Indeed, it is only by tasting that I can follow the working of my cream, and this working must be followed if we want to control it. For, a good maker must thoroughly understand his cream, as a baker understands his dough, a blacksmith his iron. At one time, the development of acidity wants encouragement, at another it needs checking, or it must even be quite stopped, that, at churning time, the cream may have attained the desired degree of maturity.

Experience teaches us that if the milk has suffered from cold, the cream must be warmed higher; if, on the other hand, the milk has got a little acid from too high a temperature, the cream must be cooled in proportion.

The grand secret in butter-making is to find just the proper point of maturity for the cream, to get it always, and never to exceed it. If there is a rock to be avoided, it is not to make the cream too sour, for the butter takes and keeps the flavour of the cream whence it comes. I will go further, and say that the butter takes and keeps the flavour of the ferment the maker adds to his cream. Watch, therefore, your ferment; if it turn bad, make another. Anyhow, it is as well to make it fresh every week.

If, at churning, your cream was very ripe, the separation of the butter proceeds easily, the buttermilk adheres less to the grains, and the washing is easy. Very little water is needed to wash butter; too much carries off the aroma.

In cold weather, take care that this water have the chill taken off, to prevent hardening the butter, for butter when too hard, spreads into too thin layers under the worker, crumbles and becomes greasy. There, Gentlemen, this is what I have to add to the essay I had the honour to submit to your association in 1889.

DISCUSSION.

M. Chapais. — Would M. Leclair explain, for the benefit of some persons who probably may not know, what is this ferment he speaks of.

M. Leclair.—There are two methods of making butter; one, when the cream is allowed to actify itself; and the other when a ferment is used to actify it.

M. Chapais.—What I ask you is, to explain what the ferment used is.

M. Leclair.—It is either buttermilk which, as you know, is always sour; or skimmilk, which has previously curdled or been made sour, and is placed in the fresh cream as soon as it is gathered.

Mr. Barnard—And you keep it in the fresh cream for a certain number of hours, don't you?

M Leclair.—Yes, according to the time that intervenes between skimming and churning.

Mr Barnard.—Which time varies according to the temperature?

M Leclair.—Certainly.

M Taché. — What proportion of ferment do you add to ordinary cream?

M Leclair.—It is difficult to say precisely; for it depends upon the temperature at the time the ferment is added.

M Taché.—But what proportion do you use? Ten, fifteen, or twenty per cent?

M Leclair.—I cannot tell you the proportion exactly; but, with a little experience, one soon gets to know the proportion required.

M. Taché.—Is it five per cent?

M. Leclair.—I cannot tell you; it depends upon too many conditions: quality and strength of the ferment, state of the cream, &c. &c.

Mr. Barnard.—Does not the nature of your ferment alter, from day to day, as it gets older.

M. Leclair. — It changes a good deal.

Mr. Barnard.—It becomes stronger with age, and less is required, does it not?

M. Leclair.—Not only does it grow stronger, but it acquires a bad taste, which it would communicate to the butter. That is the reason I advise that it be changed once a week.

Mr. Barnard.—If I understand, the object of using the ferment is to produce a fermentative action in the cream, and this action produces the result sought for. In all these fermentations, there are germs, and these develop themselves and multiply. Consequently, the more numerous the germs, the more active they are, and the more power they exert. It is a very recondite question, this of ferments. M. Nagant, who is present, has made a special study of them. He is a distinguished chemist, who has been several years in Canada, and interests himself greatly in agricultural chemistry. If you desire information on this point, I believe M. Nagant is going to treat the question.

M. Paquette.—Will you tell me, M. Leclair, if it is better in a creamery to keep the cream in the pans or in a vat.

M. Leclair.—For my part, I prefer keeping all the cream in the same vessel: because, in this one vessel the cream all ripens more equally, than it would if kept in several vessels.

M. Paquette.—Have you ever tried putting ice in the cream?

M. Leclair.—I never encourage that plan, but have always opposed it as much as possible.

M. Paquette.—Does it not colour the butter too much?

M. *Leclair.*—I think ice put on the butter might change its colour; but I do not think that putting it into the cream would alter the colour of the butter. This is only my opinion; I have never tried it, so I cannot advance any proofs that I am right.

Mr. Barnard.—You know, perhaps, that there is butter made without any fermentation, or, at least, any apparent fermentation. The Normandy butters, for instance, that are made with perfectly fresh cream, without salt, for the English market, are not made after your principle. Is not this so?

M. Leclair.—No; our method is with ripe cream. Aiming at having our cream ripe, we assure ourselves of the quantity of acidity we need to produce a proper degree of ripeness.

Mr. Barnard.—There is still another process, which is less employed in Canada, on account of the market, and which consists of making butter with unfermented cream?

M. Leclair.—There is.

Mr. Barnard.—There are machines that extract the butter directly from the warm milk. The milk is taken, separated in the centrifuge, placed in another vessel that produces the same result as the separator, and, in two minutes more than is taken to get the cream, butter is made. On the European market, or even in the American market (for there are to-day, in the States, many tourists, and the rich, educated classes have acquired European tastes), these butters made from sweet cream are those that fetch the higher prices.

This is why I thought it à *propos* to draw your attention to the fact that there are two kinds of butter: the one made from cream ripened by fermentation or acidulation, and the other from sweet cream, extracted from warm new milk.

M. Paquette.—Is it better for the pans that hold the cream to be wide or narrow?

M. Leclair.—Provided you have all the arrangements required to control your cream, I think it makes very little difference whether your pans be wide and shallow or deep and narrow.

M. Paquette.—You think there is no difference?

M. Leclair.—If you can perfectly control the ripening of your cream, it can make no difference.

M. Paquette.—Can it not be more easily controled in a wider vessel? It strikes me that a crock with plenty of surface would be superior to one of narrower dimension.

M. Leclair—I think you are right, for many authors say that it is the absorption of the oxygen of the air that determines the aroma. Modern authors in general, however, do not seem to hold with this. Still, if it were the case, it is certain that a larger surface would better encourage the absorption of oxygen. If there be an exception to the use of wide, shallow pans, it is that it would be more difficult to control in them the ripening of the cream, for the precise reason that there is in them a more extensive contact with the air; and this trouble would be much more perceptible in the great heats of summer.

Mr. Barnard.—Besides, more cream would harden at the surface.

M. Leclair.—Just so.

Mr. Barnard. — Whilst in deep crooks, you stir it; and in your method stirring is very necessary.

M. Leclair.—Yes, that it may ripen equally all over, and that no froth or foam-producing lumps, may rest upon it. Cream, when it leaves the separator, always brings with it lots of froth or "brou" (*patois*), which must absolutely be wasted, because that part of the cream never works in the same way as the rest.

M. F. X. Thibault.— Can you give us any means of knowing when the cream is fit? It is very difficult, particularly if you do not use the thermometer as you said in your address.

M. Leclair — I think experience alone can teach you that.

Mr. Barnard.—Are we to understand that you do not use the thermometer, or only that you assign it a position of secondary importance?

M. Leclair.—I assign it a secondary position.

M. Thibault.—If I understand you, you hold that the thermometer has nothing at all to do with ascertaining the degree of ripeness of the cream. Its only use is to indicate the temperature. It has nothing to do with the judging of the state of the cream, with the determination of the most favorable moment for churning.

M. Leclair.—You are right. This is how I use the thermometer: as soon as the cream is gathered, it is as well to see what its temperature is; and in proportion as the milk was more or less warm, the temperature to be given to the cream will vary. And this is how the thermometer may help you in the determination of the ascertained degree that you have decided as being the best to ripen your cream by the time you intend to churn. But, of course, the thermometer cannot possibly be of the least use in telling you whether the cream is ripe enough, acid enough—certainly it cannot.

M. Paquette.—Is there much difference in the yield of the milk if it is left in the pans?

M. Leclair.—This is a thing I have had no experience in.

M. Lalonde.—Would you tell us to what causes you attribute the *white stripes* in butter?

M. Leclair.—They may depend upon the careless washing of the butter, or they may come from allowing the cream to harden. It may be, that the butter was badly worked, and that parts of the cream remain unconverted into butter; or, sometimes, from small lumps of curd that get into the butter. It is recommended to stir the cream vigorously till these lumps disappear. It is precisely because these bits are subject to remain unbroken, that you find them again in your butter after salting. Generally, when this depends solely on careless washing, it will disappear in time; but the butter is injured by this little quantity of buttermilk that has remained too long in it.

M. Saul Coté.—If I may be allowed, I will return to the subject of ferments. Do you not think that it would be better to have a fresher ferment, even if you had to use more? In making butter, there are two results sought for: first the flavour, and, next, the greatest possible yield. If the ferment used is stale enough to ripen the cream, but at the same time gives a bad taste to the butter, the result is not satisfactory. Wherefore, I hold that it would be better to have a fresher ferment, and to use a greater percentage of it. The older the ferment is, the worse the flavour it would give: is it not so?

M. Leclair.—Decidedly so.

M. Saul Côté.—Then, I think we might put as much as 4 o/o or 5 o/o of ferment, and that in a fresher state.

M. Leclair.—Yes, the weaker it is, the more is needed. But, again, the ferment must be of good quality; for it is certain that the taste of the ferment is imparted to the butter.

M. Saul Côté.—Do you think, Mr. Leclair, that butter made after this fashion, i. e., with ferment, is as good as butter made with cream 48 hours old.

M. Leclair.— After an experiment I made last summer, my opinion, after having arrived at a definite result, and after having only tested the difference of flavour between the two butters immediately after churning, my opinion, I say, is, that the butter made from cream with the ferment is superior to the other.

M. Côté.— Without reckoning the advantages of the dairy not needing to be so large; as the cream-vats not be so numerous.

M. Leclair.—Yes; that may be in its favour.

Mr. Barnard—Have you investigated the keeping quality of butter made with ferment? Can you state positively that butters made after this method of yours will keep longer than other butters, made with cream that has not been fermented at all, or *vice-versâ*?

M. Leclair.—I made butter, last summer, with fermented cream, and with cream self-ripened, but not with sweet cream. I requested a Montreal dealer, Mr. Langlois, who is deeply interested in your society, to keep these two butters apart, to see during the winter how both behaved. After examining the two kinds of butter, M. Langlois and I decided that the butter made with the fermented cream was in a rather better condition than the other.

Mr. Barnard—The question of butter from sweet cream may be left to the St-Hyacinthe dairy school. It is asserted by some that the germ in the ferment is not likely to improve anything to which it may be added. The flavour it gives may be agreable to the taste at first, but this flavour will get stronger daily, weekly, and when