starters which have been used satisfactorily in one factory have failed to give equally good results in another. It is possible that minute differences in the milk-supply between one factory and another, due to differences in soil or feed, may play a part, and it is certainly true that it is easier to make close cheese in some districts than in others. More factors are apparently involved than the sanitary condition of the milk, because close cheese cannot be consistently made from very pure milk.

The present position may be summarized as follows: In areas where openness of texture is a problem no method can assure the consistent manufacture of close cheese, but the degree of openness can be materially reduced by paying the closest attention to the cleanliness of the milk-supply and to the details of manufacture and the curing of the cheese. In view of the importance of overcoming this major defect, the Commission recommends that existing research work should be intensified and extended to a study of the possible effects of pasture, soil, and climatic variations.

The development of a horny appearance on the cut surface of cheese exposed to air and the attendant cracking of the surface was attributed by witnesses mainly to the lack of maturity of the cheese at the time of sale. Very mature cheese does not develop these defects. It has been suggested in evidence that horniness may be accentuated by or be attributable to the use of high-testing milk, which is known to form a harder curd than low-testing milk; but no proof of this contention was submitted. Moreover, it was shown that both high- and low-testing milk cheese develop both of the above defects when cut in an immature state. Since the demand for New Zealand cheese rests on its mild flavour, it is necessary for us to sell our cheese while it is still relatively immature, and the Commission therefore recommends that research effort should be directed towards attempting to eliminate the defects under discussion whilst retaining the present character of our cheese.

**212. Milk-grading:**

Practised voluntarily by many dairy companies for years, milk-grading was made compulsory in the season 1932–33. Since the commencement of the season 1933–34, it has been accompanied by a differential rate of payment for milk according to grade, second-grade milk being paid for at a rate at least ½d. per pound butterfat less than first grade. Factories may, under the regulations, grade their milk into three grades—viz., finest, first, and second. The test and standards employed for the purpose have been criticized by some witnesses. At the present time a combination of two tests is employed, one of which must be the curd-test and the other the methylene-blue or microscopic test. All milk which decolorizes methylene-blue in less than two hours, or which is shown by the microscopic test to contain a relatively high number of organisms per cubic centimetre, and all milk which does not produce a good curd with a clean flavour after a period of eight hours is graded second. Some witnesses suggested that the milk-grading regulations should be amended to permit of the use of one only of the several tests on the condition that a high standard be required in each case. Their suggestions are that—

(1) In the case of milk supplied to a cheese-factory all grading should be based on any one of the following methods: (*a*) The direct microscopic test; (*b*) the methylene-blue test; (*c*) the curd-test.

(2) The regulations should be redrawn to provide universally for three grades—namely, finest, first-grade, and second grade.

(3) Where the direct microscopic test is employed, (*a*) the grade of finest should be applied only to milk which is of clean flavour and appearance, and contains not more than fifty thousand organisms per cubic centimetre as determined by the direct microscopic count; (*b*) the grade of first should be applied to milk which is of clean flavour and appearance, and contains more than fifty thousand but less than one million organisms per cubic centimetre; (*c*) the grade of second should be applied to all other milks.

(4) Where the methylene-blue test is employed the minimum times of decoloration for the respective grades should be: For finest, not less than five hours and a half; for first grade, not less than three hours; for second grade, under three hours.

The basis of the above suggestions is that milk can be satisfactorily graded by measuring approximately the number of bacteria in milk. The microscopic test does so directly, while the methylene-blue acts in the same manner indirectly.

The witnesses who made these suggestions pointed out that the grade of milk is primarily dependent on the number of bacteria in it. They agreed that the types of bacteria in milk vary widely, and that although reasonable numbers of milk-souring organisms in contradistinction to other types are not dangerous from a cheesemaking point of view, the obvious method of improving the milk-supply was to reduce the numbers of all bacteria to a minimum. They also pointed out that if a cheesemaker consistently receives milk of a low bacterial count, he can control his cheesemaking process more effectively than if he receives milk varying in count from day to day, because in the former case he will be working on milk that is relatively constant in character, and can, therefore, with the use of a carefully controlled starter, secure more uniform results. They further claimed that these tests are officially recognized elsewhere for the grading of milk, and that they have given satisfactory results in New Zealand.

Those who favoured the retention of the curd-test in combination with either the methylene-blue or microscopic test, considered that to be effective in ensuring a good milk-supply the methylene-blue and microscopic tests, if used independently of the curd-test, would prove to be too exacting for many suppliers in some districts, and that, consequently, it would be difficult to insist on uniform standards throughout the Dominion. They claimed, too, that these tests are unsatisfactory because a low bacterial count is not a necessary indication that a good curd will result, and they consequently placed emphasis