

## NOTES ON SOME MANURIAL EXPERIMENTS IN CANTERBURY AND OTAGO.

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IN past years the Department of Agriculture made a great number of manurial and variety experiments in co-operation with farmers in many localities. The following notes refer to a series conducted in the South Island, chiefly by Mr. A. Macpherson, during the years 1911-16. A uniform plan of operations was followed until the war made certain manures scarce, and then the modification was the least possible. The trials were made on about a hundred farms, chiefly in Canterbury and Otago, and they lasted, as already indicated, for five seasons. By this means some very valuable figures were obtained, and any mistakes or inaccuracies due to soil or seasonal variations will have been smoothed out by the large number of the trials averaged in the following tables. By the use of tables of probability, too, any abnormal variations are taken account of, so that great confidence may be felt that the results of these trials will be reflected on the average of a series of years on a farm having the average soil and climate of the districts in which the trials were made.

Records of the experiments were published in various issues of the *Journal* during the period in question, and are indexed in the half-yearly volumes, also separately in the Consolidated Index for 1910-20 under the general heading of "Co-operative Field Experiments."

There is introduced into the tables that follow a column that requires some explanation. It is called "Odds in Favour of Significance." In any experiment repeated trials will give various results. For example, if one tosses six coins there may come up four heads or two heads instead of the expected three. The average of the first ten throws may be 3.5 or 2.5 heads, and yet the coins be quite normal. If this is so, then differences between 2.5 and 3.5 in an average of ten coin-tossing experiments do not mean anything, are merely chance, or, to use the common term, are not "significant." If, however, we tossed the six coins a thousand times and found then that on the average 3.5 or 2.5 heads had turned up at each throw, we would be justified in saying that there was a real difference between the chances of heads and tails turning up—that the difference between the number of heads and tails in the trials meant something, or was "significant"; and inspection would probably prove that some of the coins were heavier on one side than on the other. On observations such as these there has been built up a Theory of Probabilities, by which one can measure the chances that the difference shown between two series of experiments is a real one due to the different manure or variety, or only an accidental one due to variations in soil, seeding, weighing, recording, &c. It is these chances that have been calculated and entered in the column referred to. Odds of over 30 to 1 are regarded as practical certainty.