

the cow is expected to yield the maximum of milk in a thoroughly sound state, as comfort, rumination, and rest cannot be obtained in hot sunshine.

From a knowledge of the extreme sensitiveness of milk and its products, it goes without saying that scrupulous cleanliness is an absolute necessity not only in the dairy, but in all the initial stages. How often do we find the cow-sheds only cow-sheds in name? And how often do we find the sheds and yards clean? Too often in close vicinity to these are the piggeries, &c. Thus it is that when the milk is warm, and consequently in the most sensitive condition for affection from bad odours, it is exposed to all the taints of an impure atmosphere. Again, when the milk is destined for the factory I have often found it left standing to cool over-night in deep cans in the cow-shed, until it has absorbed a whole brood of pestilential odours. When taken to the factory such milk soon pollutes the sound milk with which it comes in contact.

In order to illustrate the necessity for scrupulous cleanliness being observed during milking I will briefly cite the results secured by the Copenhagen Milk Supply Company, which was established some twelve to fifteen years ago, and which is unique as being the most perfect dairy system in the world. All dairies supplying milk to the company are required to come under the strict control of the Supply Company, who have a staff of inspectors and veterinary surgeons employed to periodically visit the farms and insist upon cleanliness, to examine the cows, and to see that they are fed on the stipulated food. On receipt of the milk in the large collecting dairy in Copenhagen the temperature is taken, and any milk found exceeding a certain degree is refused. Samples of each patron's milk are taken daily, and these are carefully tested, and at intervals each patron's milk is chemically analysed. The company receives the milk of between three and four thousand cows. All the milk, after arriving at the factory, is filtered through sponges and fine gravel, with the result that some 300lb. of black sediment is taken from the milk daily. Last year (1889) 12,500,000 gallons of milk were received, and out of this quantity almost 50 tons of dirt were abstracted—a quantity scarcely credible, yet, nevertheless, true.

As already stated, I have given this brief account of the working of the system with the view of showing the absolute necessity for cleanliness in handling of milk. When so much filth was abstracted from milk taken from farms known to be the most perfect and clean in the world, what must be the condition of the milk where no care is exercised, and where cleanliness is only a secondary consideration? Let every one recognise that a first-class butter-product, with good keeping-qualities, cannot be made if the milk is in any way dirty or unsound, no matter how competent the maker may be, or what system is pursued. This brings me again to the point previously referred to in my last report—viz., the necessity for having the milk delivered at the factory as soon as possible after the cows are milked, so that the operations of aerating and cooling the milk are not left in the hands of the suppliers themselves, to the detriment of the product and the risk of the maker.

Another matter requiring great attention at the hands of the milk-suppliers is the transit of the milk to the factory. Strict attention to this is necessary. Covered cans being used for the transportation of the milk to the factories, these are, for various reasons, imperfectly ventilated. Therefore the animal odour of new milk is retained, which has a very deleterious effect upon the butter-product unless the odour is removed before separation of the cream. If the odour arising from milk fresh from the cow is allowed to pass on into the cream, and then worked into the butter, such butter is certain to have a modified flavour, and will be defective in its keeping-qualities. Similar defects appear in butter made from milk taken from unhealthy cows, or milk which has been carried a long distance in close-covered tins not quite full, thus giving space for the milk to roll about. The butter from such milk will not keep long, and is liable to take on an unnaturally strong and unpleasant taste. It will also soon lose its firmness of texture, and become of a greasy nature. As a remedy for this evil I recommend that milk-tins with coned tops, having a capacity of from 10 gallons to 12 gallons, be used for the transport of milk from the farms to the factories, and that the tins be kept completely full, so that when the lid is on there will be no space left for the milk to roll about.

The proper maturity of the cream before churning is one of the most important points in the manufacture of butter for export, as on that depends the extent of the yield, and, in a measure, the keeping-qualities. Experience goes to show that ripened cream produces from 4 to 5 per cent. more butter, and its flavour and keeping-qualities are improved in a marked degree. The exact stage of ripeness is not yet ascertainable by any easy test, and so must be left to the good judgment of the operator. The ripeness should just be sufficient to coagulate the caseine of the cream.

The want of proper means for maintaining the desired low temperature throughout the various operations in butter-making for storage purposes and during transit are the greatest hindrances to the success of our butter-export trade, and these means must be procured before thorough success can be attained.

The industry has not yet reached a stage in its development where the food of the cow, cleanliness, and care of the milk on the part of the milk producers will be strictly attended to, and the quality of the product will be looked upon more as the result of careful manufacture. It is for these reasons that the use of ice becomes an absolute necessity, for whatever comes or goes we must have firm butter, so that all the operations of the process can be conducted successfully, and to counter-balance the defects of the milk in its initial stages. For example, the cream, immediately after separation, should be reduced to a very low temperature (45° to 48°). This is not only a corrective for cream that is inclined to froth during churning, but at the same time produces firmness of texture, and greatly enhances the keeping-quality of the butter. And again, after the butter is taken from the churn, and has received sufficient working to cause solidification, it should be placed for a short time, or at least until it is quite firm, in a cold atmosphere. This is secured in Denmark in the following manner: (1.) A large trough fitted with a false bottom is used. (2.) The space beneath the false bottom is filled with ice. (3.) The butter is placed on the false bottom, resting upon the ice. (4.) The trough is covered with a metal lid on which ice rests. Thus the butter is between