DEPARTMENT OF AGRICULTURE
BRANCH OF THE DAIRY AND COLD STORAGE COMMISSIONER
OTTAWA, CANADA

BUTTERMAKING ON THE FARM

BY

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BULLETIN No. 53

DAIRY AND COLD STORAGE COMMISSIONER'S SERIES

PUBLISHED BY DIRECTION OF THE HON. MARTIN BURRELL,
MINISTER OF AGRICULTURE, OTTAWA, ONT.

OTTAWA
Printed by J. DE L. TACHÉ
Printer to the King's Most Excellent Majesty
1917

LETTER OF TRANSMITTAL.

OTTAWA, ONT., May 1, 1917.

To the Honourable,
The Minister of Agriculture.

SIR.—I beg to submit for your approval the manuscript for a new bulletin of information for buttermakers on farms. Bulletin No. 17 on the same subject is now practically out of print, and there is still a brisk demand for copies. The manuscript herewith is a revision of Bulletin 17, with considerable new matter added, including paragraphs on pasteurization, causes of variation in the percentage of fat in hand separator cream, the law relating to dairy butter, plans for dairy buildings, etc.

I have the honour to recommend that this manuscript be published as Bulletin 53 of the Dairy and Cold Storage series.

I have the honour to be,
Sir,
Your obedient servant,

J. A. RUDDICK,
Commissioner.

INTRODUCTION.

Buttermaking on the farm is almost a thing of the past in some sections of the country, where "Dairy" buttermaking has been superseded by the cheese factory and the creamery. The evolution of the creamery is a natural outcome of the tendency towards division of labour and co-operation, and the creamery system has many advantages which recommend it to the dairy farmer. Greater uniformity of product, a higher average quality, ease of marketing on account of the larger quantity to be sold as one lot, and better average prices are some of the points which have made the creamery system popular.

"Dairy" butter as defined by "The Dairy Industry Act, 1914," is butter made from the milk of less than 50 cows. The total quantity of dairy butter manufactured in Canada is estimated to be greater in quantity and value than the product of the creameries. The creamery man is inclined to oppose any effort to improve the condition of the dairy butter trade, on the assumption that poor results from the making of dairy butter encourage the spread of the factory system, and that the creamery or cheese factory should become general.

There is a certain amount of truth in the foregoing contention, and the farmer who is within reach of a well managed creamery will do well to patronize it, but the fact remains that there are many hundreds of dairy farmers in Canada who cannot avail themselves of the advantages of a creamery, or of a cheese factory, and it is in the interest of the producers of creamery butter that the quality of the dairy butter should be made as fine as possible. A large quantity of inferior dairy butter helps to lower the general average of the whole Canadian output and also acts as a serious check to consumption. If all the dairy butter was of finest quality, the increase in consumption would be enormous, and better average prices would prevail for all butter. The annual loss to the farmers of Canada, as represented by the difference in the value of dairy butter and creamery butter, amounts to several million dollars a year.

It will hardly be denied by any one at all familiar with the Canadian butter trade that there is great room for improvement in the quality of a large proportion of the dairy butter; that there is a wide margin between the average price of dairy and creamery butter; and that creamery butter is much more popular with the general public than dairy butter. Dairy buttermakers who desire to improve would do well, therefore, to take into consideration the means that have been employed in the creamery to raise the standard of quality to a higher level.

In the first place, the successful creamery buttermaker has had training and experience, and brings more or less skill and accurate knowledge to bear on his work. The creamery buttermaker is supplied with a full outfit of utensils and apparatus which enable him to recover a maximum quantity of butter from the milk. The creamery buttermaker gives attention to the careful ripening of the cream, so as to develop desirable flavours and to prepare it for churning with as little loss as possible. Careful attention is paid to the matter of temperature in the cream during the ripening process and at the time of churning. No guess work is allowed in this connection, all creameries being supplied with thermometers for that purpose. The creamery buttermaker who knows his business pays careful attention to the packing of the butter, puts it in a neat, well finished package and makes it as attractive looking as possible. Creamery butter which gives satisfaction, is not allowed to remain in a warm place to develop rancid flavours, but is protected from injury by being kept at a low temperature.

Neglect of these essentials is what makes much of the difference between creamery butter and dairy butter, and it is with a view of giving some information on these points that this bulletin has been prepared.

J. A. RUDDICK,
Dairy and Cold Storage Commissioner.

Buttermaking on the Farm.

By Geo. H. Barr.

SOME OF THE DEFECTS IN DAIRY BUTTER.

The main defects in dairy butter as compared with creamery butter are, (1) bad flavour, (2) staleness or rancidity, (3) too many shades of colour, and (4) unsuitable packages. The flavour is of the highest importance, and no matter how good the butter may be in other respects, if the flavour is wrong, it is bound to be classed as an inferior article. Staleness and rancidity, so common in dairy butter, are due largely to the fact that the cream, and the butter itself are not kept at a low temperature.

Any taint that may be in the milk or cream will, to some extent, be carried into the butter. Therefore, the dairy buttermakers will see at once the necessity of having healthy cows, providing them with wholesome feed and pure water, and having the cream properly taken care of until time for churning.

Feeds that will injure the flavour of butter:

1. Turnips and turnip tops.
2. Rape or rye.
3. Decayed ensilage.
4. Leaks, onions, or apples in large quantities.

Other causes of taints in butter:

1. Cows' udders and teats in an unclean condition at milking time.
2. Milking in unclean stables.
3. Using unclean, wooden, galvanized or rusty milking pails.
4. Separating the milk in the stables.
5. Improperly cleaned separators.
6. Keeping the cream in cellars or other places where there are roots or vegetables.
7. Keeping the cream in cellars for several days at a temperature over 55 degrees.
8. Cows drinking water from stagnant ponds, or water contaminated with seepage from barnyards.

CONDITIONS THAT ARE NECESSARY TO PRODUCE FINE FLAVOURED CREAM.

Pure Water.—The cows should have at all times an abundant supply of pure water to drink. When cows are compelled to drink the water of swamps, muddy ponds or sluggish streams and ditches, in which there is decaying animal matter, including their own droppings, there is a constant menace to their health, and unless the cows are in good health, they cannot give first-class milk. Moreover, the mud, often full of foul germs, which collects on the legs, flanks and udders of the cows and falls into the milk at the time of milking, is a direct source of infection.

Salt.—When cows have free access to salt at all times, they will keep in better health, will give more milk, and the cream from this milk will have a better flavour, and keep sweet longer, than when they do not get any at all, or receive it only at intervals.

Milking.—Cleanliness in the stable is desirable at all times, but especially at milking time the stable should be clean, and free from dust. The udders, teats, and flanks should be clean when the cows are being milked. Only bright, clean, tin pails should be used to milk in. Galvanized pails are difficult to keep clean, and bad flavours have been traced to their use.

METHODS OF CREAMING.

There are three common methods of removing the cream from the milk: (1) the shallow pan, (2) deep setting, and (3) the hand separator. All these methods are used to some extent.

The Shallow Pan.—This method has many defects, and we do not recommend it. Cream from this method is apt to be too thin, by having too much milk incorporated in skimming. The large surface exposed in the pans, and the length of time that it stands, favour the absorption of odours and infection which comes from dust, etc., and also results in the cream becoming leathery, making lumpy cream for churning, which causes heavy loss of fat in the buttermilk. The comparatively high temperature of the milk and cream in shallow pans encourages the developement of bad flavours. Like all other gravity methods, the shallow pan leaves a large percentage of fat in the skim-milk.

The best results from using shallow pans are obtained by setting the milk immediately atter milking, in pressed tin pans without seams, about 3 inches deep, placing the pans on a cool surface, such as a clean cement floor, or in a large pan or box where cold water is allowed to run around the pans. Skimming should take place about 24 or 36 hours from setting. The cream should be taken off carefully by separating the cream from the edge of the pan with a thin bladed knife, when the cream may be run into a cream can, care being taken to run in as little milk as possible.

Deep Setting.—The deep setting method is a very decided improvement on the shallow pans. The best results, both as to quality and effective creaming, are secured by putting the milk, as soon as drawn, into cans about 8 inches in diameter and 20 inches deep. (Fig. 1.) The cans are then placed in a tank containing ice water (Figs. 3 and 4) and left for at least 24 hours before skimming. Fig. 2 shows a convenient style of skimmer for the deep setting method. The tank will require to be 24 inches deep and large enough to hold as many cans as the herd will fill at two or three milkings. The tank must be water tight and provided with a 3 inch overflow 17 inches from the bottom, and also a plug at the bottom to drain off the water for cleaning. The tank should be fitted with a cover and the whole protected from the weather. It would be folly to use the deep setting method without ice in this country, where it can be put up so easily and cheaply, but if it is not available for any reason, the next best thing is to have the tank placed near the well, so that all water used for various purposes may be first pumped into the tank as shown in the illustration, and then allowed to overflow into the stock trough or other receptacle. If ice is used running water in the tank would only waste the ice.

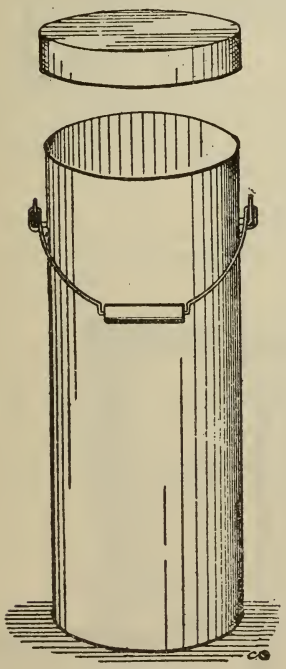


Fig. 1.

Fig. 2.

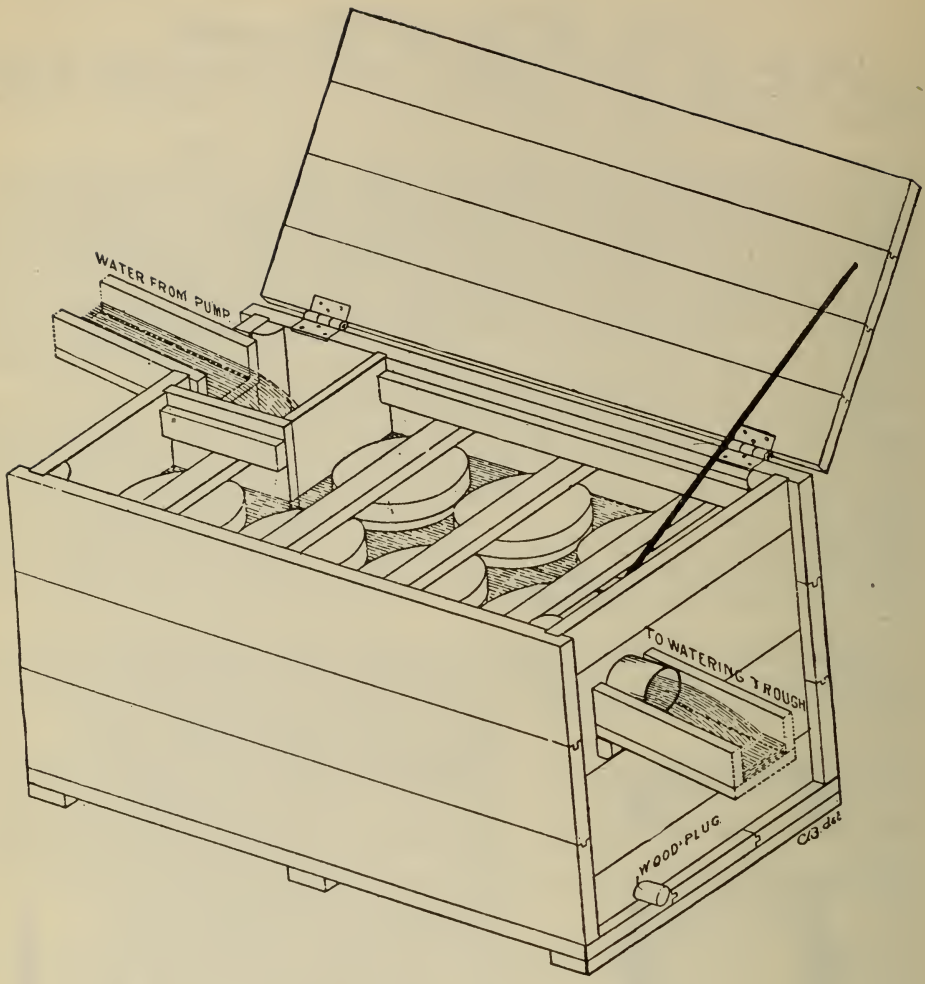


Fig. 3.

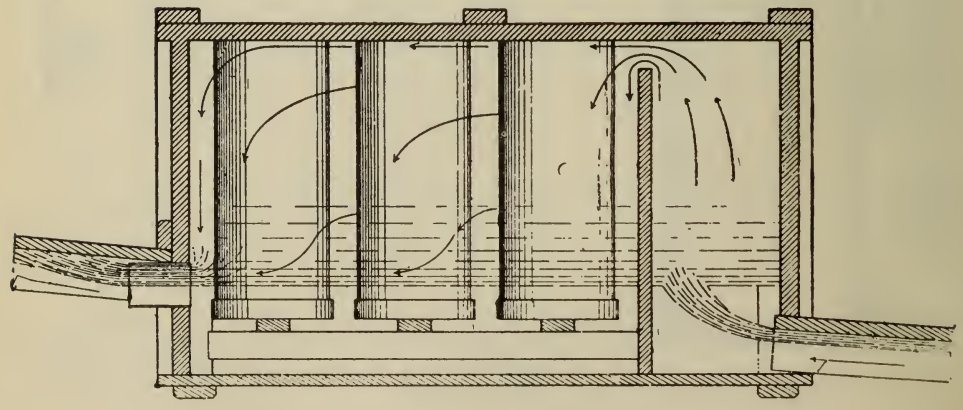
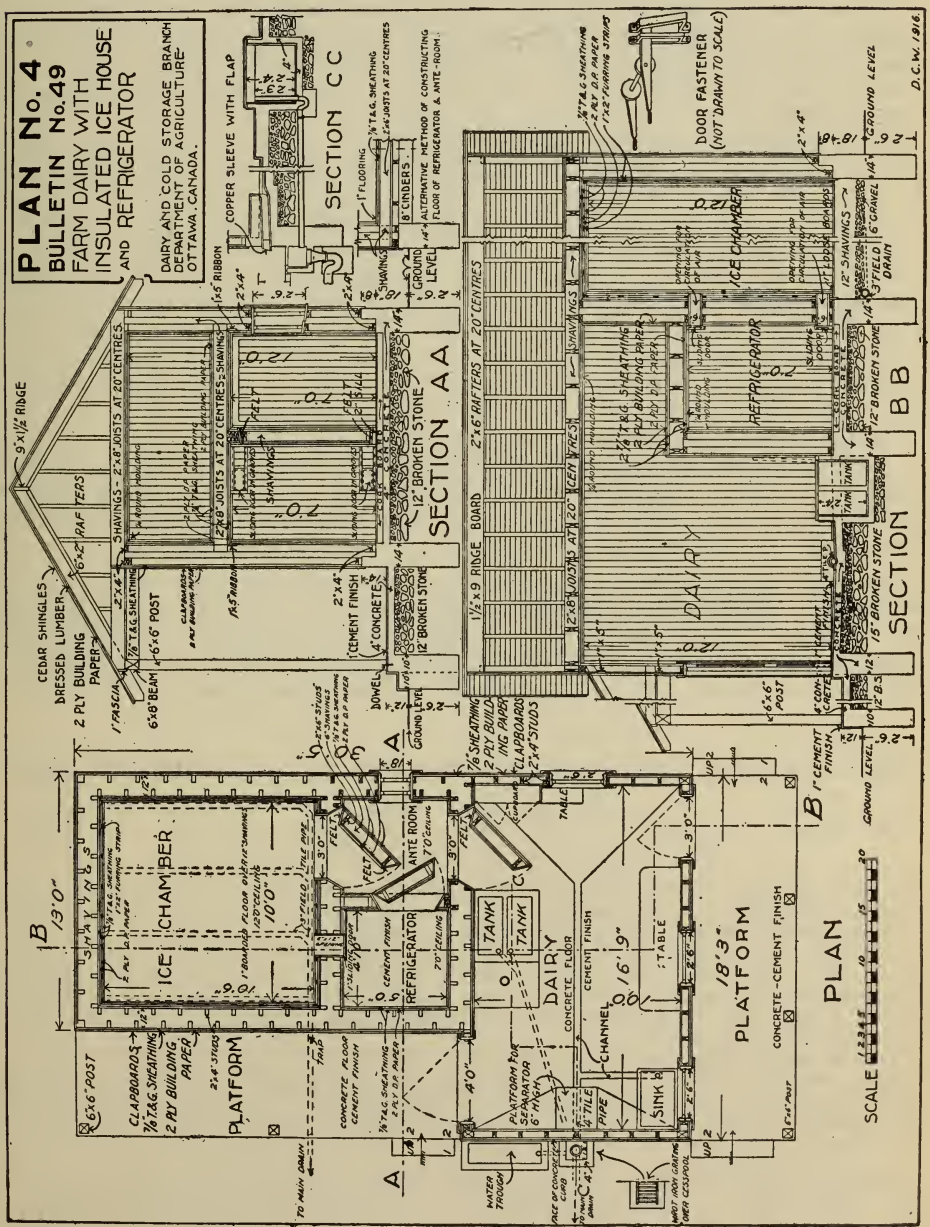


Fig. 4.

The ideal arrangement would be to have a special milk room with ice house attached. Fig. 5.

PLAN NO. 4.

Fig. 5. Reproduced from Bulletin No. 49.



THE HAND POWER SEPARATOR.

The hand power cream separator is the most reliable and best method of skimming milk at the farm.

Some of the advantages over the other methods are:—(1) less loss of fat in the skim-milk, (2) a better and more uniform quality of cream, and (3) the skim-milk is in the best possible condition for feeding young stock. All the separators on the market will do efficient skimming if properly handled.

Handling and care of separator.—It is important that the separator run smoothly. Any trembling or shaking of the separator while skimming will cause a loss of butter fat in the skim-milk. Only special separator oil should be used, and it is well to make a run about once in three weeks using kerosene oil on all the bearings.

In skimming, three things must be observed:—(1) The speed of the separator must be maintained according to the directions sent with it. The only reliable way to do this is to count the number of revolutions of the crank by the watch. A low speed means loss of fat in the skim-milk. (2) The flow of the milk into the separator should be uniform. (3) The temperature of the milk should not be under 90 degrees and for that reason, the best time to separate the milk is immediately after milking. A low temperature is also liable to cause loss of fat in the skim-milk. The faster the milk passes through the separator, the less complete is the separation, and a thinner cream is given. Every separator has some device for changing the test of the cream. In most cases the adjustment is at the cream outlet. If so, by turning the cream screw in, the cream will be richer, and by turning it out the cream will be thinner.

All the parts of the separator which come in contact with the milk or cream should be washed in lukewarm water, to which has been added a small quantity of sal soda or other cleansing powder, and then thoroughly scalded with boiling water, each time the separator is used.

Location of separators.—In some cases the separators are placed in the cow stables. This may be a convenient arrangement, but it is not by any means a proper place for separating milk, unless a special room, well ventilated and lighted, is partitioned off, to exclude the stable odours and dust. This room should have a smooth cement floor, which can easily be cleaned.

CAUSES OF VARIATION IN THE PERCENTAGE OF FAT IN HAND SEPARATOR CREAM.

(Reprinted from Circular D. & C. S. No. 14.)

A series of tests and experiments bearing on this point have been made at the Finch Dairy Station and the results are published herein with a view of explaining how such variations may be due to irregularities in the running of the cream separators.

In nearly all separators the proportion of cream is regulated by what is termed a "cream screw." When this screw or plug is turned towards the centre of the bowl, it contracts the cream line and gives a richer or higher testing cream. Turning it outwards widens the cream line and therefore, allows a larger proportion of the skim-milk to pass out with the fat and thus gives a thinner or lower testing cream.

Considering the question of separation from a purely mechanical standpoint, one would naturally come to the conclusion that once the cream screw is set at any desired point, the separator would always deliver cream containing the same percentage of fat. We must, however, consider several other factors which very materially affect the working of a cream separator. The following are the most important ones:—

(1) *The Percentage of Fat in the Milk.*—Milk from a single herd will vary in fat content from day to day, sometimes to quite an extent. This variation will affect the per cent fat in the cream. For instance, in milk testing 4 per cent, there are four pounds of fat in 100 pounds of milk; in milk testing 3 per cent fat, there are only three pounds of fat in 100 pounds of milk. If 100 pounds of each lot of milk is run through a separator under exactly the same conditions as to time, speed, temperature, etc., there will be practically the same number of pounds of cream, but there would be practically one pound of fat more in the cream from the 4 per cent milk, which would give a correspondingly higher testing cream than would be taken from the 3 per cent milk.

(2) *Temperature of the Milk.*—Milk at 70 degrees temperature is thicker or more viscous than the same milk would be if heated to 95 degrees; it will therefore not run through the separator as fast, the cream line will be narrower and the cream will test higher from milk at 70 degrees than from the same lot of milk separated at 95 degrees.

(3) *Flow of Milk into Separator.*—The milk inlet on all separators is made to feed the separator to its full capacity. If the flow of milk is partly shut off, the cream line will be narrower and a richer or higher testing cream will be the result.

(4) *Speed of the Separator.*—All hand separators are manufactured to run at a certain speed and they will do the best work at this speed, which is usually indicated on the handle of the separator. If the speed is increased, the centrifugal pressure is increased, which has the effect of condensing the cream, so that a smaller quantity of richer cream is the result.

To ascertain to what extent the above conditions would affect the percentage of fat in the cream, and to secure some accurate data on the subject, the following experiments were carried out, using a 400-pound hand separator.

In table I is given the results of separating the milk at different temperatures, all other conditions being the same. One run was made from the same milk at each temperature stated on three different days. The figures given are the average of the three days. Mixed night's and morning's milk from the same patrons was used each day.

TABLE I.—Separating at Different Temperatures.

Per Cent Fat in Milk.	Temp. of Milk at Separating.	Lbs. Cream per 100 lbs. Milk.		Per Cent Fat in Cream.	PerCent Fat in Skim-milk.
		Lbs.	Oz.		
3·57	70 degrees	8	0	44·2	·040
3·57	75 "	8	14	40·0	·033
3·57	80 "	10	0	35·5	·021
3·57	85 "	10	11	33·1	·028
3·57	90 "	11	2	32·0	·017
3·57	95 "	12	2	29·3	·021

Here we find a variation of 14·9 per cent fat in the test of the cream with all the conditions the same, except the temperature of the milk. The pounds of cream per one hundred pounds of milk increases as the temperature of the milk is raised and it must also be noted that the percentage of fat in the skim-milk increases as the temperature of the milk is lowered.

Table II shows the effect of changing the speed of the separator. The figures given are the average of three runs at each speed on three different days.

TABLE II.—Variation in the Speed of the Separator.

Per Cent Fat in Milk.	Temperature Of Milk.	Speed turned per minute.	Lbs. Cream per 100 lbs. Milk.		Per Cent Fat in Cream.	Per Cent Fat in Skim-milk.
			Lbs.	Oz.		
3·63	95 deg.	65	9	14	36·6	·018
3·63	95 "	*60	12	0	30·1	·017
3·63	95 "	55	15	7	23·4	·023
3·63	95 "	50	18	14	19·2	·027

A metronome was used to count the turns of the handle, so that the speed of the separator was absolutely the same during the whole run. It was found extremely difficult to turn the separator at a uniform speed throughout an entire run, and unless the operator has a reliable indicator, there is likely to be a considerable variation in the speed of the separator. The writer is of the opinion that the speed of the separator has probably more to do with the variations in the cream tests than any other condition.

Five turns per minute under proper speed made 6·7 per cent difference in the test, and ten turns too slow made a difference of 10·9 per cent. The difference in the test between five turns too fast and ten turns too slow was 17·4 per cent, the percentage being only a little over half in one case what it was in the other.

Turning the separator too slow also causes a greater loss of fat in the skim-milk. Ten revolutions per minute too slow increased the loss of fat 0·1 per cent.

*Correct speed.

TABLE III.—Showing the effect of Low Speed and Low Temperature Combined on the Percentage of Fat in the Cream and Loss of Fat in the Skim-milk. Three Runs were made from the same Milk on Three different Days.

Per Cent Fat in Milk.	Speed turned per minute.	Temperature of Milk.	Per Cent Fat in Cream.	Per Cent Fat in Skim-milk.
3·6	50	70 degrees	28·5	·078
3·6	50	80 "	27·0	·053
3·6	50	90 "	21·5	·030

There is not as great a variation in the percentage fat in the cream as in some of the other tables, but the loss of fat in the skim-milk is very high at the low temperatures, showing that the best results will be obtained by turning the separator at its proper speed and having the milk at a temperature of 95 or 96 degrees.

Two runs were made from milk testing 3·3 per cent and two from milk testing 4·5 per cent. The following table shows the average results:—

TABLE IV.—Variation in the per cent Fat in the Cream from Milk containing different percentages of Fat.

Speed of Separator.	Temp. of Milk.	Per cent Fat in Milk.	Per cent Fat in Cream.	Per cent Fat in Skim-milk.
60	95·5	3·3	27·0	·017
60	95·5	4·5	35·5	·015

Here we find a difference of 1·2 per cent of fat in the milk made a difference of 8·5 per cent in the cream test. There will not be so much variation as 1·2 per cent fat in the milk from the same herd from day to day, but there may be a difference of 0·5 per cent, which at the same rate of variation would equal 3·5 per cent in the test of the cream.

The foregoing results show very plainly that different conditions in the milk and only slight changes in the operating of the separator, without changing the cream screw, will make wide variations in the percentage of fat in the cream. If the temperature of the milk is too low, or the speed of the separator is reduced below the required number of revolutions per minute, the variations will be accompanied by an excessive loss of fat in the skim-milk.

A good separator, properly handled, will deliver cream testing anywhere from 20 to 35 per cent fat and not leave over 0·02 per cent fat in the skim-milk.

To give the best results in Butter-making cream should test 30 to 35 per cent fat.

GEO. H. BARR,
Chief, Dairy Division.

THE CREAM AND ITS CARE.

RELATION BETWEEN PERCENTAGE OF FAT AND QUANTITY OF CREAM.

The following table will show approximately the pounds of cream separated from 100 pounds of milk, testing from 3·3 to 4 per cent of fat, the cream testing from 20 to 40 per cent.

Pounds of Milk.	Fat in Milk.	20% Cream.	25% Cream.	30% Cream.	35% Cream.	40% Cream.
	%	Lb.	Lb.	Lb.	Lb.	Lb.
100	3·3	16·5	13·2	11·00	9·43	8·25
100	3·4	17·0	13·6	11·33	9·71	8·50
100	3·5	17·5	14·0	11·66	10·00	8·75
100	3·6	18·0	14·4	12·00	10·28	9·00
100	3·7	18·5	14·8	12·33	10·57	9·25
100	3·8	19·0	15·2	12·66	10·85	9·50
100	3·9	19·5	15·6	13·00	11·14	9·75
100	4·0	20·0	16·0	13·33	11·43	10·00

CREAM AND ITS CARE.

Advantages of a rich cream.—Skimming a rich cream leaves more skim-milk for feeding young stock; there is less can room required for the cream; less cream to cool; it will keep sweet longer than thin cream will, other conditions being equal; it will churn more easily; and will make better flavoured butter than can be made from thin cream. The cream should be skimmed of such richness that one gallon (10 lbs.) of it will yield 3 to 3½ lbs. of butter.

Cooling the cream.—The cream from deep setting will not require much cooling, but cream from shallow pans or from hand separators should be cooled to under 60 degrees, immediately after skimming, and kept cool until about 12 hours before churning.

If cream is allowed to stand at a high temperature (70 to 75 degrees) for any length of time, the flavour will be injured, and it is apt to become curdled or lumpy. This condition will cause serious loss of fat in the buttermilk and the quality of the butter will not be fine.

We would recommend keeping the cream in shotgun cans (Fig. 1) and the cans put in a box similar to the one recommended for deep setting (Figs. 3 and 4). Tin cans are preferable to crocks, because they are easier to handle, and if the temperature of the cream has to be changed for churning, it can be done very much more quickly and easily when in the tin cans, by surrounding them with either warm or cold water. Water or ice should not be put into the cream to raise or lower the temperature. Warm cream from the separator should not be added to cream already cooled. The cream should be stirred well each time a fresh lot is added, and occasionally until it is ready to churn. Fig. 6 shows a first-class cream stirrer, with a saucer-shaped tin disc perforated, and a wire handle about 24 inches long.

Fig. 6.

Preparing the cream for churning.—This means developing the proper acidity (sourness) and having the cream at the right temperature. No fresh cream should be added for at least 12 hours before churning. If the cream is sweet at this time, a small quantity (5 to 10 p.c.) of clean flavoured sour skim-milk may be added with good results and the cream kept at churning temperature for 12 hours.

The appearance of the cream when ready to churn should be smooth and glossy, and pour like thick syrup; it should smell and taste slightly sour.

The proper temperature of the cream for churning depends upon:

(1) The richness of the cream,
(2) The length of time the cows have been milking,
(3) The breed of the cows, and
(4) The feed of the cows.

It will therefore be seen how difficult it is to give any temperature as the best for churning. It is well, however, to know that the following conditions require low churning temperatures (54 to 62 degrees):

(1) Very rich cream,
(2) Cream from the milk of fresh cows,
(3) Cream from the milk of cows receiving succulent feed, such as fresh pasture, clover, ensilage, and wheat bran.

Conditions that require high churning temperatures (64 to 75 degrees):

(1) Very thin cream,
(2) Cream from cows a long time in milk,
(3) Cream from the milk of cows receiving dry feed, such as hay, straw, dry pasture, or cotton seed meal.

It cannot be definitely stated how high it may be necessary to raise the temperature of the cream to churn under some of the above conditions, and the best rule that can be given is to raise the temperature high enough to bring the butter in about 30 minutes.

Too high a churning temperature will cause the butter to come in soft lumps instead of in a flaky granular condition. The texture will be greasy and too much buttermilk will be incorporated in the butter which is likely to sour and spoil the flavour.

Too low a churning temperature is also undesirable, although it is better to have the temperature a little low rather than too high. Cream at too low a temperature is difficult to churn. When the butter does come, it will be in such a firm condition that it will not gather properly, and is apt to make a dry brittle butter that does not spread easily. It is nearly always necessary to have a higher churning temperature in the fall and winter than in the spring and summer. Aim to have the cream at such a temperature that the churning will be completed in from 25 to 30 minutes.

Occasionally cream will not churn readily even at the highest churning temperature mentioned above. This condition usually occurs in the winter months when the cows have been milking a long time and they are being fed on dry feed. These conditions tend to make the butter fat globules very hard and it is difficult to get them massed together as butter. When ordinary churning temperatures will not overcome the difficulty, it is advisable to pasteurize the cream to 140 or 145 degrees.

PASTEURIZATION OF CREAM.

Pasteurizing cream means heating it to a temperature of 140 to 180 degrees and cooling it down quickly to a ripening or churning temperature. This is easily done in creameries where special machinery is provided and an abundant supply of steam and cold water is available. It is not so easily done on the farm, however, but in cases where there is difficulty in getting the cream to churn, when there are bad flavours on the cream, when the butter is going to be stored for winter use, or a mild flavoured butter is desired, it will pay to pasteurize. In dairies where steam is available, the heating of the cream can be done by providing shot gun cans (Fig. 1) in which to put the cream, then place these cans in a tub or box of water and turn the steam into the water. When the desired temperature is reached, the water can be drawn off and cold water or water and ice can be put in the box to cool the cream. Where no steam is available, an ordinary wash boiler half filled with water may be set on the stove and the shot gun cans set in it. The cooling may be done in a tub or box, as stated above. The cream must be stirred continually while being heated. Cooling will be done more quickly and effectively if the cream is stirred.

Pasteurizing Temperature.—When getting the cream to churn is the only difficulty, a temperature of 145 degrees will be high enough. If there is a bad flavour on the cream, or if the butter is going to be kept for several months, the best results will be secured by heating to a temperature of 165 to 180 degrees. Heating to these high temperatures will impart a cooked flavour to the butter, which will, however, pass off in about 10 days, leaving a mild sweet flavour.

Pasteurizing should not be done until all the cream for a churning is on hand. The cream should remain at churning temperature for at least 3 hours before churning.

Pasteurized cream usually requires a slightly lower churning temperature than unpasteurized cream. If the butter comes soft, the churning temperature of the cream should be lowered or the time between cooling and churning lengthened.

CHURNING.

All the cream should be passed through a finely perforated tin strainer as it is being put into the churn. (See Fig. 7.)

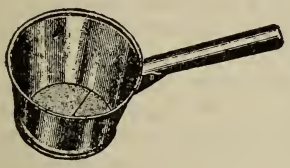


Fig. 7.

Amount of cream in the churn.—Churning will be completed in the shortest time when the churn is about one-third full. The churn should never be more than half full.

Colouring.—When colouring is used, it should be added to the cream just before churning is commenced. Colouring does not improve the quality of the butter, but in the late fall and winter months a little colouring improves its appearance. The butter makers must be guided in using colour by the tastes of their customers. Too deep a shade is undesirable.

Speed of the churn.—The proper speed for the churn depends upon its size. That speed which gives the greatest concussion will be the most effective.

Adding water to the cream in the churn.—If the cream has been properly prepared and is at the right temperature, the churning may be finished without adding any water. If for any reason the butter is coming a little too fast, it is advisable to add, just when the cream is breaking, some water with a little salt in it about two degrees colder than the cream. This will assist in separating the butter from the buttermilk. Two common causes for cream churning too slow, are (1) too much cream in the churn and (2) the temperature of the cream is too low.

When to stop the churn.—This is an important point and it has a great deal to do with the quality of the butter. The churn should be stopped when the granules are about the size of wheat or split peas. When the granules are too small many of them will go through the strainer into the buttermilk and cause a considerable loss.

Over-churning should be avoided as much as under-churning. Over-churned butter will retain a large amount of buttermilk, which will be difficult to remove in washing.

The buttermilk should be drawn off as soon as churning is completed.

The cream strainer.—A dipper with a wire gauze bottom (Fig. 7) can be used for straining the buttermilk.

Washing the butter.—The butter should be washed as soon as churning is finished and only pure clean water should be used. If the butter is for immediate use, rinse the butter by sprinkling two or three dipperfuls of cold water over the butter, allowing it to run off at once. Then run in a little less water than there was cream and revolve the churn as in churning until the granules are about the size of large peas and draw the water off immediately. In very warm weather have the water about 2 degrees colder than the buttermilk and in cold weather from 2 to 3 degrees warmer.

If the butter is intended for packing, run in slightly more water than there was cream, about 2 degrees colder than the buttermilk, and revolve the churn quickly about half a dozen times and draw it off; then wash a second time using a little less water than there was cream, at the same temperature as the buttermilk, and revolving the churn as in churning until the granules are about the size of large peas and draw off the water at once.

Salting the butter.—A large quantity of dairy butter is too heavily salted and there is very little uniformity in the amount of salt used. We would suggest that for prints ½ to ¾ of an ounce per pound be used, and for packed butter not more than one ounce per pound.

In creamery buttermaking the salting is done almost entirely in the churn. If the amount of butter in the churn can be fairly well estimated, it is the best method to follow. Add the salt as soon as the washing water is drained off, sifting on half of the salt evenly over the butter; then turn the butter over with a wooden ladle (Fig. 8) or by turning the churn partly over, and sift on the balance of the salt; put on the cover of the churn and revolve slowly until the butter is gathered into a solid mass, and allow it to lie in the churn for ten to twenty minutes before working it. If the salting is done on the worker, the butter can be weighed and the salting done accurately. Take the butter out of the churn in the granular form, after weighing it, spread it evenly over the worker and sift all the salt on before working is commenced. Endeavour to have the salt well mixed with the butter while it is still in the granular form.

Fig. 8.

Working the butter—For farm buttermaking, a lever butter worker is preferable to a butter bowl for working the butter. (See Fig. 9). In working the butter a sliding or scraping motion should be avoided. The lever should be pressed downward, double the butter over with a ladle, or by inserting the lever under the butter at one side of the worker, roll it over and work as before. When the butter is sufficiently worked, it should present a smooth solid appearance when cut with a sharp ladle, and when pressed between the worker and the ladle the moisture should show in small beads evenly distributed over the cut surface. Butter which has been salted in the churn will not require as much working as that salted on the worker. Only fine dairy salt should be used and it should be kept in a clean place, as salt will absorb odours and thus may injure the flavour of the butter.

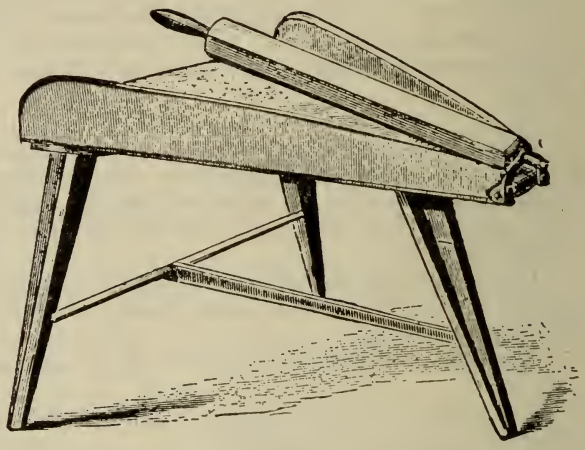


Fig. 9.

PACKAGES.

Unfortunately, a very large quantity of dairy butter is placed on the market in packages which are neither attractive nor convenient to handle.

Packed butter.—For packed butter, there is nothing so neat as a 10 or 20 pound spruce tub lined with parchment paper.

Print butter.—The brick shaped 1 lb. print or the flat oblong 2 lb. print neatly wrapped in parchment paper are the most popular and attractive packages.

Parchment paper.—Print butter should always be wrapped in parchment paper of good quality, and it will add to the attractiveness of the package if the name of the farm or dairy, and the address of the proprietor, are neatly printed on each wrapper. Many dairy buttermakers seem to forget that the merchant who buys their butter must resell it, and that the appearance of the butter has much to do with a customer's decision in buying. No one cares to buy a sloveniy package of butter, for it is a fairly safe inference that if the outside of the butter looks clean and attractive, the inside will be all right, and vice versa.

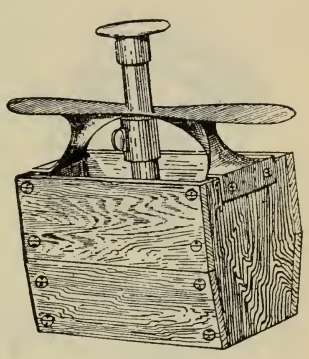


Fig. 10.

LEGAL BRANDING OF PRINT BUTTER.

In reference to printed wrappers, the regulations passed under authority of The Dairy Industry Act provide that no person shall cut or pack dairy butter in blocks, squares or prints and wrap such blocks, squares or prints in parchment paper unless the said parchment paper is printed or branded with the words " dairy butter " in letters at least one-quarter of an inch square.

The same regulations provide further that every person who packs dairy butter in boxes similar to those used for the packing of creamery butter shall cause such packages to be branded at the time of packing with the words " dairy butter " in letters at least one-half inch long and three-eighths of an inch wide. Such branding must be applied on the side of the box.

We would suggest the following forms as suitable for the printing of dairy butter wrappers:

CHOICE DAIRY BUTTER
Made by
Mrs John Doe,
Rose Bank Farm, Doeville,
Ontario.

or

CHOICE DAIRY BUTTER
Made from Separator Cream
By
Mrs. John Doe,
Rose Bank Farm, Doeville,
Ontario.

The churn.—The barrel churn (Fig. 11) is the most convenient and easiest to keep sweet and clean. Before using, it should be well scalded with boiling water and then cooled by revolving a few minutes with cold water in it. After churning, a pailful of cold water should be put in the churn and revolved to wash out any butter that may be in it; then thoroughly scald it with boiling water and leave it open in a clean, dry place. A little salt sprinkled in the churn after scalding helps to keep it sweet. We would strongly recommend washing the churn occasionally with hot lime water to keep it sweet.

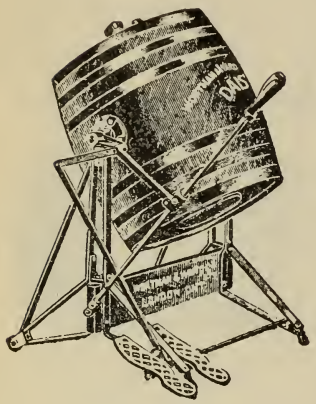


Fig. 11.

The butterworker.—The V-shaped lever butterworker (Fig. 9) is the most convenient for farm dairy work. In preparing the worker for use it should be well scrubbed with a brush and boiling water and then thoroughly cooled by pouring on cold water. The butter printer and ladle should be washed in the same way and then put into cold water for some time before using. Sometimes the butter will stick to the worker and printer. This indicates that they have not been properly brushed with hot water before cooling. A thorough brushing with hot water with a little salt added, before cooling, will remedy this trouble.

Thermometers.—It will be noticed that all through the process of making butter proper temperatures are essential to get the best results. It is therefore absolutely necessary that the successful buttermaker should have a correct dairy thermometer. One that is correct cannot always be purchased at the ordinary stores, but they can be procured from any of the leading dairy supply houses throughout the Dominion. A float or glass thermometer is preferable to the metal backed style, as they are much easier to keep clean.

To get the best results in farm dairy work—

(1) Keep good cows.
(2) Feed them liberally.
(3) Keep them comfortable and clean when in the stable.
(4) Skim a cream testing about 30 per cent.
(5) Keep the cream cool.
(6) Churn at the temperature that will give a flaky granule in the butter.
(7) Use clean, pure water for washing butter, not more than three degrees colder or warmer than the buttermilk.
(8) Put the butter up in neat, clean, attractive packages.
(9) Keep everything in and about the dairy clean and attractive.

NOTE.—Copies of this bulletin in English or French may be secured free of charge on application to the Dairy and Cold Storage Commissioner, Ottawa.

Blue prints, on a working scale, of the plan on page 10 may be obtained from the same source. For other plans *see* Bulletin 49.