

A certain number of organisms intermediate in their characteristics between *Sbm. plantarum* and *Sbm. casei* were isolated. Two varieties were distinguished, neither of which produced undesirable flavours or discoloration; the second variety, however, was very tolerant of salt and caused open texture.

Betabacteria, when added in fairly large numbers to the cheese milk, invariably produced bad flavours, discoloration, and openness.

Betacocci were found to cause slit openness. Most varieties also produced objectionable flavours and discoloration.

The Flora of Good quality Cheese: The flora of good quality cheese was usually found to be less diverse than that of poor quality cheese. The types present in the former were chiefly *Sbm. plantarum* variety 4, *Sbm. casei*, and variety 1 of the group intermediate between *Sbm. plantarum* and *Sbm. casei*. A small proportion of the flora often consisted of other types—e.g., betabacteria. Indeed, there was some evidence that the presence of small numbers of betabacteria actually improved the flavour of the cheese.

Those cheeses, however, which included in their flora a high proportion of (a) betabacteria, (b) most varieties of betacocci, or (c) the first two varieties of *Sbm. plantarum* mentioned above were invariably of poor quality. Clearly, therefore, it becomes a matter of practical importance to devise means of preventing any relatively large numbers of these undesirable organisms from gaining access to cheese milk. With this ultimate object in view, the sources of the different types of lactobacilli are at present under investigation. Progress along these lines should be considerably expedited as a result of the work described in this report, since it is now possible to forecast from laboratory examination of a given lactobacillus approximately what effect that organism is likely to produce in cheese.

(d) *The Composition of Milk Reacting to Bromthymol Blue, and its Effects on Cheese Quality* (F. H. McDowall).—A study has been made of the factors influencing the bromthymol blue test for mastitis. It has been shown that the high pH in the milk, corresponding to a positive bromthymol blue test, persists in an appreciable volume of the foremilk with some affected quarters, but only for a very small volume with other quarters. In the latter case the result of the test would depend to a great extent on the quantity of milk taken. The test is also affected by the quantity of indicator added and the interval between time of drawing the samples and time of reading. An investigation in the field, in collaboration with Mr. J. P. James, M.R.C.V.S., of the Veterinary Laboratory, Wallaceville, and Mr. A. H. Ward, of the herd-recording department of the New Zealand Dairy Board, has indicated that a positive reading of the bromthymol blue test means a high leucocyte count in the milk, but at least 50 per cent. of the milks with high cell count are not shown up by the test.

Work at the Institute and that carried out by Mr. Veale has shown that there is usually a significant difference between the composition of milk from quarters reacting positive to the bromthymol blue test and that of milk from sound quarters of the same cow. While previous work has shown that milk from quarters showing active mastitis has an influence on the flavour of cheese, it is still open to question whether milk from quarters affected with latent mastitis has any effect on cheese quality (its effect on the quantitative aspects of cheesemaking will, of course, be related to the effect on milk composition). By means of a specially designed milking-machine bucket and claw which permitted the separate collection of milk from the individual quarters, sufficient milk was collected from affected and corresponding sound quarters to permit a comparison of the cheesemaking qualities of the two samples. The comparison was carried out with 100 per cent., 25 per cent., and 10 per cent. mastitis milk. The cheese, when graded three weeks after manufacture, showed no appreciable difference. The gradings of the mature cheese are not yet available.

BUTTERMAKING PROJECTS.

(e) *Fat Losses in Buttermilk* (W. J. Wiley).—The percentage of fat in buttermilk may give an erroneous impression as to the efficiency of churning; the figure that is desired is the percentage of the fat present in the cream which is lost in the buttermilk. It is generally impracticable to weigh the buttermilk, and recourse must be made to indirect methods of calculating the loss. These indirect methods are based on assumptions as to the composition of the butter. During this season a series of experimental churnings was made in which the losses were estimated directly by weighing and analysing the cream, buttermilk, and wash-water. The results agreed closely with those obtained indirectly by a method proposed by Udy in New Zealand and by another method proposed by Bird and Derby in the United States. Both these indirect methods were proved to be sufficiently accurate for factory control work and for much experimental work.

(f) *Oxidation of the Fat of Butter in Cold Storage* (W. J. Wiley).—The experiments on the oxidation of the fat of unsalted butter in cold storage mentioned in the last report have been continued, and extended to include salted butters. It was found that both salted and unsalted butters made from ripened cream oxidized more rapidly than corresponding butters made from cream acidified to the same extent with pure lactic acid. Salted butters oxidized more rapidly than corresponding unsalted butters. The more rapid oxidation in the case of the ripened-cream butters was not due to the presence of diacetyl or acetoin, as these compounds were found to have no influence on the oxidation. Low pasteurization temperatures favoured the oxidation of the butterfat. The results indicate the presence in ripened pasteurized cream and in unripened raw cream of a fat oxidizing enzyme which is most active at low pH values (about 5) and high salt concentration.