

- (10) The careless packing of hoops favours slit openness.
- (11) Pressure may be a factor in accentuating openness, but faults in ordinary methods of pressing are not the prime cause.
- (12) The careful control of cheese whilst in the curing-room is important. High temperatures of curing-rooms should be avoided.
- (13) The cracking of the cut surface of cheese on exposure to air depends to a certain extent on maturity.
- (14) Further research is required on factors affecting the curing of cheese, methods of pressing, chemical constituents of milk and curd in relation to cheesemaking, the cause of slow vats, the influence of starters, the influence of the test of the milk, and certain modifications in manufacture.
- (15) It is apparent that the cause or causes of open texture in cheese is far more complex than is commonly presumed, and that no cure is likely to be ascertained without possibly long and unrestricted effort.

Standardization of Milk for Cheesemaking.

During the past dairying season most of the experimental cheese has been made from standardized milk, in order to eliminate as far as possible differences in the cheese arising from differences in the fat-casein ratio of the milk. Much valuable information on the practice of standardizing milk has thus been obtained in the course of the year. This should be a very useful guide to cheese-factories adopting the standardization of milk, which has now become a very common practice in the North Island.

A fat-casein ratio of 0.70 was adopted for the manufacture of cheese to comply with the regulations requiring 50 per cent. fat in water-free substance. The fat in the milk was estimated in the factory by the Gerber method, and the casein was estimated by the Walker method. The accuracy of the factory testing was checked by laboratory analyses. During March and April the casein-fat ratio was reduced to 0.65 for the manufacture of a cheese containing 52 per cent. fat in the water-free solids. A detailed analysis of the figures is in course of preparation and will be published in the near future. It may be stated, however, that the Walker test has proved itself almost indispensable for a proper standardization of the milk received at the experimental factory. Although wide differences in fat content, in casein content, and the casein-fat ratio were experienced from day to day, the range of figures for fat in the water-free substance showed a maximum variation of 50 to 54.5, while 88 per cent. of the figures ranged from 51 to 53.5. The testing of the cheese was carried out for the most part in the College factory. Where analytical methods of testing cheese were used the maximum range of variation was somewhat smaller. Calculations of possible errors due to variations in the losses in manufacture, variations in quantity of salt incorporated in the cheese, errors in the Gerber fat test and the Walker casein test, and possible errors in the testing of cheese, indicate that it is not safe to aim at a figure for fat in the water-free solids too close to the standard required.

The standardization results indicate that a casein-fat ratio of 0.725 would be safe under the conditions of cheese-manufacture at the Institute. This should yield a mean result of 51.8 per cent. of fat in the water-free substance, provided that conditions of manufacture remain reasonably constant.

Through the kindness of the manager, the standardization figures of a factory near Palmerston North where the Walker test has been regularly used were examined, and were found to agree fairly closely with those at the Institute. As was to be expected in view of the greater difficulties in measuring volumes of milk and in sampling, the range of figures for fat in the water-free substance is rather large—namely, 49.5 to 55.5 per cent. The majority of the results (93 per cent. of a series of 441 figures), however, fell within the range of 50.5 to 54, the mean being 52.2.

The standardization records show further that a casein-fat ratio of 0.65 is suitable where cheese containing 52 per cent. fat in the water-free substance is desired.

The Manufacture of Standardized Cheese.

It has become apparent in the course of the past year's work that standardized cheese must be allowed to develop more acidity previous to salting than whole-milk cheese made from milk of the same fat percentage. Great attention needs to be paid to cooking temperatures.

Since standardization of milk for cheesemaking results in the reduction of cheese-output in proportion to the amount of fat and other cheese solids removed with the cream, an attempt has been made to study on a small scale (a) the extent of reduction in yield, (b) the effect on the quality of the produce, and (c) the possibility of adding skim-milk powder to high-testing milk in place of removing fat in order to obtain the desirable fat-casein ratio. All of the cheeses comprising this series of experiments have not yet been examined. It may be stated, however, from the examinations already made that the addition of skim-milk powder to high-testing milk produces a cheese-milk with a very firm and gritty body. It is also inferior in flavour to the corresponding whole-milk cheese. Milk standardized by the addition of liquid skim-milk produced cheese which scored slightly less in flavour, without any reduction in body and texture, than the corresponding whole-milk cheese. No comparison was made with low-testing whole milk of the same composition as the standardized high-testing milk. A detailed report of this experiment will be published when all the data has been collected.

Analysis of Standardized Cheese.

The analysis of cheese plays a most important part in fulfilling the regulations pertaining to the export and sale of standardized cheese. Dr. F. H. McDowall made a careful study of the unavoidable errors that arise in testing cheese under factory conditions, and of the extent of variation of solids in different parts of a cheese. The details of this work were published in a bulletin entitled "Standardized Cheese and Cheese-analysis." Briefly stated, the investigation showed that the theoretical error of