

DAIRY LABORATORY, WALLACEVILLE

The laboratory work during the past year has been slightly more diversified. As some minor investigations have been undertaken, the total number of routine samples is slightly lower. The total figure is 3,447, of which 3,106 are bacteriological and 341 chemical.

Bacteriological.—The principal work carried out in the bacteriological section has again been the micro-biological analysis of butter samples supplied by grading-stores. The results suggest that factories are like suppliers; a few are consistently clean, others are consistently dirty, and the remainder are consistently inconsistent. As this has been observed and commented upon for several years, some means should be found of enforcing a reasonable standard of sanitation of butter-factory equipment. During the past year serious complaints arose about the quality of butter after a long period of storage in Britain. The deterioration was evidently caused by the growth of bacteria, and particularly mould. In another case unsalted butter sent to Belgium was reported on unfavourably because of its content of coliform organisms, the presence of which in large numbers was evident before the butter left New Zealand. Such occurrences emphasize the necessity for a much higher standard of factory hygiene.

A small number of water samples have been examined, and as the results obtained reveal a need for improvement in factory water-supplies generally, an extension of this work is planned as soon as staff and facilities are available. A few starters for cheese-making have been supplied to factories and samples returned tested for contamination.

Chemical.—The principal chemical work has been the examination of a large number of butter samples for copper and iron contamination. Similar analyses have been done on cream samples, and especially on whey cream, to assist Instructors in locating the source of metallic contamination in butter. This work has enabled improvements to be made in some factories, but the high metallic content of a number of samples indicates that there is scope for a good deal more of this work.

A few factory water-supplies have been examined and suggestions made for improvement. The results obtained indicate the need for a great deal more of this work, accompanied by efforts to get the recommendations put into practice. Chemical examinations have also been made of a small number of farm waters which were the subject of complaint. The results show that unsatisfactory features might be easily remedied if simple measures for treatment were applied.

Oxidative changes are important as the cause of defects in butter, and several methods of studying these have been developed in various laboratories, but most methods are of use only after the defects are quite evident. Ascorbic acid (vitamin C) is one of the most easily oxidizable substances in milk and cream, so the behaviour of this in freshly-made butter seemed worth investigating. A series of preliminary experiments showed that ascorbic acid is very quickly oxidized in butter, so quickly in fact that as much as 50 per cent. might be lost while the butter was being melted. Even during the short time required to melt a small sample of about 10 grammes, at least 10 per cent. might be lost. To study these changes a micro-titration method was developed and was used for several series of "kinetic" experiments. The object was to study the rate of oxidation of ascorbic acid in butter serum at different temperatures and in the presence of very small amounts of copper and iron. Very striking results were obtained, and a paper describing this work has been prepared for publication in the *Journal of Dairy Research*.

The market available for dried-milk products has encouraged a number of dairy factories to dry buttermilk by the roller process and also to use the same equipment for drying skimmed or whole milk. The Dairy Division has been asked to exercise some control over these products, and this has involved extension of the laboratory work,