

Another day I visited the country districts, and, under the guidance of Baron Weddell, saw a model farm, where dairying and agriculture is taught. This dairy was, however, under the old system, and had not the most modern appliances.

I then visited a new co-operative dairy-factory, with all the latest improvements, and, without pretending to be an expert, acquired the following information: The milk is cooled by the farmers immediately after milking, and to do this most of them use ice; they nearly all have ice-houses. The milk is weighed when delivered to the dairy-factory, and samples are daily taken of each farmer's supply. The milk is then emptied into a large round vat, and is passed from here into a small vat close to the separators, where it is heated slightly by steam-pipe, and then it is run into the separators. The cream, after leaving the separators, is cooled to as low a point as possible, and at least to 48° Fahr., by using ice. The skim-milk is elevated in a pipe from the separators, and is run through a heater, which raises the temperature to 160° or 170°, and thus destroys germs which might carry disease to calves, and at the same time arrests fermentation and consequent sourness. The farmers take back their skim-milk.

The best butter for export is made from soured cream; and this is one of the most important features in a Danish dairy. The sourness is arrived at by keeping on hand some sour cream called the "starter," and by mixing this to the extent of 2 per cent. with the sweet cream the necessary alteration takes place. The sourness is in reality caused by a germ (named by Pasteur No. 18 Bacillus), and much attention is required in the souring process.

A "starter" can be created by keeping cream for thirty-six hours in an equal temperature of 18° to 20° Reamur, which sours it, and renders it ready for use in twenty-four hours. About 4 per cent. more butter is obtained by the sour-cream system as compared with the sweet cream. Next comes the churning, and this also requires much attention. The churns used are stationary, and only the "plunger" inside moves. Our American churns, which themselves revolve, are utterly condemned as bad butter-makers, so I have ordered a double one to be sent from Copenhagen for Edendale. It is similar to those represented in the various sketches and plans sent you. The churn is filled to the extent of about two-thirds its capacity, and the butter should come in about thirty-five minutes. During churning the temperature is carefully watched and regulated by the revolutions of the "plunger." A thermometer is introduced through a hole in the churn, and closely watched. About 55° Fahr. is, I understand, about the proper temperature (9° to 12° Reamur).

The colouring fluid varies according to the season, and is introduced in the cream just previous to churning; about 1 drachm to 22 gallons of milk is about the allowance. The butter is removed from the churn in a hair sieve, and is well rinsed in pure cool water before being put on the butter-table. In the Copenhagen dairy it was then worked moderately by the hand; and there is much art in the manner in which this handling is done, and dairymaids with naturally cool hands are selected for the duty. The butter is next spread out in a trough, and salted with 2 per cent. of the finest dairy salt; and it is then placed in a refrigerating-trough for two hours, in a temperature of 7° Reamur. Then it is passed ten times under the butter-worker, during which process 2 per cent. more salt is added. Then it is once more put in the refrigerating-trough for about an hour, and until sufficiently cooled down to stand the final working of eight to twelve times under the butter-worker, which process should thoroughly express the buttermilk and leave the butter ready for packing. Most of the factories only use the butter-workers, but some people think that the best butter is produced by first working it slightly with the hand.

The foregoing is, shortly, the system of Danish butter-making; but, unless it is seen, one can scarcely credit how careful and exact the experts are in conducting the process, and they calculate things to one degree of temperature, or one revolution more or less of the churn per minute. Now, we have everything to carry on this system, or can easily supply what is wanting, excepting the means of refrigerating the cream and butter, and this, I believe, we must procure to place us on an equal footing with the Danes. In their cold country they have an ample supply of ice, and every farm of any size has its ice-house.

The refrigerating-trough alluded to by me is merely a wooden trough with ice laid in the bottom, which is again covered with a false bottom, on which the butter rests, and the whole trough is then covered with a metal lid, on which ice is laid. The butter is then between two layers of ice, but without coming into contact with it. The necessity for cooling the butter is a *sine quâ non* in Denmark, as, unless so treated, it cannot be worked sufficiently to get out the buttermilk without rendering the butter oily and tallowy. Now, I believe this is certainly the reason our butter is so greasy and tallowy; and in Denmark, where ice is used, even the style of pressure is studied, and direct pressure is insisted on, such as is given in the butter-worker. In packing, care must also be taken not to "spread" the butter into the kegs, but merely to put it in and press it down.

The question now comes, how are we going to find the necessary cold? Are we to purchase a small refrigerating-engine to make ice, or shall we try the ammonia system and use a refrigerated room, or shall we use the ammonia pipes to surround and cool refrigerating-troughs or vats? These seem to me the alternative possibilities, unless we can make a contract with the Bluff refrigerating-works to supply ice, which might be delivered daily. I fancy it will end in our supplying ourselves with the means of maintaining a refrigerated-room, and also of making ice. Some new ammonia systems are now being tested in London, and I am communicating with the promoters. We are also testing the Arctos machine at Nelson Brothers' stores. I will write again fully on this subject, but we can take it as a certainty that the best butter cannot be made without the power of chilling it sufficiently to stand the working of the butter-worker; and, unless the buttermilk is thoroughly expressed from the butter, it will not keep, and cannot be packed for export. Then, after it is made, the butter should be kept in a cool-room until shipped. As to packing butter in tins, it seems a simple enough business, and I visited a large packing works. In this case the butter was purchased from a number of dairies and brought to the Copenhagen works for tinning, after which it is sent to all parts of the world. On receiving the butter it is passed through a butter-worker, in case any moisture has been left in by the farmers, after which it is put into 1lb. to 28lb. tins, and branded in