

Of these I cannot treat in detail within the limits of this paper, but only so far as they may have a powerful and obvious bearing throughout the process.

Milk is usually composed of solids dissolved in about ten times their bulk of water, holding in suspension from 3 to 6 per cent. of butter-fat. Now, the first aim of the cheese-maker is to separate the caseine, or curd and butter-fat in combination with water, from the other substances the milk contains. How are you to bring about that state? By the action of rennet, making certain substances of the milk insoluble. The butter-fat, being in a state of emulsion, needs no special treatment to cause it to separate; in fact, the object should rather be to keep it in a fine emulsion until the coagulation of the caseine has taken place, so that the fat may be more evenly encased or distributed throughout the whole body of the solidified caseine or curd.

The first step, therefore, is to coagulate the caseine of the milk with rennet, by which solidification the butter-fat will also be encased and held in suspension. Now, there is a point here worthy of note, and to which I wish to draw your attention. The condition of the caseine at the time the rennet is added has very much to do with the quantity of cheese you can make from a given quantity of milk. Then, the quality of it at this stage exerts a powerful influence over the condition and quality of the finished product. It is of the utmost importance that you should determine the exact condition of the caseine of the milk as regards maturity before the introduction of rennet. In fact, I cannot find words strong enough to press home this point of the process. Here lies one of the great secrets of successful cheese-making, for undoubtedly the state of the milk when consumed raw, and before curdling in the making of cheese, exercises a most important influence both on the value of milk as an article of food and upon its conversion into cheese. The great importance to the cheese-maker of being able to estimate with accuracy the condition of his milk as regards maturity cannot be over-estimated. That a certain amount of maturity is required before the addition of rennet, for the purpose of causing a complete coagulation of the caseine, can be easily ascertained by a little experiment. Take, for instance, a given quantity of milk containing a feeble trace of acidity; then take a given quantity of milk newly drawn from a healthy cow. Again take a given quantity of new milk into which has been put a few drops of an alkaline solution. Let us now add a given quantity of rennet extract to each sample of milk, and carefully note the time required for coagulation of each sample and note the condition of the curd when coagulation is complete. The sample having a feeble degree of acidity will be found to coagulate more quickly and more perfectly, and will differ materially from that of the other samples. In the other samples it will be found to take longer for the rennet to act on the caseine, and that solidification will never be so perfect. The curd from the sample of milk slightly alkalized will be found, on examination after complete coagulation, to want that firm flaky body and cohesiveness that will characterize the slightly matured article. Moreover, the curd from the slightly alkalized sample, if any attempt is made to separate it from the whey, the latter will become full of extraneous matter, caused by minute fragments of curd separating with the whey through the weakness of the curd structure, thus forming what is known to the cheese-maker as "white whey." I will here quote an extract from a paper on "The Work of Acidity in Cheese-making," by Francis T. Bond, M.P., and published in the Journal of the Royal Agricultural Society of England, third series, Vol. ii., part ii., page 275. He says that while the presence of acidity in milk is not *essential* to enable rennet to exercise the peculiar power which it possesses of coagulating it, a certain amount of acidity in the milk when the rennet is added to it gives to the curd a degree of tenacity which renders it firm and enables it to be handled without loss of any material portion of its structure in the whey. Our makers do not seem to appreciate the value of this point and fact as they ought to do, and will have to do, before they will ever attain their desired end. This ripeness of the milk at this stage is not merely to hasten the action of the rennet, but is something which conveys its influence further. It acts as a regulating balance throughout the whole process, and its effects enter into the quality and build of the finished product. One thing makers must all recognise through their every-day work is that a certain amount of acidity is required in all curd before the addition of salt, in order that the cheese may possess that mildness of flavour, nutty, buttery quality, firmness of body, and keeping qualities which so much characterize a first-class Cheddar cheese. Now, this being so, it will readily occur to you that if the milk is set too soon, or before the proper degree of ripeness is reached, we have just to wait for the deficiency of maturity in some other part of the process. Now, by allowing a feeble maturity to be brought about in the milk prior to the introduction of rennet, not only do we obtain a better yield and a better quality of goods, but we save time thereby; for it is well known that milk ripens much faster and much better when all its constituents are together and intact. Any person of ordinary intelligence can carry out a series of experiments to prove the reliability of the primary effects of acidity, and of its excess or deficiency, on the curd and curded cheese.

Some of the makers, with a view to hastening the process of maturing, resort to the introduction of sour whey—a process, to say the least of it, which seems rather anomalous. Such a practice is very dangerous, and is very likely to propagate faults from one day's milk to another, producing a host of unnecessary evils which have to be contended with in subsequent parts of the process.

The amount of acidity which milk should possess before the introduction of rennet varies according to the season of the year. In the early part of the season—say, during September and part of October—a higher stage of maturity and more rennet is required to produce a thorough coagulation of the caseine than is required later in the season. This is due to a want of cohesiveness in the caseine of the milk in the early part of the season, resulting from the cows being newly-calved and from the too moist feed of the early part of the spring. But as the season advances and the feed becomes more mature, the cohesiveness of the curdy substance of the milk will be much greater, and will not require so much maturity in the milk or the addition of so much rennet to produce complete coagulation. Now, from what has been said, it will be obvious that this knowledge of the right condition of the milk before the addition of rennet is one of the nice points in cheese-making,