determining fat in the water-free substance of cheese by factory methods as compared with analytical methods is 1·5 per cent. These theoretical errors were shown to occur in practice. Variations of 1·5 per cent. in the water-free substance figures from place to place in a single cheese, and variations of 1 per cent. in the fat water-free substance in single samples drawn by an ordinary cheese-trier from different cheeses from one vat, were found. Thus in extreme cases two estimations on different samples of the same cheese from one vat could show a total divergence of 4·5 per cent. fat in the water-free substance. Whilst such extreme variations are seldom likely to occur, the analyses of duplicate cheeses made in the experimental factory during the past year confirmed those conclusions with regard to the range of possible error that may arise in practice.

Conditions affecting the Transport of Cheese.

It is generally recognized that export cheese is still in an immature state when it leaves the dairy factory and that it matures while on the way to the Home market. It is equally well known that the conditions to which cheese is exposed during curing are just as important as the actual manufacture of it. With a view to measuring the variations in temperature in the holds of ships during the voyage to England and the effects which these have upon cheese quality, the Institute conducted a series of trials during the past season. This work was made possible by the shipping companies concerned granting permission to place thermographs at various points in the hold, and to adopt other measures of recording temperature and humidity. The Institute had the enthusiastic co-operation of the New Zealand Dairy-produce Board, the Dairy Division, the Department of Scientific and Industrial Research, and the National Institute for Research in Dairying in carrying out the experiments. In spring and midsummer, several days' make of cheeses were manufactured in the experimental dairy factory from milk of known sanitary and chemical quality. Milks classed as good and bad respectively from a sanitary viewpoint were used. The cheeses were subjected to chemical and bacteriological examination fourteen days after manufacture, and they were individually graded in the ordinary way. One cheese from each vat was thereafter transferred to the factory cold stores to act as a control on those exported, and the remainder were exported. In loading the cheeses aboard ship four points in the ship's hold were selected and corresponding cheeses were stored at these points, at each of which was placed a carefully calibrated thermograph. On arrival at London the cheeses made in the spring months were graded by officers of the Dairy Division and transferred to the National Institute for Research in Dairying. Chemical and bacteriological analyses of the cheeses were made there, accompanied by grading at regular intervals till they were ripe, when they were cut and photographed. The corresponding cheeses held in the factory cold stores were subjected to similar examinations. From these two trials it is hoped to get some information on the effect of sea transport, but the information can only be used as a guide to more comprehensive research work in cheese ripening and storage, because the number of cheeses examined is too small to formulate reliable conclusions.

In a second series of experiments the effect of possible variations in temperature at different points in the hold of ships on the loss of weight of waxed and unwaxed cheese was studied along with the effect in quality. This was extended to inquire into the effect of holding cheeses in London stores at different temperatures. Batches of export cheese were stored in the holds of ships in the way described above. Observations of temperature and humidity were made daily at the different points in the holds on the voyage to England. After inspection and weighing at London, they were transferred to cold stores, to be held at definite and different temperatures till they are mature. The results of these experiments have not yet been received.

BUTTERMAKING EXPERIMENTS.

In the development of the New Zealand butter industry the practice of manufacturing butter from fresh and neutralized cream has entirely displaced the practice of other countries, of using cream that is ripened to a varying degree of acidity. Recently some factories have revived the practice of adding starter to cream in very moderate amounts with the object of improving the flavour of their butter. The evil effects of excessive acidity of cream at the time of churning on the keeping-quality of butter are well known, but there is no definite information of the minimum degree of acidity which would impart a decided full flavour to the butter without influencing its keeping-quality. During the past season the Institute has carried out a trial with this object in view. Butter has been made from lines of fresh and neutralized cream; each line has been divided into two portions, one of which has been treated in the natural way, and to the other starter has been added. One half of each day's manufacture has been exported, and is being examined on arrival in London. The corresponding half is being held for six months in cold storage in the Dominion to observe the effect of storage on keeping-quality.

In the course of the above experimental work on buttermaking it was shown that cream could be very easily contaminated subsequent to pasteurization and while passing from the coolers to the holding-vats. This was avoided by paying particular attention to the careful sterilization of the cream-pumps and cream-holding vats before using these daily.

PURE-MILK PRODUCTION PROBLEMS.

Experiments are in progress to determine the most common sources of contamination of milk in the ordinary type of New Zealand milking-shed. Special attention is being devoted to the effect of contamination from milking-machines, and to simple practical methods of keeping milking-machines clean and free from contamination. These experiments must necessarily be carried out over a long period of time, on account of uncontrollable variations that occur from day to day, and seasonal