for installation in selected New Zealand factories. Statistics have been collected from a number of butter-factories of the power utilization in the churning of butter under normal conditions of buttermaking.

Wrapping of Cheese in Pliofilm.—Previous trials have been continued. The 1 lb. portions of cheese wrapped in Pliofilm found a ready sale on the local market. Trials of the method on the commercial scale are now under way.

Starters for Cheese-manufacture.—The use of a series of single-strain starters in rotation is now almost universal in cheese-factories in New Zealand. Eight unrelated cultures of satisfactory activity are now available and most managers use them as four pairs in a four-day rotation. This system has proved most successful over the past two seasons. It almost eliminates the possibility of starter failure caused by bacteriophage derived from whey and present in milk as received at the cheese-factory.

The various devices used to protect the starter culture from air-borne phage during the course of its preparation in or near the factory are all proving satisfactory. They all depend either upon the exclusion of air-borne phage by filtration of air through cotton-wool or upon the destruction of air-borne phage by heat or by the action of ultra-violet light. The few failures which still occur occasionally are usually traceable to flaws in the equipment, with a consequent admission to the culture of untreated air.

The over-all position with cheese-starters is very satisfactory, some of the largest factories being quite free from trouble throughout the season.

"Phage-carrying" Starter.—Investigation of the phage-bacterium symbiosis mentioned last year has been carried a stage further by the trial of "phage-carrying" cultures in commercial cheese-factories. The culture used was a resistant form of one of our stock strains (HP) which "carries" the phage to which it was originally sensitive. The results in commercial practice confirmed the indications of the laboratory findings. Used as a starter, the "phage-carrying" culture was prepared in the factory without any protection from air-borne phage and it survived under these conditions. Only long-continued trials, however, will show whether the culture is proof against any phage which may occur in the surroundings. There is also a practical difficulty in that the phage persists in the culture only for a limited time. Hence constant laboratory control is necessary. It is not yet possible, therefore, to decide whether the phenomenon will provide a basis for an improvement in the already very satisfactory starter system in present use.

Survey of Cheese-milk Quality.—Following on the investigations into cheese quality carried out in the Hauraki Plains district last season, a survey of cheese-milk quality in the Waikato and Taranaki districts was made from October, 1946, to March, 1947. This work was carried out in co-operation with Dairy Division Instructors and the factory-managers in eleven factories. All the milk-supplies in these factories were subjected daily to a reductase test and to a modified curd test. The results are still being collected and examined in conjunction with the cheese-grading figures for the season.

Influence of Milk Composition on Cheese-manufacture.—In some cheesemaking experiments, attempts have been made to determine the relative influences of fat and casein on the moisture-holding properties of cheese curd. Previous work on the manufacture of cheese from milk from which fat had been abstracted or to which fat had been added had shown that fat probably has a proportion of moisture closely associated with it. This moisture is carried by the fat into the finished cheese. The remainder of the moisture in the cheese curd is apparently associated with the casein gel, and treatment of the curd in the vat must be designed to reduce this moisture to a definite figure which gives the correct final moisture in the cheese. Low-casein milk derived from Friesian cows forms a curd which needs more drastic moisture-expelling treatment than high-casein milk from Jersey cows. It is not clear whether this difference is due to differences in the nature of the curd from the two milks or merely to the fact that