

water existed, this practice might be worthy of imitation in dairies. The colour of the wall was another not unimportant circumstance in the formation of dairies. In one instance he had known of a large dairy constructed of wood being painted black, or rather being covered with tar. As black is the colour of all others the most absorbent of heat, the results may be guessed. Scrupulous cleanliness is another of the essentials of dairy management—the scalding, and cleansing, and airing of the milk-pans and other utensils being of the first consequence. The reason of this was also obvious; any minute portion of milk left from one operation would necessarily become so changed by the next as greatly to hasten the internal chemical changes in the milk. Another class of phenomena was connected with the extraordinary power of minute and inappreciable quantities of animal effluvia to produce change in such a delicately compounded fluid as milk. Thus, it was a rule never to have a dairy near a stable or other bad smell; there must be no drain near it, no meat kept in it, and the cheese itself should, where possible, be separated as far as possible. In these cases, as indeed in all cases of noxious effluvia, it was believed that excessively minute quantities of decomposing animal matter were carried in the air, rapidly inducing a change of a chemical nature in substances susceptible of such changes. In the case of milk, the phenomena were all referable to the tendency of casein to undergo change, which was much enhanced by exposure to impure air.

Mr. Way said that he had now shortly to call attention to the curdling of milk. It was seen that the natural souring was due to production of lactic acid; but in what way did this bring about a separation of the curd? This question was best answered by examining the properties of casein. Casein, or the curd of milk, was but slightly soluble in water, but very soluble in a weak solution of an alkali. In milk casein was kept in solution by a small quantity of soda, which accounted for the alkalinity of the milk when first drawn. Upon the formation of the acid this latter seizes the soda, thus depriving the curd of its solvents, and the consequence was that the curd was immediately set free. The separation of the curd from the whey was assisted by warming the milk; this was the reason why milk, slightly sour, but not curdled, became so when added to hot tea. If this explanation of the curdling of milk was correct, the same result would be obtained by the use of vinegar or muriatic acid; and Mr. Way showed that these acids would curdle fresh milk. The lecturer then went on to say that he would make a very short sketch of the different operations of butter and cheese-making.

CREAM.—Cream, he stated, was merely a concentration of milk; the butter, by its lightness, rising and carrying with it a certain quantity of casein; it was therefore merely a mechanical separation. Clouted or Devonshire cream was butter with a larger quantity of cheesy matter, and therefore less wholesome than ordinary cream. Cream cheese was one step further than Devonshire cream, being a mixture of casein and butter with a considerable quantity of whey not pressed out. To this circumstance was attributable the impossibility of keeping cream cheese sweet more than a few days. There was a method of preserving cream and milk sweet for some time, which was interesting in a chemical point of view. It consisted in the periodical heating of the milk or cream to the boiling point. If this were done every morning or second morning, the milk may be preserved for several weeks. In the same way fresh cream be bottled and well corked, the bottles then placed in cold water gradually raised to the boil-

ing point, it will be preserved for months. The explanation in these cases is that, by a temperature of 211° Fahrenheit, the quantity of ferment produced by the action of the air on the casein is destroyed; if no further contact of air takes place, the change of milk sugar into lactic acid is suspended; but if the milk is exposed to the air after boiling, a further quantity of ferment is produced, to destroy which, before it greatly accumulates, recourse must be again had to the process of heating.

Mr. Way thought it possible that the bisulphate of lime, the use of which had excited so much attention as a means of retarding the fermentation of the juice of the cane and the beet-root, in the preparation of sugar, might be advantageously employed in the preservation of milk; but possibly the inventor had contemplated this application of his process.

BUTTER.—The separation of butter in churning was considered a mechanical process, but there were one or two circumstances which seemed to favour the notion that chemical action of some kind occurred during the operation. The circumstances affecting the butter were the same as those affecting the milk. Butter was never entirely free from casein and milk sugar. The casein, although it did not exceed one-half per cent of the weight of the butter, yet was sufficient to make the preservation of butter difficult. The method of preserving by salting and pressure were intended to meet this tendency of butter to become rancid—here, again, possibly the bisulphate of lime might be useful. There was a method of preserving butter for domestic purposes described in Mr. Rham's "Dictionary of the Farm," (p. 113), and which was founded on the separation of the casein and buttermilk. It consisted in melting the butter, and allowing the casein and water to separate and fall to the bottom. The solid butter thus obtained was less finely-flavoured; but it kept better, and was much preferable to salt butter for pastry and other such purposes. To remove the turnip taste in butter, Mr. Way recommenced stirring the milk as it is drawn, or the addition of a little saltpetre; or the adoption of Mr. Huxtable's plan, adding to each gallon of milk a tablespoonful of the clear solution of half an ounce of chloride of lime (or bleaching powder) in a gallon of water. In respect to the theory of the formation of butter in the cow, Mr. Way remarked that it was believed that although fat (and by a parity of reasoning butter) could be formed from the starch and muceilage of the food, and that in the presence of sufficient oily matter it was not likely that such production of fat should take place; then came the question how far oily foods would increase the yield of butter. It must not be lost sight of, however, that butter consisted of two fats—a solid and a liquid; and that, according as the one or the other predominate, the butter was firm or soft; the oils might possibly increase the quantity, but would the quality be good? He would suggest, as an experiment of physiological interest, an attempt to feed a cow with a mash in which such a solid fat should be introduced. By proper measures, best known to dairy farmers, a cow might be made to eat this perhaps, and it would be interesting to know the results on the quantity and quality of the butter.

CHEESE.—Mr. Way remarked that the curdling of milk was due as before explained to acids, which combined with the soda of the soluble curd. In general, the production of acid in the milk was brought about by the use of rennet, which was a ferment produced by the exposure of the lining membrane of the stomach of a calf to the air. The use of rennet presupposed, of course, the destruction of the milk sugar, and therefore