REPORTS OF RESEARCH COMMITTEES OF THE COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DAIRY RESEARCH INSTITUTE.

Dairy Research Management Committee: Mr. A. Morton (Chairman), Messrs. G. A. Marchant, W. E. Hale, A. Linton, T. C. Brash, Dr. C. J. Reakes, Messrs. W. Singleton, J. Murray, Quentin Donald, and Professor H. G. Denham. Director of Research: Professor Wm. Riddet. Secretary: Dr. E. Marsden.

During the year the Committee sustained severe losses through the deaths of Sir George Fowlds, who had acted as Chairman since the inception of the Dairy Research Institute, and of Mr. Dynes Fulton, who was also an original member of the Committee.

Mr. A. Morton was appointed Chairman in succession to Sir George Fowlds.

The Dairy Research Institute has during the year made material progress with problems affecting the manufacture of butter and cheese. Whilst, as in past years, practical cheese and butter experiments have formed important parts of the work, more attention has been devoted to fundamental questions relating to the manufacture of these products. It is becoming increasingly evident that emphasis must be placed on arriving at a clearer understanding than now obtains of the fundamental changes occurring in the manufacture of butter and cheese. This principle, already clearly established in the application of science to other industries, is well demonstrated by the progress made in the year under review.

Cheese.—With respect to cheesemaking, outstanding advances have been made in regard to the control of the vigour of starters, the role of bacteria in the ripening of cheese, the chemical changes occurring in the manufacture of cheese, and the devising of a simple yet equitable method of payment for cheese-milk. The observation that bacteriophage occurs in starter cultures has cleared up many baffling phenomena, and although this knowledge has not yet provided a solution of all starter difficulties it has yielded a new and definite line of attack, which in time should prove effective. Knowledge of the respective parts played by starter, rennet, and lacto-bacilli now brings the possibility of controlling the flavour of cheese within reasonable measure of practicability. Work on the chemistry of cheesemaking promises to put cheesemaking practices on a scientific basis, thereby providing a means of eliminating chance failures. The introduction of an inexpensive casein-test and the formulation of an equitable method of payment for milk for cheesemaking should remove long-standing objections which some suppliers have had to the distribution of co-operative cheese-factory proceeds.

Butter.—Work on buttermaking, though less extensive, is none the less important. The fundamental factors affecting the flavour and composition of butter are matters of greatest interest to the butter industry. It is essential to obtain an adequate explanation for the variations that occur in butterfat from day to day and season to season. Feed is of supreme importance. Unfortunately, there is no definite local information on the effect of either stage of growth or species of pasture-plants on the butterfat secreted by the cow grazing on pasture. Trials initiated at Morrinsville with respect to feed tains suggest important modifications of methods of grassland management or of treatment of cream in dairy factories. Experiments projected for next dairying season should test the validity of these suggestions. Equally important are the experiments on containers for the export of butter and the storage investigations, which aim at delivering butter with a fresh bloom appearance to consumers in distant markets.

Ghee.—Attempts to manufacture ghee make a new direction in which research can help the dairy industry. It is an effort to find another outlet for dairy-products. This is a function of the Institute which should be fostered, but which, on account of pressure of work in other directions in the past, has not been exercised.

The scope of activities of the Institute and the more outstanding results achieved in different projects are summarized in the following statements, prepared by the various research workers concerned. More detailed information is contained in the several publications enumerated at the end of this report.

Cheesemaking Investigations.

(*a*) *Starters.*—Since the work on cheese-ripening has led to the belief that acid-production is the main function of a starter culture, effort has been concentrated on attempts to produce cultures active in growth and free from sudden variations in vitality. A definite advance was made in the early part of the dairying season by the discovery of a new method for selecting strains of lactic streptococci for incorporation in starter cultures. Most starters in use up to the present have been mixtures of several strains of streptococci, and the question has often been raised as to whether (in cheese-manufacture) all these strains were essential to the action of the starter. The use of single strains as starter cultures had not, however, been a marked success in the past. During the year under review it was discovered that whereas several single strains might appear to have similar properties as judged by the usual criteria they could be sharply differentiated by the way in which they reacted to incubation in milk at 100° F. Some strains grew normally at this temperature; others, which had appeared similar at lower temperatures, proved to be very adversely affected by 100° F. Practical trials in the cheese-vat, where the curd is subjected to a temperature of 100° F. during part of the process, showed that only those strains which withstood this temperature produced acid at the rate desired by the cheesemaker. Several heat-resistant strains were isolated and have been used with success in commercial factories during the past season. They have proved, in general, more active as acid-producers than the majority of mixed cultures.