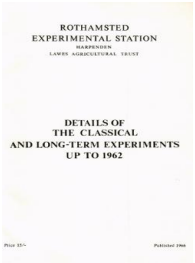
ROTHAMSTED RESEARCH

Details of the Classical and Long-term Experiments Up to 1962



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Agdell- Formerly 4-course Rotations

Rothamsted Research

Rothamsted Research (1966) *Agdell- Formerly 4-course Rotations ;* Details Of The Classical And Long-Term Experiments Up To 1962, pp 14 - 16 **- DOI: https://doi.org/10.23637/ERADOC-1-191**

AGDELL,
4-COURSE ROTATIONS, 1848-1951

The experiment compared two 4-course rotations:-
Plots 2, 4, 6: Turnips, barley, red clover (or beans), wheat.
Plots 1, 3, 5: Turnips, barley, bare fallow, wheat.
The manures were applied to the turnips only at the following rates per acre:-

Table 6

1848 to 1948 unless otherwise stated.

Plot Number	Treatment P P_2O_5 lb.	K K_2O lb.	Na lb.	Mg lb.	N N lb.	R lb.
	(1)	(2)	(2)	(2)	(3)	(4)
5; 6	-	-	-	-	-	-
3; 4	85	245	100	200	-	-
1; 2	85	245	100	200	43	2000

Treatments. P: superphosphate. K: sulphate of potash. Na:sulphate of soda. Mg: sulphate of magnesia. N: sulphate of ammonia. R: castor meal.

Notes:
(1) Until 1884 made from 200 lb. bone ash and 150 lb. sulphuric acid supplying about 65 lb. P_2O_5 per acre. 1888-1892 ordinary superphosphate 68 lb. P_2O_5. 1896-1900 basic slag 108 lb. P_2O_5.
(2) Until 1892 the rates were 147 lb. K_2O, 200 lb. sulphate of soda, 100 lb. sulphate of magnesia.
(3) Until 1912 a mixture of ammonium sulphate and ammonium chloride.
(4) Until 1936 rape cake. The rape cake and castor meal each provided about 100 lb. N per acre.

The above arrangement gave 6 main plots each of 0.4 acres, but these were further subdivided to show the effect of carting the roots and leaves of the turnip crop off the land as compared with feeding them off by sheep or ploughing them in. This comparison was discontinued after the root crop of 1900; all roots and leaves have since been carted off.

Clover was grown in 16 seasons, and was replaced by beans in 10 seasons.

Varieties: Swedes: Since 1932 Bruce; previously several varieties had been grown for short periods only. In 1944 14 varieties of turnips and swedes were compared for resistance to club-root.

Barley: Plumage Archer since 1917, previously Chevalier and Archer Stiff Straw.

Wheat: Squarehead's Master since 1903 (Little Joss 1911), previously Red Rostock and Red Club. In 1947 winter wheat failed and was replaced by spring wheat, Atle.

Club-root (Plasmodiophora brassicae) was first mentioned as causing serious damage to the turnip crop in 1920, thereafter the yields declined rapidly and by 1948 the crop was not fit to weigh.

After the end of the 26th rotation in 1951 the experiment ended but cropping continued to measure the residual effects of the phosphate and potash applied to the root crop since 1848. Uniform

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dressings of nitrogenous fertiliser were given to all plots according to the needs of the crops. The cropping has been:-

1952 Bare fallow.
1953 Barley, Plumage Archer, unmanured.
1954 Barley, Plumage Archer, 1.0 cwt. N, divided dressing.
1955 Spring wheat, Koga II, 0.6 cwt. N.
1956 Winter beans, S.Q. Giant, unmanured.
1957 Potatoes, Ulster Supreme, 1.0 cwt. N.
1958 Italian Ryegrass S22. The original 6 plots were divided; one half of each was sown with ryegrass, the other was bare fallowed. The ryegrass was cut twice and 0.8 cwt. N per acre was applied for each cut.
1959 2nd year Italian Ryegrass; 3.2 cwt. N in four dressings. Fallow plots sown with strips of potatoes, sugar beet, barley, each crop testing 0.0; 0.25; 1.0 cwt. P_2O_5 as superphosphate.
1960 Cocksfoot S37 after Italian Ryegrass; 0.8 cwt. N for each cut. Rotation of potatoes, sugar beet, barley continued testing direct application 0.0; 0.25; 1.0; 1.5 cwt. P_2O_5.
1961 Second year cocksfoot; 0.8 cwt. N for each cut. Plots 1, 3, 5 only: crops in rotation, testing superphosphate as follows:- None; 0.75; 1.50 cwt. P_2O_5 either ploughed in or in seedbed; also 0.75 cwt. ploughed in plus 0.75 cwt. in seedbed.
1962 Third year cocksfoot; 0.8 cwt. N for each cut. Plots 2, 4, 6 only: treatments and cropping as in 1961 on plots 1, 3, 5.

Liming: In 1954 the plots were limed with ground chalk at the following rates in tons calcium carbonate per acre:- Plot 1 3 tons; plot 2 4 tons; plot 3 (part only) 0.5 tons; plot 4 parts at 0.5, 1.0 and 1.5 tons. See Rep. Rothamst. exp. Sta. for 1954, pp. 146-148.

For further details of the early years of the experiment and yearly yields see Memoranda of the Field Experiments 1901, 110-121.

For residual effects of the manures see Warren, R.G. (1957). Rep. Rothamst. exp. Sta. for 1957, 252-260.

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Table 7

CROPS IN ROTATION - AGDELL

1848 - 1919

Manure to turnips until 1948 Plot Rotation	None since 1848 5 Fallow	None since 1848 6 Clover	Mineral manure* No Nitrogen 3 Fallow	Mineral manure* No Nitrogen 4 Clover	Mineral* and nitrogenous manure+ 1 Fallow	Mineral* and nitrogenous manure+ 2 Clover
Swedes, roots: tons per acre	1.7	0.6	8.8	9.6	18.0	15.9
Barley, grain: cwt per acre	11.4	10.8	12.0	12.0	16.4	18.4
Beans, grain: cwt per acre	-	7.7	-	10.7	-	13.1
Clover, hay: cwt per acre	-	30.7	-	58.6	-	60.2
Wheat, grain: cwt per acre	13.8	12.8	16.3	17.7	16.9	17.8

1920 - 1953

Manure to turnips until 1948 Plot Rotation	None since 1848 5 Fallow	None since 1848 6 Clover	Mineral manure* No Nitrogen 3 Fallow	Mineral manure* No Nitrogen 4 Clover	Mineral* and nitrogenous manure+ 1 Fallow	Mineral* and nitrogenous manure+ 2 Clover
(1) Swedes, roots: tons per acre	1.00	0.35	7.69	10.84	13.88	6.99
(2) Turnips, roots: tons per acre	0.72	0.23	3.27	3.78	5.19	4.03
(3) Barley, grain: cwt per acre	7.7	6.5	11.1	14.5	10.8	10.7
(4) Clover, hay: cwt per acre	-	8.6	-	30.2	-	25.2
(5) Wheat, grain: cwt per acre	13.3	11.6	16.6	17.1	14.0	16.0

*P, K, N_a, Mg.

+Rape dust (or castor meal + sulphate of ammonia)

(1) Mean of 2 years 1920 and 1928
(2) Mean of 4 years 1924, 1932, 1936 and 1940
(3) Mean of 8 years 1921, 1925, 1929, 1933, 1941, 1945, 1949 and 1953
(4) Mean of 4 years 1922, 1926, 1930, 1938
(5) Mean of 7 years 1923, 1927, 1935, 1939, 1943, 1947, 1951

1937 Barley 1931 Wheat excluded crop failed

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