REPORTS OF RESEARCH COMMITTEES OF THE COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DAIRY RESEARCH INSTITUTE.

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Material progress has been made during the year with the investigation of problems affecting the manufacture of cheese and butter. These can be briefly divided into three categories—namely, the control of defects, the raising of average standards of quality, and the assessment of yield of products and control of losses.

The elimination of open texture in cheese and feed flavour in butter have received most attention. The former is a serious and widespread occurrence which is exceedingly difficult to control in dairy practice and which has received close examination for a period of years. It has now been shown that the "slit" and "sweet" types of open texture of cheese are fundamentally due to certain strains of lactobacilli that play a part in the normal ripening of cheese. Although not present in large numbers in freshly-made cheese, lactobacilli rapidly increase during the curing process, and those which produce gas cause fractures to occur in the body of the cheese. These then develop into slits if the cheese is of normal acidity, or round (sweet) holes if the cheese is sweet and the curd is accordingly plastic. It has been shown that gas-producing strains of lactobacilli can be controlled at least in the early stages of the ripening of the cheese by the use of active starters. It is not yet clear whether this is due directly to the starter organisms or indirectly to chemical conditions induced in the cheese by the organisms; nevertheless, there is abundant evidence that active starters which produce acid vigorously during the cheesemaking process play an important part in making cheese close when graded at fourteen to twenty days old. The development by the Institute of starters prepared from single strains of lactic streptococci selected to grow at the temperatures normally employed in the cooking of cheese curd was shown in the previous year's experimental work to be a notable advance in encouraging acid development and in the control of openness. At that time difficulty was experienced in maintaining the vigour of these starters due to their frequent and sudden failure as the result of bacteriophage action, which similarly affects mixed starters. In the present year this difficulty has been overcome under the conditions prevailing in the Institute dairy factory. Equally good results have been obtained in some commercial factories, but others still experience difficulty in preserving the vigour of these starters. It still remains to be determined whether or not certain milks make these starters more susceptible to phage. The selected starters have received wide favour from cheese-factory managers, and in the dairy season 1936-37 some 2,639 starters were supplied to 140 separate cheesemaking companies.

Much work yet remains to be carried out on the best cheese-manufacturing technique when cheese-starters are employed, and on their influence on the final quality of cheese. The results of experiments to date indicate the desirability of using selected single strains as a partial source of the starter supply, but they do not justify their exclusive use as starter.

Work on "openness" is proceeding along other lines to identify the particular strains of lactobacilli that produce gas in ripening cheese and to trace their source with a view to controlling their occurrence in milk.

Fairly widespread feed flavour that occurs in cream and in butter in certain localities in the Dominion has been definitely attributed to types of clover present in pastures. Suckling, subterranean, and white clovers have all been shown to cause trouble, especially when they are in the actively growing stage. Field evidence collected by the Grasslands Division of the Plant Research Bureau, who are collaborating with the Institute in this investigation, shows that the "feedy" condition is not accentuated by top-dressing. Indeed, it emphasizes the fact that as fertility is increased by top-dressing and by carrying greater numbers of stock, the proportion of grasses present in pastures increases and the "feediness" in cream produced thereon falls off markedly. While the problem can possibly be overcome ultimately on farms by pasture and stock management methods which preserve a definite balance of clover and grasses, there is already definite evidence that the intensity of "feediness" in cream can be materially mitigated, if not eliminated, by preventing animals from grazing "feedy" pastures for a period of at least four hours prior to milking. This practice does not apparently reduce the production of dairy cows. Work at the Institute is in progress to define the percentage of clover that can be present in a pasture without causing taint and also to define the growth conditions of the plants which induce the taint.

On the manufacturing side it has been shown that taint can be largely removed from cream by special processing methods. This is a most useful recourse in case of emergency, but it should not be accepted as a final solution of the problem, because of the possible influences of this treatment on the finer flavour properties of butterfat.

Studies on the neutralization of cream have explained the fundamental reasons for occasional yet unintentional overneutralization and consequent ill effects on butter flavour. These same studies have emphasized not only the need for careful neutralization, but also the necessity for avoiding high acidity in butter that is to be stored for any period of time.

Attempts are constantly made by research to raise the existing standards of quality of food. This is just as necessary with dairy products as with others. In this connection good progress has been made at the Institute with the improvement of flavour in cheese by the addition to milk for