bush.	931 lbs.	1510 lbs.	21⅜ bush.	1221 lbs.	2402 lbs.	26⅝ bush.	1685 lbs.	3134 lbs.	
1890	Beans	7 bush.	603 lbs.	1079 lbs.	24⅛ bush.	1764 lbs.	3441 lbs.	15⅛ bush.	1102 lbs.	2145 lbs.	
1891	Wheat	29½ bush.	2598 lbs.	4371 lbs.	42¾ bush.	3995 lbs.	6546 lbs.	44⅜ bush.	4575 lbs.	7250 lbs.	
12th Course, 1892–95.											
1892	Swedish Turnips . .	6¾ cwts.	0½ cwt.	7¼ cwts.	202⅜ cwts.	3⅞ cwts.	206½ cwts.	473 cwts.	12 cwts.	485 cwts.	
1893	Barley	16⅜ bush.	1440 lbs.	2446 lbs.	15⅜ bush.	1339 lbs.	2295 lbs.	20½ bush.	1639 lbs.	2890 lbs.	
1894	Clover (weighed as hay) (6)	..	..	15⅝ cwts.	..	..	54½ cwts.	..	..	69⅜ cwts.	
1895	Wheat	23¼ bush.	1713 lbs.	3267 lbs.	37 bush.	2650 lbs.	5034 lbs.	39 bush.	2683 lbs.	5126 lbs.	
13th Course, 1896–99.											
1896	Swedish Turnips . .	7½ cwts.	1½ cwts.	8⅝ cwts.	215½ cwts.	14¼ cwts.	229⅞ cwts.	343½ cwts.	53⅜ cwts.	397 cwts.	
1897	Barley	11⅜ bush.	1251 lbs.	1927 lbs.	22½ bush.	1790 lbs.	3064 lbs.	30½ bush.	2328 lbs.	4085 lbs.	
1898	Clover or Beans . . .										
1899	Wheat										

(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, Seventh, Eighth, Ninth, and Tenth Courses—200 lbs. Bone-ash, and 150 lbs. Sulphuric Acid, *per acre*; Eleventh and Twelfth Courses—made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate.

(2) For the Tenth Course, in addition to the Superphosphate for the Swedish Turnips—300 lbs. Sulphate Potash, 200 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia were applied February 29, 1884, and harrowed in; and the same quantities were applied again before the final ploughing and preparation of the land for the sowing of the seed in May. For the Swedes of the Eleventh and Twelfth Courses the same mineral manures (which are the same as the mineral manures of Plot 3 for the third and subsequent Courses) were again applied, but only once for each of these two Courses. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, and 600 lbs. Basic Slag, per acre.

(3) 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 Potash, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 160 lbs. 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, Seventh, Eighth, Ninth, and Tenth Courses—300 lbs. Sulphate of Potash, 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*; Eleventh and Twelfth Courses—the same in other respects as in Courses 3–10, but the Superphosphate made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, 600 lbs. Basic Slag, 2000 lbs. Rape-cake, 100 lbs. Sulphate of Ammonia, and 100 lbs. Muriate of Ammonia, per acre.

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

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

(6) Two cuttings.

(7) Three cuttings.

[For Summary Table of the above results, see pp. 108–9.]

AGDELL FIELD.

(Area under experiment, about 3 acres.)

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 season, 1898, is the 51st, and the growing crop (Beans) is the third of the Thirteenth Course.

One-third of the land has been continuously unmanured. One-third has, for the first Nine Courses, or 36 years, 1848–83, been manured with Superphosphate of Lime alone, once every four years, that is for the turnip-crop commencing each course; but for the Tenth, Eleventh, Twelfth, and Thirteenth Courses, a complex mineral manure has been applied, as described in foot-note, No. 2. Lastly, one-third has been manured (also for the turnip-crop only), with a complex mineral and Nitrogenous manure, as described in the foot-note, No. 3.

From half of each of the three differently manured plots, the turnip-crops (roots and leaves) are removed; and on the other half they are either consumed on the land by sheep, or spread and ploughed in. In the case of all the other crops, the total produce is removed from the land.

In the First Course, clover was sown over the whole of each of the three differently manured plots; but in each of the subsequent courses, a leguminous crop was grown on only half of each of the three plots, the other half being left fallow, in the third year of each course. 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. In the Seventh Course, clover was sown (spring 1873), and gave three cuttings in 1874. In the Eighth Course beans were grown. In the Ninth Course clover was sown (in the spring of 1881), and gave two cuttings in 1882. In the Tenth Course clover was sown (in the spring of 1885), and yielded two cuttings in 1886. In the Eleventh Course clover was sown (with the barley), in 1889, but failed during the winter, and in 1890 beans were grown instead. In the Twelfth Course clover was again sown in April 1893, and gave two cuttings in 1894. In the Thirteenth Course clover was sown (with the barley), April 1897, but failed during the winter, and in 1898 beans were grown instead.

Table II. (below), gives the results relating to the portions of each plot from which the turnip-crops were entirely removed; and on which, in the third year of each course (excepting the first, 1850, when clover was grown), the land was left fallow.

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 (4) (or Roots).	Plot 1. Straw (or Leaf).	Plot 1. Total Produce.(5)	Plot 2. Superphosphate of Lime alone (1), Courses 1–9, Complex Mineral Manure (2), Courses 10–13, for the Turnip Crops only. Corn (4) (or Roots).	Plot 2. Straw (or Leaf).	Plot 2. Total Produce.(5)	Plot 3. Complex Mineral and Nitrogenous Manure(3), for the Turnip Crops only. Corn (4) (or Roots).	Plot 3. Straw (or Leaf).	Plot 3. Total Produce.(5)
1st Course, 1848–51.										
1848	Swedish Turnips	175¼ cwts.	19¾ cwts.	195 cwts.	292 cwts.	35 cwts.	327 cwts.	394½ cwts.	46½ cwts.	441 cwts.
1849	Barley	33⅜ bush.	2200 lbs.	4149 lbs.	29⅛ bush.	1870 lbs.	3575 lbs.	37 bush.	2342 lbs.	5026 lbs.
1850	Clover (calcd as hay) (6)	..	..	57¼ cwts.	..	..	60¾ cwts.	..	..	68¼ cwts.
1851	Wheat	30½ bush.	3273 lbs.	5290 lbs.	31⅜ bush.	3497 lbs.	5617 lbs.	30½ bush.	3610 lbs.	5642 lbs.
2nd Course, 1852–55.										
1852	Swedish Turnips	37 cwts.	5¾ cwts.	42¾ cwts.	256¾ cwts.	22½ cwts.	279½ cwts.	408½ cwts.	40 cwts.	448½ cwts.
1853	Barley	32⅛ bush.	2187 lbs.	4046 lbs.	32 bush.	2003 lbs.	3876 lbs.	37⅝ bush.	2595 lbs.	4849 lbs.
1854	Fallow	..	..	..	..	..	..	..	..	..
1855	Wheat	37⅜ bush.	4295 lbs.	6735 lbs.	38⅞ bush.	4286 lbs.	6756 lbs.	38¼ bush.	4952 lbs.	7428 lbs.
3rd Course, 1856–59.										
1856	Swedish Turnips	45½ cwts.	2¼ cwts.	47¾ cwts.	170½ cwts.	8 cwts.	178½ cwts.	328½ cwts.	11½ cwts.	339¾ cwts.
1857	Barley	43¾ bush.	2330 lbs.	4777 lbs.	30⅜ bush.	1545 lbs.	3272 lbs.	47½ bush.	2400 lbs.	5091 lbs.
1858	Fallow	..	..	..	..	..	..	..	..	..
1859	Wheat	35¾ bush.	4315 lbs.	6582 lbs.	37½ bush.	4310 lbs.	6671 lbs.	42⅔ bush.	5330 lbs.	8066 lbs.
4th Course, 1860–63.										
1860	Swedish Turnips	1⅜ cwts.	0⅜ cwt.	1⅞ cwts.	33⅜ cwts.	2 cwts.	35⅜ cwts.	87½ cwts.	3½ cwts.	91 cwts.
1861	Barley	35½ bush.	2190 lbs.	4248 lbs.	32⅔ bush.	1954 lbs.	3807 lbs.	60⅝ bush.	3920 lbs.	7419 lbs.
1862	Fallow	..	..	..	..	..	..	..	..	..
1863	Wheat	45 bush.	4563 lbs.	7446 lbs.	46 bush.	4690 lbs.	7626 lbs.	52⅝ bush.	5495 lbs.	8837 lbs.
5th Course, 1864–67.										
1864	Swedish Turnips	7½ cwts.	0¾ cwt.	8¼ cwts.	52¾ cwts.	4½ cwts.	57¼ cwts.	182½ cwts.	9 cwts.	191½ cwts.
1865	Barley	34½ bush.	1828 lbs.	3659 lbs.	31¼ bush.	1509 lbs.	3170 lbs.	44⅝ bush.	2398 lbs.	4799 lbs.
1866	Fallow	..	..	..	..	..	..	..	..	..
1867	Wheat	27½ bush.	2654 lbs.	4330 lbs.	26½ bush.	2774 lbs.	4420 lbs.	22⅜ bush.	2850 lbs.	4328 lbs.

		Failed, and ploughed up.		Failed, and ploughed up.		Failed, and ploughed up.	
6th Course, 1868–71.							
1868	Swedish Turnips	21⅜ bush.	1628 lbs.	25¼ bush.	1873 lbs.	39¼ bush.	3064 lbs.
1869	Barley						
1870	Fallow						
1871	Wheat	11¼ bush.	2075 lbs.	16¼ bush.	2128 lbs.	17⅞ bush.	2693 lbs.
			2881 lbs.		3328 lbs.		3414 lbs.
			3004 lbs.		3133 lbs.		3747 lbs.
7th Course, 1872–75.							
1872	Swedish Turnips	51⅞ cwts.	8¼ cwts.	142½ cwts.	14⅝ cwts.	332 cwts.	34¼ cwts.
1873	Barley	20⅝ bush.	1374 lbs.	22⅜ bush.	1370 lbs.	31¼ bush.	1626 lbs.
1874	Fallow						
1875	Wheat	24⅝ bush.	2833 lbs.	28⅝ bush.	3230 lbs.	29¼ bush.	3623 lbs.
			60 cwts.		156⅝ cwts.		366¼ cwts.
			2596 lbs.		2713 lbs.		3412 lbs.
			4412 lbs.		5065 lbs.		5448 lbs.
8th Course, 1876–79.							
1876	Swedish Turnips	31¼ cwts.	5¼ cwts.	193¼ cwts.	17 cwts.	309⅜ cwts.	34⅜ cwts.
1877	Barley	23 bush.	1244 lbs.	21 bush.	1054 lbs.	30¼ bush.	1625 lbs.
1878	Fallow						
1879	Wheat	10⅜ bush.	1493 lbs.	14¼ bush.	1956 lbs.	12⅜ bush.	1691 lbs.
			36⅜ cwts.		210¼ cwts.		344½ cwts.
			2602 lbs.		2304 lbs.		3406 lbs.
			2162 lbs.		2905 lbs.		2478 lbs.
9th Course, 1880–83.							
1880	Swedish Turnips	32⅝ cwts.	3⅞ cwts.	224 cwts.	12¼ cwts.	450¼ cwts.	36 cwts.
1881	Barley	29⅜ bush.	1556 lbs.	24¼ bush.	1239 lbs.	33⅜ bush.	1755 lbs.
1882	Fallow						
1883	Wheat	33¼ bush.	2994 lbs.	33¼ bush.	3686 lbs.	37¼ bush.	3689 lbs.
			36½ cwts.		236¼ cwts.		486½ cwts.
			3170 lbs.		2576 lbs.		3651 lbs.
			5140 lbs.		6208 lbs.		6132 lbs.
10th Course, 1884–87.							
1884	Swedish Turnips	17⅞ cwts.	7⅜ cwts.	25¼ cwts.	159⅜ cwts.	178¾ cwts.	298¾ cwts.
1885	Barley	15½ bush.	1518 lbs.	2402 lbs.	12⅞ bush.	1833 lbs.	19 bush.
1886	Fallow						
1887	Wheat	34⅜ bush.	2505 lbs.	4639 lbs.	41¼ bush.	6103 lbs.	39¼ bush.
			7⅜ cwts.		18⅜ cwts.		55¼ cwts.
			1518 lbs.		1043 lbs.		1528 lbs.
			2402 lbs.		3465 lbs.		3308 lbs.
							353¾ cwts.
							2643 lbs.
							5894 lbs.
11th Course, 1888–91.							
1888	Swedish Turnips	15 cwts.	7⅛ cwts.	142½ cwts.	15¼ cwts.	158⅜ cwts.	431¼ cwts.
1889	Barley	15¼ bush.	953 lbs.	15⅛ bush.	965 lbs.	1775 lbs.	20 bush.
1890	Fallow						
1891	Wheat	32 bush.	2941 lbs.	36 bush.	3586 lbs.	5742 lbs.	41 bush.
			7⅛ cwts.		15¼ cwts.		37⅞ cwts.
			953 lbs.		965 lbs.		1231 lbs.
			4863 lbs.		3586 lbs.		4238 lbs.
							469¼ cwts.
							2362 lbs.
							6748 lbs.
12th Course, 1892–95.							
1892	Swedish Turnips	9⅞ cwts.	1⅛ cwt.	11 cwts.	22⅝ cwts.	4⅛ cwts.	230¼ cwts.
1893	Barley	19⅜ bush.	1614 lbs.	2784 lbs.	13 bush.	1203 lbs.	1998 lbs.
1894	Fallow						
1895	Wheat	21⅜ bush.	1630 lbs.	3066 lbs.	28¼ bush.	2138 lbs.	4011 lbs.
			1⅛ cwt.		22⅝ cwts.		523½ cwts.
			1614 lbs.		1203 lbs.		18⅜ bush.
			3066 lbs.		2138 lbs.		32½ bush.
							15⅝ cwts.
							1597 lbs.
							2368 lbs.
							538¾ cwts.
							2755 lbs.
							4442 lbs.
13th Course, 1896–99.							
1896	Swedish Turnips	15¼ cwts.	3¼ cwts.	18¼ cwts.	161 cwts.	8¾ cwts.	169⅜ cwts.
1897	Barley	11¼ bush.	914 lbs.	1609 lbs.	12¼ bush.	969 lbs.	1677 lbs.
1898	Fallow						
1899	Wheat						
							345 cwts.
							21¼ bush.
							35 cwts.
							1465 lbs.
							380 cwts.
							2639 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, Seventh, Eighth, Ninth, and Tenth Courses—200 lbs. Bone-ash, and 150 lbs. Sulphuric Acid, *per acre*; Eleventh and Twelfth Courses—made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate.

(2) For the Tenth Course, in addition to the Superphosphate for the Swedish Turnips—300 lbs. Sulphate Potash, 200 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia were applied February 29, 1884, and harrowed in; and the same quantities were applied again before the final ploughing and preparation of the land for the sowing of the seed in May. For the Swedes of the Eleventh and Twelfth Courses the same mineral manures (which are the same as the mineral manures of Plot 3 for the Third and subsequent Courses) were again applied, but only once for each of these two Courses. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, and 600 lbs. Basic Slag, per acre.

(3) 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 Potash, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 160 lbs. 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, Seventh, Eighth, Ninth, and Tenth Courses—300 lbs. Sulphate of Potash, 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*; Eleventh and Twelfth Courses—the same in other respects as in Courses 3-10, but the Superphosphate made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, 600 lbs. Basic Slag, 2000 lbs. Rape-cake, 100 lbs. Sulphate of Ammonia, and 100 lbs. Muriate of Ammonia, per acre.

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

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

(6) Two cuttings.

[For Summary Table of the above results, see pp. 108-9.]

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AGDELL FIELD.

(Area under experiment, about 3 acres.)

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 season, 1898, is the 51st, and the growing crop (Beans) is the third of the Thirteenth Course.

One-third of the land has been continuously unmanured. One-third has, for the first Nine Courses, or 36 years, 1848–83, been manured with Superphosphate of Lime alone, once every four years, that is, for the turnip-crop commencing each course; but for the Tenth, Eleventh, Twelfth, and Thirteenth Courses, a complex mineral manure has been applied, as described in foot-note, No. 2. Lastly, one-third has been manured (also for the turnip-crop only), with a complex mineral and Nitrogenous manure, as described in the foot-note, No. 3.

From half of each of the three differently manured plots, the turnip-crops (roots and leaves) are removed; and on the other half they are either consumed on the land by sheep, or spread and ploughed in. In the case of all the other crops, the total produce is removed from the land.

In the First Course, clover was sown over the whole of each of the three differently manured plots; but in each of the subsequent courses a leguminous crop was grown on only half of each of the three plots, the other half being left fallow, in the third year of each course. 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. In the Seventh Course, clover was sown (spring 1873), and gave three cuttings in 1874. In the Eighth Course beans were grown. In the Ninth Course clover was sown (in the spring of 1881), and gave two cuttings in 1882. In the Tenth Course clover was sown (in the spring of 1885), and yielded two cuttings in 1886. In the Eleventh Course clover was sown (with the barley) in 1889, but failed during the winter, and in 1890 beans were grown instead. In the Twelfth Course clover was again sown in April 1893, and gave two cuttings in 1894. In the Thirteenth Course clover was sown (with the barley), April 1897, but failed during the winter, and in 1898 beans were grown instead.

Table III. (below), gives the results relating to the portions of each plot on which the turnip-crops were either fed off by sheep, or cut and spread on the land; and on which clover or beans were grown.

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 (4) (or Roots).	Straw (or Leaf).	Total Produce.(5)	Plot 2. Superphosphate of Lime alone(1), Courses 1–9, Complex Mineral Manure(2), Courses 10–13, for the Turnip Crops only. Corn (4) (or Roots).	Straw (or Leaf).	Total Produce.(5)	Plot 3. Complex Mineral and Nitrogenous Manure(3), for the Turnip Crops only. Corn (4) (or Roots).	Straw (or Leaf).	Total Produce.(5)
1st Course, 1848–51.										
1848	Norfolk White Turnips	109 cwts.	67¾ cwts.	176¾ cwts.	220¾ cwts.	90 cwts.	310¾ cwts.	229 cwts.	151¼ cwts.	380¼ cwts.
1849	Barley	48 bush.	3225 lbs.	6046 lbs.	42¾ bush.	3327 lbs.	5885 lbs.	42⅞ bush.	3646 lbs.	6206 lbs.
1850	Clover (calcd as hay) (6)	..	..	48¼ cwts.	..	..	49⅝ cwts.	..	..	60¼ cwts.
1851	Wheat	30¾ bush.	3760 lbs.	5855 lbs.	32 bush.	4014 lbs.	6176 lbs.	31¼ bush.	4035 lbs.	6169 lbs.
2nd Course, 1852–55.										
1852	Swedish Turnips	19½ cwts.	3¼ cwts.	22¾ cwts.	250¼ cwts.	22 cwts.	272¼ cwts.	386 cwts.	33 cwts.	419 cwts.
1853	Barley	28¾ bush.	2077 lbs.	3817 lbs.	38 bush.	2756 lbs.	5058 lbs.	35⅜ bush.	2981 lbs.	5190 lbs.
1854	Beans	5½ bush.	953 lbs.	1367 lbs.	10⅜ bush.	1378 lbs.	2124 lbs.	13⅜ bush.	1605 lbs.	2544 lbs.
1855	Wheat	34¼ bush.	3351 lbs.	5526 lbs.	36¾ bush.	3611 lbs.	5921 lbs.	40¾ bush.	4370 lbs.	6992 lbs.
3rd Course, 1856–59.										
1856	Swedish Turnips	20¼ cwts.	1¾ cwts.	21¾ cwts.	196 cwts.	14¼ cwts.	210¼ cwts.	341¼ cwts.	11¾ cwts.	353 cwts.
1857	Barley	40½ bush.	2312 lbs.	4558 lbs.	52⅜ bush.	2780 lbs.	5741 lbs.	63¾ bush.	3405 lbs.	6930 lbs.
1858	Beans	5¼ bush.	965 lbs.	1307 lbs.	8⅜ bush.	1320 lbs.	1895 lbs.	14¾ bush.	1760 lbs.	2754 lbs.
1859	Wheat	30¼ bush.	3355 lbs.	5265 lbs.	37¼ bush.	4320 lbs.	6689 lbs.	38⅜ bush.	4955 lbs.	7417 lbs.
4th Course, 1860–63.										
1860	Swedish Turnips	1 cwt.	(5 lbs.)	1 cwt.	38¾ cwts.	1¾ cwt.	40¼ cwts.	72 cwts.	4½ cwts.	76¼ cwts.
1861	Barley	29⅜ bush.	1970 lbs.	3635 lbs.	42½ bush.	2553 lbs.	4982 lbs.	54⅜ bush.	3940 lbs.	7148 lbs.
1862	Beans	27 bush.	1845 lbs.	3546 lbs.	30 bush.	2155 lbs.	4027 lbs.	41½ bush.	2945 lbs.	5520 lbs.
1863	Wheat	30½ bush.	3008 lbs.	4941 lbs.	41⅝ bush.	3888 lbs.	6562 lbs.	44⅜ bush.	4919 lbs.	7721 lbs.
5th Course, 1864–67.										
1864	Swedish Turnips	8½ cwts.	1 cwt.	9½ cwts.	78¾ cwts.	4¾ cwts.	83½ cwts.	168½ cwts.	8¾ cwts.	177½ cwts.
1865	Barley	27⅝ bush.	1460 lbs.	2961 lbs.	41¼ bush.	2244 lbs.	4457 lbs.	43⅜ bush.	2958 lbs.	5308 lbs.
1866	Beans	8¾ bush.	905 lbs.	1485 lbs.	10 bush.	1835 lbs.	2481 lbs.	24⅜ bush.	2155 lbs.	3782 lbs.
1867	Wheat	15½ bush.	1524 lbs.	2506 lbs.	25 bush.	2648 lbs.	4242 lbs.	21¼ bush.	1654 lbs.	3023 lbs.

6th Course, 1868–71.											
1868	Swedish Turnips . .	Failed, and ploughed up.			Failed, and ploughed up.			Failed, and ploughed up.			
1869	Barley	25⅝ bush.	1944 lbs.	3387 lbs.	33½ bush.	2401 lbs.	4313 lbs.	42¼ bush.	3229 lbs.	5701 lbs.	
1870	Beans	17⅞ bush.	710 lbs.	1854 lbs.	15⅜ bush.	878 lbs.	1867 lbs.	26⅜ bush.	1008 lbs.	2746 lbs.	
1871	Wheat	21⅜ bush.	2655 lbs.	3994 lbs.	23 bush.	2980 lbs.	4404 lbs.	25¼ bush.	3644 lbs.	5236 lbs.	
7th Course, 1872–75.											
1872	Swedish Turnips . .	29½ cwts.	7¾ cwts.	37¼ cwts.	190½ cwts.	19½ cwts.	210 cwts.	330 cwts.	39 cwts.	369 cwts.	
1873	Barley	22⅞ bush.	1495 lbs.	2844 lbs.	29⅜ bush.	1841 lbs.	3575 lbs.	45⅛ bush.	2456 lbs.	5018 lbs.	
1874	Clover (calcd as hay)(7)	..	..	22¼ cwts.	..	..	55¼ cwts.	..	..	68¾ cwts.	
1875	Wheat	19⅜ bush.	2353 lbs.	3642 lbs.	31¼ bush.	3928 lbs.	5954 lbs.	30½ bush.	4385 lbs.	6292 lbs.	
8th Course, 1876–79.											
1876	Swedish Turnips . .	21 cwts.	5 cwts.	26 cwts.	225¾ cwts.	27½ cwts.	253¼ cwts.	359¼ cwts.	63 cwts.	422¼ cwts.	
1877	Barley	23⅜ bush.	1341 lbs.	2673 lbs.	38⅜ bush.	1994 lbs.	4157 lbs.	49⅛ bush.	3125 lbs.	5963 lbs.	
1878	Beans	7⅜ bush.	775 lbs.	1255 lbs.	13⅞ bush.	1350 lbs.	2241 lbs.	26⅜ bush.	1880 lbs.	3617 lbs.	
1879	Wheat	8⅞ bush.	1219 lbs.	1800 lbs.	15½ bush.	1771 lbs.	2781 lbs.	14 bush.	2138 lbs.	3034 lbs.	
9th Course, 1880–83.											
1880	Swedish Turnips . .	21 cwts.	3 cwts.	24 cwts.	223¾ cwts.	11 cwts.	234¾ cwts.	446¼ cwts.	38¾ cwts.	485 cwts.	
1881	Barley	25¾ bush.	1468 lbs.	2929 lbs.	28¼ bush.	1430 lbs.	3051 lbs.	50½ bush.	3078 lbs.	5964 lbs.	
1882	Clover (calcd as hay)(6)	..	..	22¼ cwts.	..	..	70⅜ cwts.	..	..	83¾ cwts.	
1883	Wheat	25¾ bush.	2060 lbs.	3741 lbs.	40 bush.	3275 lbs.	5901 lbs.	50¼ bush.	4505 lbs.	7743 lbs.	
10th Course, 1884–87.											
1884	Swedish Turnips . .	12 cwts.	5 cwts.	17 cwts.	206 cwts.	23 cwts.	229 cwts.	280¾ cwts.	63¾ cwts.	344½ cwts.	
1885	Barley	16 bush.	1379 lbs.	2235 lbs.	32½ bush.	2358 lbs.	4193 lbs.	44¾ bush.	3386 lbs.	5946 lbs.	
1886	Clover(weighd as hay)(6)	..	..	11¾ cwts.	..	..	42 cwts.	..	..	32½ cwts.	
1887	Wheat	27¼ bush.	1844 lbs.	3550 lbs.	44¾ bush.	3468 lbs.	6332 lbs.	43¼ bush.	3645 lbs.	6409 lbs.	
11th Course, 1888–91.											
1888	Swedish Turnips . .	8 cwts.	3½ cwts.	11½ cwts.	249½ cwts.	23 cwts.	272½ cwts.	417⅝ cwts.	40½ cwts.	458⅛ cwts.	
1889	Barley	12⅝ bush.	865 lbs.	1530 lbs.	29¾ bush.	1613 lbs.	3250 lbs.	25½ bush.	2030 lbs.	3409 lbs.	
1890	Beans	8¼ bush.	633 lbs.	1197 lbs.	24 bush.	1630 lbs.	3269 lbs.	16½ bush.	1059 lbs.	2195 lbs.	
1891	Wheat	26½ bush.	2318 lbs.	3921 lbs.	50½ bush.	5017 lbs.	8034 lbs.	42 bush.	4309 lbs.	6811 lbs.	
12th Course, 1892–95.											
1892	Swedish Turnips . .	6¼ cwts.	0¼ cwt.	6½ cwts.	254½ cwts.	4⅛ cwts.	258⅝ cwts.	333⅞ cwts.	8⅜ cwts.	342¼ cwts.	
1893	Barley	14¼ bush.	1358 lbs.	2226 lbs.	19⅝ bush.	1466 lbs.	2677 lbs.	25½ bush.	2100 lbs.	3694 lbs.	
1894	Clover (weighd as hay)(6)	..	..	17½ cwts.	..	..	64¾ cwts.	..	..	83¾ cwts.	
1895	Wheat	22½ bush.	1619 lbs.	3119 lbs.	39⅜ bush.	2831 lbs.	5325 lbs.	40 bush.	2760 lbs.	5292 lbs.	
13th Course, 1896–99.											
1896	Swedish Turnips . .	11¼ cwts.	2½ cwts.	13¾ cwts.	240¾ cwts.	18½ cwts.	259¼ cwts.	319½ cwts.	61½ cwts.	380½ cwts.	
1897	Barley	11⅛ bush.	986 lbs.	1677 lbs.	37⅜ bush.	2794 lbs.	4919 lbs.	42¾ bush.	3353 lbs.	5742 lbs.	
1898	Clover or Beans . .										
1899	Wheat										

(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, Seventh, Eighth, Ninth, and Tenth Courses—200 lbs. Bone-ash, and 150 lbs. Sulphuric Acid, *per acre;* Eleventh and Twelfth Courses—made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate.

(2) For the Tenth Course, in addition to the Superphosphate for the Swedish Turnips—300 lbs. Sulphate Potash, 200 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia were applied February 29, 1884, and harrowed in; and the same quantities were applied again before the final ploughing and preparation of the land for the sowing of the seed in May. For the Swedes of the Eleventh and Twelfth Courses the same mineral manures (which are the same as the mineral manures of Plot 3 for the Third and subsequent Courses) were again applied, but only once for each of these two Courses. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, and 600 lbs. Basic Slag, per acre.

(3) 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 Potash, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 160 lbs. 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, Seventh, Eighth, Ninth, and Tenth Courses—300 lbs. Sulphate of Potash, 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;* Eleventh and Twelfth Courses—the same in other respects as in Courses 3–10, but the Superphosphate made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, 600 lbs. Basic Slag, 2000 lbs. Rape-cake, 100 lbs. Sulphate of Ammonia, and 100 lbs. Muriate of Ammonia, per acre.

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

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

(6) Two cuttings.

(7) Three Cuttings.

[For Summary Table of the above results, see pp. 108–9.]

AGDELL FIELD.

(Area under experiment, about 3 acres.)

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 season, 1898, is the 51st, and the growing crop (Beans) is the third of the Thirteenth Course.

One-third of the land has been continuously unmanured. One-third has, for the first Nine Courses, or 36 years, 1848–83, been manured with Superphosphate of Lime alone, once every four years, that is for the turnip-crop commencing each course; but for the Tenth, Eleventh, Twelfth, and Thirteenth Courses, a complex mineral manure has been applied, as described in foot-note, No. 2. Lastly, one-third has been manured (also for the turnip-crop only), with a complex mineral and Nitrogenous manure, as described in the foot-note, No. 3.

From half of each of the three differently manured plots, the turnip-crops (roots and leaves) are removed; and on the other half they are either consumed on the land by sheep, or spread and ploughed in. In the case of all the other crops, the total produce is removed from the land.

In the First Course, clover was sown over the whole of each of the three differently manured plots; but in each of the subsequent courses, a leguminous crop was grown on only half of each of the three plots, the other half being left fallow, in the third year of each course. 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. In the Seventh Course, clover was sown (spring 1873), and gave three cuttings in 1874. In the Eighth Course beans were grown. In the Ninth Course clover was sown (in the spring of 1881), and gave two cuttings in 1882. In the Tenth Course clover was sown (in the spring of 1885), and yielded two cuttings in 1886. In the Eleventh Course clover was sown (with the barley), in 1889, but failed during the winter, and in 1890 beans were grown instead. In the Twelfth Course clover was again sown in April 1893, and gave two cuttings in 1894. In the Thirteenth Course clover was sown (with the barley), April 1897, but failed during the winter, and in 1898 beans were grown instead.

Table IV. (below), gives the results relating to the portions of each plot on which the turnip-crops were either fed off by sheep, or cut and spread on the land; and on which, in the third year of each course (excepting the first, 1850, when clover was grown), the land was left fallow.

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 (4) (or Roots).	Straw (or Leaf).	Total Produce. (5)	Plot 2. Superphosphate of Lime, alone, (1) Courses 1–9, Complex Mineral Manures (2), Courses 10–13; for the Turnip Crops only. Corn (4) (or Roots).	Straw (or Leaf).	Total Produce. (5)	Plot 3. Complex Mineral and Nitrogenous Manure, (3) for the Turnip Crops only. Corn (4) (or Roots).	Straw (or Leaf).	Total Produce. (5)
1st Course, 1848–51.										
1848	Swedish Turnips	17¾ cwts.	20½ cwts.	193¼ cwts.	345 cwts.	39¾ cwts.	384¾ cwts.	429 cwts.	46¾ cwts.	475¾ cwts.
1849	Barley	44⅝ bush.	3139 lbs.	5785 lbs.	41 bush.	3209 lbs.	5708 lbs.	44⅛ bush.	3709 lbs.	6344 lbs.
1850	Clover (calcd as hay) (6)	..	..	62⅜ cwts.	..	..	60⅛ cwts.	..	..	65 cwts.
1851	Wheat	31¼ bush.	3498 lbs.	5584 lbs.	32⅞ bush.	3834 lbs.	6062 lbs.	27⅛ bush.	3969 lbs.	5801 lbs.
2nd Course, 1852–55.										
1852	Swedish Turnips	27¼ cwts.	4 cwts.	31¼ cwts.	273¼ cwts	22¼ cwts.	295½ cwts.	390¾ cwts.	37¾ cwts.	428½ cwts.
1853	Barley	33 bush.	2210 lbs.	4161 lbs.	39⅞ bush.	2729 lbs.	5110 lbs.	37⅛ bush.	3323 lbs.	5672 lbs.
1854	Fallow	..	..	..	..	..	..	..	..	..
1855	Wheat	37½ bush.	4070 lbs.	6473 lbs.	37⅝ bush.	4492 lbs.	6961 lbs.	37⅜ bush.	5107 lbs.	7499 lbs.
3rd Course, 1856–59.										
1856	Swedish Turnips	34 cwts.	2 cwts.	36 cwts.	193¾ cwts.	12¼ cwts.	206 cwts.	339¾ cwts.	12¼ cwts.	351¼ cwts.
1857	Barley	44¼ bush.	2430 lbs.	4912 lbs.	48¾ bush.	2595 lbs.	5326 lbs.	66⅝ bush.	3570 lbs.	7261 lbs.
1858	Fallow	..	..	..	..	..	..	..	..	..
1859	Wheat	35½ bush.	4045 lbs.	6270 lbs.	39⅝ bush.	4720 lbs.	7242 lbs.	40¼ bush.	5545 lbs.	8136 lbs.
4th Course, 1860–63.										
1860	Swedish Turnips	1¼ cwt.	¼ cwt.	1⅝ cwt.	40¾ cwts.	2 cwts.	42¾ cwts.	87 cwts.	5¼ cwts.	92¾ cwts.
1861	Barley	33 bush.	2018 lbs.	3871 lbs.	40⅝ bush.	2475 lbs.	4803 lbs.	57¾ bush.	4175 lbs.	7554 lbs.
1862	Fallow	..	..	..	..	..	..	..	..	..
1863	Wheat	42 bush.	4295 lbs.	6999 lbs.	49⅛ bush.	5051 lbs.	8194 lbs.	49 bush.	5638 lbs.	8747 lbs.
5th Course, 1864–67.										
1864	Swedish Turnips	9 cwts.	¾ cwt.	9¾ cwts.	79½ cwts.	5½ cwts.	84¾ cwts.	185½ cwts.	9½ cwts.	195 cwts.
1865	Barley	35⅜ bush.	1809 lbs.	3695 lbs.	39½ bush.	2043 lbs.	4122 lbs.	46⅝ bush.	3274 lbs.	5753 lbs.
1866	Fallow	..	..	..	..	..	..	..	..	..
1867	Wheat	23⅛ bush.	2598 lbs.	4126 lbs.	27⅛ bush.	2989 lbs.	4702 lbs.	19⅞ bush.	2905 lbs.	4180 lbs.

6th Course, 1868–71.										
1868	Swedish Turnips	Failed and ploughed up.			Failed and ploughed up.			Failed and ploughed up.		
1869	Barley	21 bush.	1648 lbs.	2843 lbs.	30⅛ bush.	2265 lbs.	3999 lbs.	38⅜ bush.	3244 lbs.	5491 lbs.
1870	Fallow	..	..	..	..	..	..	..	..	..
1871	Wheat	14½ bush.	1946 lbs.	2840 lbs.	15⅜ bush.	2240 lbs.	3193 lbs.	17¼ bush.	2363 lbs.	3925 lbs.
7th Course, 1872–75.										
1872	Swedish Turnips	49½ cwts.	7¼ cwts.	56¼ cwts.	167½ cwts.	17⅜ cwts.	184⅞ cwts.	331½ cwts.	33½ cwts.	364¾ cwts.
1873	Barley	20⅚ bush.	1311 lbs.	2536 lbs.	27 bush.	1611 lbs.	3209 lbs.	47 bush.	2796 lbs.	5478 lbs.
1874	Fallow	..	..	..	..	..	..	..	..	..
1875	Wheat	24½ bush.	2851 lbs.	4396 lbs.	30⅜ bush.	3525 lbs.	5443 lbs.	30 bush.	4085 lbs.	5942 lbs.
8th Course, 1876–79.										
1876	Swedish Turnips	32¼ cwts.	5⅛ cwts.	37⅜ cwts.	208½ cwts.	16½ cwts.	224¾ cwts.	377½ cwts.	40¾ cwts.	418 cwts.
1877	Barley	22½ bush.	1275 lbs.	2609 lbs.	31⅜ bush.	1706 lbs.	3530 lbs.	44⅝ bush.	2646 lbs.	5217 lbs.
1878	Fallow	..	..	..	..	..	..	..	..	..
1879	Wheat	11¾ bush.	1612 lbs.	2351 lbs.	14½ bush.	1843 lbs.	2755 lbs.	10⅜ bush.	1426 lbs.	2100 lbs.
9th Course, 1880–83.										
1880	Swedish Turnips	38¼ cwts.	4 cwts.	42¼ cwts.	238¾ cwts.	12⅞ cwts.	251⅝ cwts.	447½ cwts.	38 cwts.	485½ cwts.
1881	Barley	31⅝ bush.	1568 lbs.	3297 lbs.	28½ bush.	1500 lbs.	3083 lbs.	47⅞ bush.	2993 lbs.	5720 lbs.
1882	Fallow	..	..	..	..	..	..	..	..	..
1883	Wheat	34½ bush.	3231 lbs.	5445 lbs.	40½ bush.	4110 lbs.	6778 lbs.	39¼ bush.	4028 lbs.	6536 lbs.
10th Course, 1884–87.										
1884	Swedish Turnips	20¼ cwts.	7 cwts.	27¼ cwts.	172½ cwts.	18¾ cwts.	191¼ cwts.	296½ cwts.	66¼ cwts.	362⅛ cwts.
1885	Barley	22⅜ bush.	1768 lbs.	3056 lbs.	17⅛ bush.	1480 lbs.	2576 lbs.	32½ bush.	2778 lbs.	4624 lbs.
1886	Fallow	..	..	..	..	..	..	..	..	..
1887	Wheat	33½ bush.	2655 lbs.	4811 lbs.	40½ bush.	3480 lbs.	6105 lbs.	41 bush.	3763 lbs.	6410 lbs.
11th Course, 1888–91.										
1888	Swedish Turnips	23 cwts.	7⅝ cwts.	30⅝ cwts.	166 cwts.	16 cwts.	182 cwts.	423⅜ cwts.	35 cwts.	458¾ cwts.
1889	Barley	16⅞ bush.	996 lbs.	1898 lbs.	19½ bush.	1135 lbs.	2248 lbs.	23½ bush.	1776 lbs.	3045 lbs.
1890	Fallow	..	..	..	..	..	..	..	..	..
1891	Wheat	31¼ bush.	2898 lbs.	4763 lbs.	40 bush.	4103 lbs.	6509 lbs.	45½ bush.	4938 lbs.	7610 lbs.
12th Course, 1892–95.										
1892	Swedish Turnips	12⅜ cwts.	1 cwt.	13⅜ cwts.	263½ cwts.	4½ cwts.	267⅝ cwts.	500¾ cwts.	11⅜ cwts.	512½ cwts.
1893	Barley	19 bush.	1639 lbs.	2758 lbs.	15¾ bush.	1245 lbs.	2160 lbs.	25⅜ bush.	1979 lbs.	3567 lbs.
1894	Fallow	..	..	..	..	..	..	..	..	..
1895	Wheat	22½ bush.	1728 lbs.	3196 lbs.	32 bush.	2403 lbs.	4428 lbs.	32½ bush.	2575 lbs.	4651 lbs.
13th Course, 1896–99.										
1896	Swedish Turnips	24½ cwts.	4 cwts.	28½ cwts.	177⅛ cwts.	11¼ cwts.	188½ cwts.	331½ cwts.	48 cwts.	379½ cwts.
1897	Barley	13⅛ bush.	1158 lbs.	1945 lbs.	19⅜ bush.	1425 lbs.	2530 lbs.	35⅜ bush.	2570 lbs.	4551 lbs.
1898	Fallow									
1899	Wheat									

(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, Seventh, Eighth, Ninth, and Tenth Courses—200 lbs. Bone-ash, and 150 lbs. Sulphuric Acid, *per acre;* Eleventh and Twelfth Courses—made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate.

(2) For the Tenth Course, in addition to the Superphosphate for the Swedish Turnips—300 lbs. Sulphate Potash, 200 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia were applied February 29, 1884, and harrowed in; and the same quantities were applied again before the final ploughing and preparation of the land for the sowing of the seed in May. For the Swedes of the Eleventh and Twelfth Courses the same mineral manures (which are the same as the mineral manures of Plot 3 for the Third and subsequent Courses) were again applied, but only once for each of these two Courses. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, and 600 lbs. Basic Slag, per acre.

(3) 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 Potash, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia, 160 lbs. 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, Seventh, Eighth, Ninth, and Tenth Courses—300 lbs. Sulphate of Potash, 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;* Eleventh and Twelfth Courses—the same in other respects as in Courses 3–10, but the Superphosphate made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. For the Swedes of the Thirteenth Course—500 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 200 lbs. Sulphate of Magnesia, 600 lbs. Basic Slag, 2000 lbs. Rape-cake, 100 lbs. Sulphate of Ammonia, and 100 lbs. Muriate of Ammonia, per acre.

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

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

(6) Two cuttings.

[For Summary Table of the above results, see pp. 108-9.]

AGDELL FIELD.

(Area under experiment, about 3 acres.)

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

SUMMARIES OF THE RESULTS GIVEN IN TABLES I., II., III., AND IV. (pp. 100–1, 102–3, 104–5, and 106–7), RESPECTIVELY.

As the Table shows, *averages* are given for each of the four portions of the experimental land, for which Tables I., II., III., and IV., respectively, give the details. The averages are given, first of the produce of the eight intermediate Courses (Courses 2–9, 1852–1883); that is, excluding the First Course, when the land was in somewhat uneven condition, and when (as the detailed Tables show), on some portions Norfolk Whites, and on others Swedish Turnips, were grown; excluding also the Tenth, Eleventh, and Twelfth Courses, on account of the change in the Mineral Manures used on Plot 2. Averages are also given of the produce of the Tenth, Eleventh, and Twelfth Courses, that is, after the change in the Mineral Manures applied to Plot 2. For full particulars of the manures applied to Plot 2, and also of those applied to Plot 3, see Foot-notes 1, 2, and 3, on pages 101, 103, 105, or 107.

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 (1) (or Roots).	Plot 1. Straw (or Leaf).	Plot 1. Total Produce. (2)	Plot 2. Superphosphate of Lime, alone, Courses 1–9, Complex Mineral Manure, Courses 10–12, for the Turnip Crops only. Corn (1) (or Roots).	Plot 2. Straw (or Leaf).	Plot 2. Total Produce.(2)	Plot 3. Complex Mineral and Nitrogenous Manure, for the Turnip Crops only. Corn (1) (or Roots).	Plot 3. Straw (or Leaf).	Plot 3. Total Produce.(2)
Summary of Table I. (pp. 100–1):—Results relating to the portions of each plot from which the turnip-crops were entirely removed; and on which clover or beans were grown.										
Average of 8 Courses (Courses 2–9), 1852–1883.										
1852, '56, '60, '64, '72, '76, '80	Swedish Turnips	16⅝ cwts.	3 cwts.	19⅜ cwts.	126⅞ cwts.	11½ cwts.	138⅜ cwts.	266½ cwts.	24⅜ cwts.	290¾ cwts.
1853, '57, '61, '65, '69, '73, '77, '81	Barley	32⅝ bush.	1971 lbs.	3790 lbs.	27⅜ bush.	1623 lbs.	3196 lbs.	42⅜ bush.	2547 lbs.	4962 lbs.
1854, '58, '62, '66, '70, '74, '78, '82	Clover, 1874, and '82 (as hay)	..	..	25¾ cwts.	..	..	52⅝ cwts.	..	..	75 cwts.
	Beans	12½ bush.	1081 lbs.	1867 lbs.	12½ bush.	1200 lbs.	1996 lbs.	21⅛ bush.	1809 lbs.	3230 lbs.
1855, '59, '63, '67, '71, '75, '79, '83	Wheat	26 bush.	2762 lbs.	4407 lbs.	28½ bush.	3023 lbs.	4841 lbs.	32⅝ bush.	3758 lbs.	5847 lbs.
Average of 3 Courses (Courses 10, 11, and 12), 1884–1895.										
1884, 1888 and 1892	Swedish Turnips	4⅝ cwts.	1⅞ cwts.	6½ cwts.	194½ cwts.	15¼ cwts.	209½ cwts.	410⅜ cwts.	40⅜ cwts.	451⅛ cwts.
1885, 1889 and 1893	Barley	13⅜ bush.	1214 lbs.	1972 lbs.	19⅓ bush.	1334 lbs.	2412 lbs.	27¼ bush.	1928 lbs.	3483 lbs.
1886, 1890 and 1894	Clover, 1886 and 1894 (as hay)	..	..	13½ cwts.	..	..	49¼ cwts.	..	..	49¼ cwts.
	Beans, 1890	7 bush.	603 lbs.	1079 lbs.	24⅝ bush.	1764 lbs.	3441 lbs.	15½ bush.	1102 lbs.	2145 lbs.
1887, 1891 and 1895	Wheat	26⅛ bush.	2057 lbs.	3707 lbs.	40½ bush.	3314 lbs.	5858 lbs.	41⅜ bush.	3560 lbs.	6160 lbs.

SUMMARY of TABLE II. (pp. 102–3):—Results relating to the portions of each plot from which the turnip-crops were entirely removed; and on which, in the third year of each course (excepting the first, 1850, when clover was grown), the land was left fallow.

AVERAGE OF 8 COURSES (COURSES 2–9), 1852–1883.

1852, '56, '60, '64, '72, '76, '80	Swedish Turnips	26 cwts.	3¼ cwts.	29¼ cwts.	134¼ cwts.	10⅛ cwts.	144¼ cwts.	262⅝ cwts.	21⅛ cwts.	283¼ cwts.
1853, '57, '61, '65, '69, '73, '77, '81	Barley	30 bush.	1792 lbs.	3497 lbs.	27⅜ bush.	1568 lbs.	3131 lbs.	40¾ bush.	2423 lbs.	4755 lbs.
1854, '58, '62, '66, '70, '74, '78, '82	Fallow	..	..	..	..	..	..	..	..	..
1855, '59, '63, '67, '71, '75, '79, '83	Wheat	28⅜ bush.	3153 lbs.	4976 lbs.	30¾ bush.	3383 lbs.	5348 lbs.	31½ bush.	3782 lbs.	5808 lbs.

AVERAGE OF 3 COURSES (COURSES 10, 11, AND 12), 1884–1895.

1884, 1888 and 1892	Swedish Turnips	14¼ cwts.	5¼ cwts.	19¼ cwts.	176¼ cwts.	12⅝ cwts.	188⅞ cwts.	417½ cwts.	36¼ cwts.	453¾ cwts.
1885, 1889 and 1893	Barley	17 bush.	1362 lbs.	2325 lbs.	13⅝ bush.	1070 lbs.	1869 lbs.	19¼ bush.	1452 lbs.	2587 lbs.
1886, 1890 and 1894	Fallow	..	..	..	..	..	..	..	..	..
1887, 1891 and 1895	Wheat	29½ bush.	2359 lbs.	4208 lbs.	35¼ bush.	3080 lbs.	5285 lbs.	37⅜ bush.	3321 lbs.	5695 lbs.

SUMMARY OF TABLE III. (pp. 104–5):—Results relating to the portions of each plot on which the turnip-crops were either fed off by sheep, or cut and spread on the land; and on which clover or beans were grown.

AVERAGE OF 8 COURSES (COURSES 2–9), 1852–1883.

1852, '56, '60, '64, '72, '76, '80	Swedish Turnips	15½ cwts.	2⅜ cwts.	17¾ cwts.	150½ cwts.	12⅜ cwts.	163⅛ cwts.	262⅞ cwts.	24⅞ cwts.	287¾ cwts.
1853, '57, '61, '65, '69, '73, '77, '81	Barley	28 bush.	1758 lbs.	3351 lbs.	38 bush.	2250 lbs.	4417 lbs.	47⅞ bush.	3146 lbs.	5903 lbs.
1854, '58, '62, 66, '70, '74, '78, '82	Clover, 1874, and '82 (as hay)	..	..	22½ cwts.	..	..	63 cwts.	..	..	76½ cwts.
	Beans	12 bush.	1026 lbs.	1802 lbs.	14⅜ bush.	1486 lbs.	2439 lbs.	24½ bush.	1892 lbs.	3494 lbs.
1855, '59, '63, '67, '71, '75, '79, '83	Wheat	23¼ bush.	2441 lbs.	3927 lbs.	31⅜ bush.	3303 lbs.	5307 lbs.	33¼ bush.	3821 lbs.	5932 lbs.

AVERAGE OF 3 COURSES (COURSES 10, 11, AND 12), 1884–1895.

1884, 1888 and 1892	Swedish Turnips	8¾ cwts.	2⅞ cwts.	11⅝ cwts.	236 cwts.	16¾ cwts.	253⅝ cwts.	344⅓ cwts.	37½ cwts.	381⅝ cwts.
1885, 1889 and 1893	Barley	14½ bush.	1201 lbs.	1997 lbs.	27½ bush.	1812 lbs.	3373 lbs.	31⅞ bush.	2505 lbs.	4350 lbs.
1886, 1890 and 1894	Clover 1886 and 1894 (as hay)	..	..	14½ cwts.	..	..	53⅜ cwts.	..	..	58½ cwts.
	Beans 1890	8¼ bush.	633 lbs.	1197 lbs.	24 bush	1630 lbs.	3269 lbs.	16⅜ bush.	1059 lbs.	2195 lbs.
1887, 1891 and 1895	Wheat	25⅝ bush.	1927 lbs.	3530 lbs.	44⅞ bush	3772 lbs.	6564 lbs.	41⅜ bush.	3571 lbs.	6171 lbs.

SUMMARY OF TABLE IV. (pp. 106–7):—Results relating to the portions of each plot on which the turnip-crops were either fed off by sheep, or cut and spread on the land; and on which, in the third year of each course (excepting the first, 1850, when clover was grown), the land was left fallow.

AVERAGE OF 8 COURSES (COURSES 2–9), 1852–1883.

1852, '56, '60, '64, '72, '76, '80	Swedish Turnips	24 cwts.	2⅞ cwts.	26⅞ cwts.	150¼ cwts.	11 cwts.	161¼ cwts.	269¾ cwts.	22¼ cwts.	292 cwts.
1853, '57, '61, '65, '69, '73, '77, '81	Barley	30⅓ bush.	1784 lbs.	3491 lbs.	35⅝ bush.	2116 lbs.	4148 lbs.	48⅜ bush.	3253 lbs.	6018 lbs.
1854, '58, '62, '66, '70, '74, '78, '82	Fallow	..	..	..	..	..	..	..	..	..
1855, '59, '63, '67, '71, '75, '79, '83	Wheat	27⅞ bush.	3081 lbs.	4863 lbs.	31⅝ bush.	3621 lbs.	5659 lbs.	30½ bush.	3950 lbs.	5883 lbs.

AVERAGE OF 3 COURSES (COURSES 10, 11, AND 12), 1884–1895.

1884, 1888 and 1892	Swedish Turnips	18½ cwts.	5½ cwts.	23¾ cwts.	200½ cwts.	13½ cwts.	213⅝ cwts.	406⅞ cwts.	37⅝ cwts.	444⅝ cwts.
1885, 1889 and 1893	Barley	19¼ bush.	1468 lbs.	2571 lbs.	17⅜ bush.	1287 lbs.	2328 lbs.	27¼ bush.	2178 lbs.	3745 lbs.
1886, 1890 and 1894	Fallow	..	..	..	..	..	..	..	..	..
1887, 1891 and 1895	Wheat	29½ bush.	2427 lbs.	4257 lbs.	37⅜ bush.	3329 lbs.	5681 lbs.	39½ bush.	3759 lbs.	6224 lbs.

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

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