

operating the single-strain starter cultures developed at this Institute. The conclusions formed are tentative pending completion of the examination of the cheese at maturity—

- (1) Effect of Percentage of Starter: With variation in the proportion of starter added, the difference in ratio of acid development was less pronounced in the later stages of the process than in the earlier stages, and the differences in acidity or quality of the cheese were not very marked even when half or double the normal quantities of starter were used.
- (2) Effect of Running Acidity: The pH measurements confirmed the generally accepted finding that with a higher running acidity there is a more rapid development of acidity in the earlier stages of the process. High-running acidities tended to produce a more acid type of cheese with a mealy body and sharp flavour, while the low-running acidities gave cheese with a smooth body but a tendency towards excessive "sweetness."
- (3) Effect of Time of Salting: The observation that time of salting had little effect on the final acidity of the cheese was confirmed. It was found that salting at a high acidity gave cheese with a mealy type of body, while salting at a low acidity gave cheese with a smoother body but a greater tendency towards mechanical openness.

(f) *Strength of Cheese Bandages* (J. D. Sargent).—In collaboration with the British Cotton Research Association, Manchester, an attempt has been made to define the most desirable and yet least costly type of bandage for export cheese. Working with eleven specially woven bandages differing in physical properties and make-up, it has been shown that the ultimate shape of cheese exposed for sale depends upon both the type of cheese-curd and type of bandage. The load required to break a piece of bandage cloth of standard dimensions under specified conditions is an important consideration. It is equally important that the bandage should not stretch. It is also obvious that the texture of the woven threads and the nature of the materials used should be defined. These several points are receiving consideration and it is hoped that the results will not only lead to definition of the most economical bandage to be used, but also provide a basis for establishing standards for cheese bandages.

(g) *Standardization of Cheese-manufacture* (W. Riddet, J. D. Sargent, and E. A. Sawyer).—Interwoven with specific projects on the relation to the quality of cheese of starters, acidities of curd at critical stages in the manufacturing process, and the addition to milk of selected organisms, an attempt has been made to define the effect of cheese-manufacturing technique on the time occupied by manufacture and on the general quality of the cheese when mature. This work, which is fundamental to the interpretation of any cheesemaking experiments, has been proceeding for a number of years and the data collected are proving valuable in predicting and detecting critically the influence of each step in the cheesemaking process. It ultimately aims at defining the cheesemaking procedure best suited to a particular starter and milk-supply.

BUTTERMAKING PROJECTS.

(h) *Control of Feed-taints by Feeding Experiments* (I. Campbell and others).—Continuing work of the previous season on the influence of mixtures of rye-grass and white clover fed to cows in stalls, it has been shown by the alternate twenty-one day plan of animal feeding experimentation that 30 per cent. white clover in the ration produces negligible taint in cream, while 70 per cent. creates a definite taint under the same conditions. Confirmatory results have been obtained with cows grazing pastures of rye-grass and clover. As in past years, it has been shown that taint from clover falls off in intensity as the rate of growth of the plant recedes from November onwards, and under these conditions the clover content of pasture may be increased without any adverse effect on the taint of cream. An attempt was made to contrast under grazing conditions the respective influences on taint of milk of rate of clover growth and state of maturity of the plant when consumed, but the experiment was spoilt by the unexpected onset of a long period of dry weather in the normally active growing pasture season.

Green lucerne, constituting 30 per cent. to 70 per cent. of the ration for two respective groups, was fed to the stall cows for sixteen days. The group fed the higher proportion gave a strong flavour indistinguishable from that resulting from clover feeding, while with 30 per cent. lucerne only occasional mild flavours were recorded. Creams were exchanged periodically with Mr. Marryatt, of the Fields Division of the Department of Agriculture, Hamilton, who was studying another aspect of the same problem at Ruakura. These samples were pointed for feediness both in the Waikato and at the Institute. From the exchange of these fresh samples it was shown that the same type of flavour was being produced at both centres and that the Institute grading standard agreed approximately with that used by Mr. Marryatt.

In order to find out more about the physiology of tainting, cows were drenched with various liquids. The amount of active drench, the time between drenching and milking, and the intensity of the flavour produced in milk were noted, and interesting results obtained. Expressed white-clover juice, land-cress juice, and mustard oil (the tainting principle generally recovered from the hydrolysis of cruciferous plants) were used. It was found that five minutes after drenching with a milk emulsion containing 1 gram or 2 grams of mustard oil pronounced flavours similar to mustard oil were produced in the cream. Only mild "mustard" flavours were recorded two hours after drenching. The juice from as little as 1 lb. of land cress (*Coronopus didymus*) gave characteristic strong flavours and odours. It is hoped to develop this "extraction and drenching" technique further, as it seems to offer useful possibilities in future experimentation.