

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

BULLETINS 1-20

1905-1907

DAIRY AND COLD STORAGE
COMMISSIONER'S SERIES

These will include abnormal growths, bruises, immaturity and the effects of fungous diseases.

'Properly packed.' 'Slacks' and over-pressed packages are to be considered as not properly packed if the condition is likely to result in permanent damage during handling or transit.

EXPLANATORY NOTES.

(a).—*For the Grower.*

If the grower sells his fruit unpacked, the Act does not apply to him in any particular.

If he sells his fruit in uncovered barrels or boxes, the Act requires only that the top of each package shall be no better than the fruit throughout the package.

If the grower packs his own fruit he accepts the responsibility of the packing, as described in the following paragraph :

(b).—*For the Owner.*

Section 320 of the Act requires that the person who owns the fruit when it is packed in closed barrels or boxes must mark plainly on each package:—

1. His name and post office address.
2. The name of the variety of the fruit.
3. The grade of the fruit, whether it is 'Fancy,' 'No. 1,' 'No. 2,' or 'No. 3.'

If he marks the package 'Fancy' the fruit must be practically perfect, as described in Section 321, sub-section (b) (i).

On reading subsection (b) (ii) carefully, it will be seen that the packer should aim in packing Grade No. 1 to discard every injured or defective fruit, and not to deliberately include ten per cent of inferior specimens. This margin is meant to make the work of grading easier and more rapid than if absolute perfection were exacted.

Ten per cent is presumed to be the margin within which an honest packer can do rapid work, using every endeavour to make each specimen conform to the general standard for the grade.

Even the twenty per cent margin in grade No. 2 must be composed of specimens not less than nearly medium size. It is not presumed that any culls will be included in this grade.

The Act makes no restriction as to the quality of fruit which is marked 'No. 3.'

It should be noted that the definitions of grades do not vary from year to year; no provision is made for lowering the standard when the quality of the crop is poor. In such a case the only result is that a smaller proportion of the fruit is of the higher grades.

On the owner is laid the duty of seeing that the face of each package fairly represents the contents as required by Section 321, sub-section c. Over-facing is an offence against the Act which is most severely dealt with by the courts.

(c).—*For the Packer.*

Whether he is putting up his own fruit or that of another person, the packer is required by Section 4 of the Order in Council printed above, to pack the fruit in accordance with the law. He should read the whole Act carefully, but should give Section 321 special attention. If he violates these requirements, he is liable to the fine specified in Section 5 of the Order in Council.

DEPARTMENT OF AGRICULTURE
DAIRY COMMISSIONER'S BRANCH
OTTAWA, CANADA

COW TESTING ASSOCIATIONS

WITH SOME NOTES ON

THE SAMPLING AND TESTING OF MILK

By J. A. RUDDICK and C. F. WHITLEY

BULLETIN No. 12
DAIRY COMMISSIONER'S SERIES

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

DECEMBER, 1906



LETTER OF TRANSMITTAL.

OTTAWA, December 17, 1906.

To the Honourable

The Minister of Agriculture.

SIR,—I have the honour to submit for your approval bulletin No. 12, Dairy Commissioner's series, entitled 'Cow Testing Associations, with some notes on the Sampling and Testing of Milk,' which I have prepared with the assistance of Mr. C. F. Whitley, B.S.A., a member of my staff, who is charged with the direct supervision of the work of organizing Cow Testing Associations, &c. The increasing interest in the question of the improvement of dairy herds, has given rise to a demand for the information which this bulletin is intended to supply.

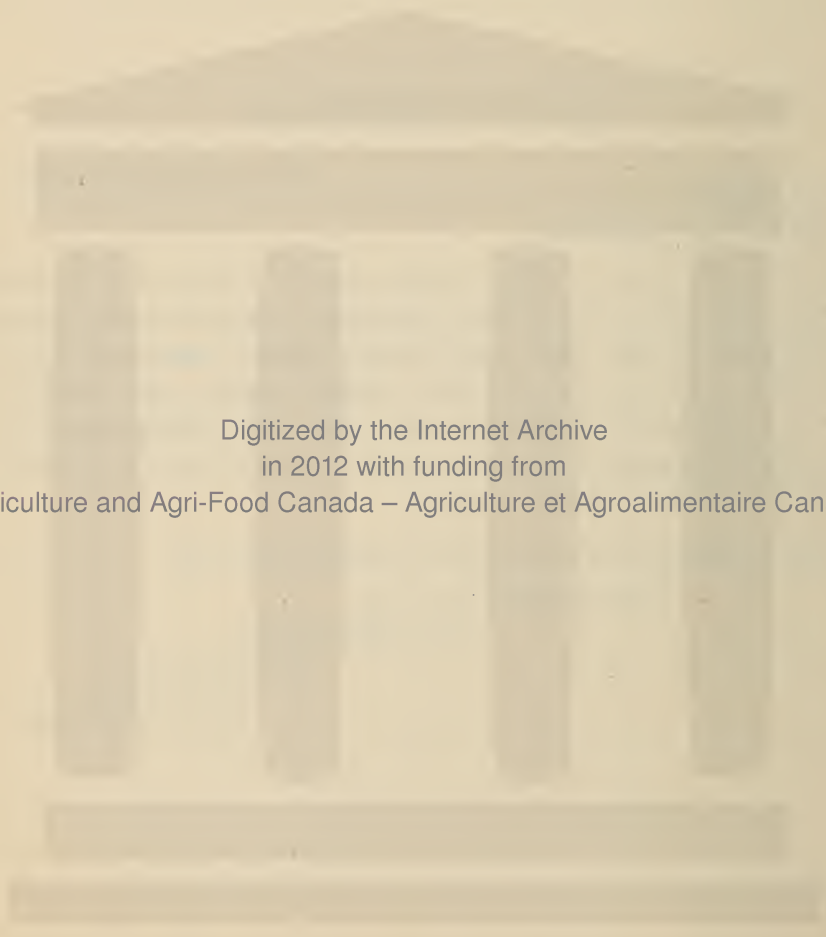
I beg to recommend that it be printed for general distribution.

I have the honour to be, sir,

Your obedient servant,

J. A. RUDDICK,

Dairy Commissioner.



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COW TESTING ASSOCIATIONS

WITH SOME NOTES ON

THE SAMPLING AND TESTING OF MILK.

BY J. A. RUDDICK AND C. F. WHITLEY.

INTRODUCTION.

The dairy farmers of Canada are beginning to realize the importance of the question of the improvement of dairy herds, and the possibilities there are in this line of work for increasing the profits of milk production. According to the results which have followed intelligent breeding and selection, combined with good care and feeding, in other lands, as well as the experiences of progressive farmers in this country, it would seem to be possible to increase the average production of Canadian herds by at least 2,000 pounds of milk per cow per year, by applying the same rational methods. Such an increase in production would mean an additional revenue from dairying to the farmers of Canada of at least \$30,000,000 a year, without increasing the number of cows kept.

The plans for the improvement of a dairy herd need not be elaborate or expensive, and should take cognizance of the fact that there are good cows and poor cows, judged by their milk production, in all breeds, and that it does not follow because a cow may have a lengthy pedigree that her performance at the milk pail is up to the mark; that there are 'scrub' thoroughbreds as well as common 'scrubs.' It will require some moral courage to discard the expensive thoroughbred scrub after she has been shown up in her true colours, but that is what should be done. There is only one true standard, and the test must be production. This is not an argument against the thoroughbred animals as such, but rather an attempt to place performance ahead of pedigree. Ancestry is a most important consideration, but unless the record carries with it some account of production, it lacks the only really important feature, and the man looking for superior animals gets no information from it that is of real value to him. He may have personal knowledge of the strain in question but that is another matter.

Any scheme which has for its object the improvement of our dairy stock must provide for a study, and record, of the performance of the individual cow, as well as deal with the management of the herd, including its care and feeding, and the breeding of animals to replace those which are discarded in the 'weeding' process. Individuality can only be determined by the weighing and testing of each cow's milk.

It is quite practicable for individual farmers to test their own herds, and many are doing so, but some form of co-operation makes the work easier and cheaper and at the same time more useful, inasmuch as each member of an association has the information relating to other herds as well as his own.

CHEESE FACTORY AND CREAMERY OWNERS SHOULD BE INTERESTED.

Owners or managers of cheese factories and creameries naturally take an interest in this question and there is no reason why testing of individual cows should not be done by the factory management. Most factories have the necessary appliances (except the sample bottles), and the manager is, or should be, more competent to do the work properly than the average farmer is. It needs no argument to prove that if

the patrons of a factory increase the yield of milk from their cows the factory will derive a corresponding benefit. If the efforts which are now made by the owners of most factories, to increase their milk supply at the expense of neighbouring establishments, were to be directed towards securing an increased yield of milk from the herds already supplying the factories, a more abiding and better general result would be obtained, even from the individual factory standpoint.

COW TESTING ASSOCIATIONS.

It is probable, however, that the most popular plan for getting the testing done will be through the organization of Cow Testing Associations. There are some twenty of these associations already in existence in the provinces of Ontario and Quebec, which have been organized by the members of the Dairy Commissioner's staff, and the number is increasing almost daily. The organization is being effected on the following basis:—

RULES AND REGULATIONS.

1. The organization shall be known as the.....Cow Testing Association.
2. The officers shall consist of a president, a vice-president and a secretary-treasurer. Three other members shall be appointed to act along with the officers as a committee of management.
3. The officers shall be elected to hold office for one year or until their successors are elected.
4. The annual meeting shall be held at the call of the president.
5. Meetings of the committee of management shall be held at the call of the secretary-treasurer. Three members shall form a quorum.
6. Any person who will agree to keep a record of individual cows during the whole milking period, to the extent of weighing the morning's and evening's milk on at least three days every month, and also take a sample for testing, will be admitted to membership. The number of members may be limited at the discretion of the committee of management.
7. The milk will be preserved and a composite sample tested once a month with a Babcock milk tester.
8. Members will be expected to provide themselves with scales, sample bottles, one for each cow, and a box for holding the samples.
9. Members shall assume the responsibility of delivering the samples to the place where the testing is to be done, on such days as may be directed by the person in charge of that work.
10. The association agrees to provide a suitable place in which the testing may be done without cost to the department.
11. For the season of 1907, the Department of Agriculture at Ottawa, through the Dairy Commissioner, will agree to provide blank forms for recording the weights of milk, the necessary preservatives, do the testing once a month, compile the figures and prepare a report at the end of the year.

NOTE.—A cheese factory or a creamery is a natural centre for an association of this nature. The facilities for testing are available at any properly equipped factory, and the samples can be delivered easily on the regular milk wagons.

FREQUENT WEIGHING ADVISED.

While the weighing and testing of the milk on three days a month is considered sufficient to estimate the total yield of milk and fat, more frequent weighings are recommended if a careful study of cause and effect in milk production is to be undertaken. If the milk is weighed every day, any abnormal variation between milkings is at once noted and the cause more easily assigned than when the variation is found after an interval of ten days. The good or bad effect of particular treatment or circumstances is at once impressed on the notice of the owner if the matter is reflected at the scale.

IMPORTANCE OF FEEDING.

Because there is no reference to the feeding of the cows in the rules and regulations of the Cow Testing Associations, it does not follow that this phase of the question is considered unimportant or that it should not form a part of the general scheme for the improvement of dairy herds. For the present, however, we do not insist on this feature, believing it best to get the testing well established first.

PERSISTENT WORK WILL BE REQUIRED.

It is useless to begin this work unless one is prepared to follow it up faithfully and persistently, year after year, and make use of the information respecting the individual merits of his cows. Testing should begin as soon as the cows come in milk, and be continued until the milking period is over. With one full season's record to guide him, the owner of a herd is in a position to begin his process of intelligent 'weeding' and lay plans for future breeding. As many as practicable of the poorest cows should be discarded. Theoretically, all cows which do not come up to a certain standard should be got rid of, but in practice it is useless to turn off any animals unless there is some certainty of being able to replace them with better ones. The author does not think it wise to set up any arbitrary standard. Much depends on the character of the herd to begin with and, moreover, as the average of the herd is improved, the standard should be raised. It may be pointed out in this connection that the Danish associations are continuing their work as energetically as ever, though the average of many herds has reached such a high level as 10,000 to 12,000 pounds of milk per year.

THE IMPORTANCE OF A GOOD SIRE.

The greatest curse that dairy farming in this country has known is the 'scrub' bull, be he mongrel or thoroughbred. It is absolutely useless to attempt any great improvement of the herd unless careful attention is given to the selection of this all-important member. He is truly the 'head of the herd,' and cannot be too carefully selected from a strain which has a record for large milk production. The services of such an animal are valuable beyond comparison with one of indifferent breeding. It is the part of wisdom to see that such a bull serves none but those cows which come up to a good standard. Many farmers feel that they cannot afford to purchase such expensive animals, but why should not several farmers co-operate in the purchase and use of bulls of the right sort? Why should not the Cow Testing Associations take up the question of securing bulls for their exclusive use, and mate them only with the best cows?

INCREASED PRODUCTION MAY MEAN INCREASED CONSUMPTION OF FEED.

It is quite probable that an increase in the yield of milk will not be secured without some increase in the quantity of feed consumed. If so, all the better, provided that the same proportion of milk is produced per feed unit. The cow, in this sense, must be regarded as a 'machine' for converting a bulky raw material into a more concentrated and highly finished product. The greater the capacity of the machine the more profitable its operation, unless the forcing process entails undue waste. There is undoubtedly a difference in 'efficiency' of cows in this respect, and here is where careful observation and record of the feed consumed becomes important. There is another phase of the feeding question which requires consideration. The relative cost of different feeds is not always in accordance with their milk producing value. It is quite possible to feed a cow expensively and not produce any better results than could be obtained with other feeds or combinations costing much less. The consideration of this side of the subject goes back to the choice of fodder crops best suited to the particular farm occupied. On this point we would refer again to the Danish experience, for they have been able to largely increase the yield of milk per cow and still produce as much milk per 100 feed units as they did when the yield was smaller.

THE COW TESTING OUTFIT.

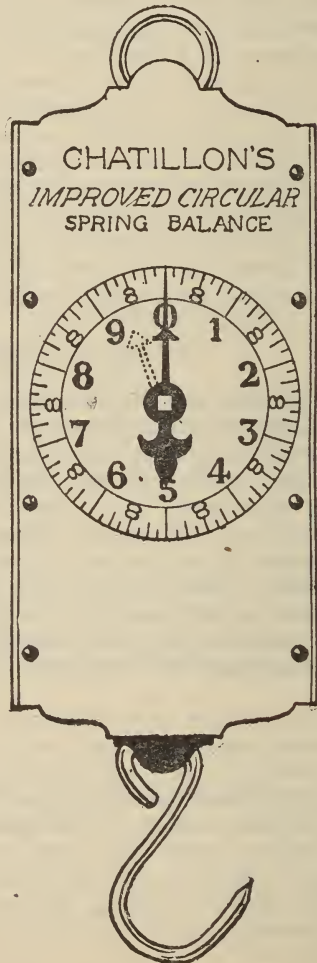
To weigh and sample the milk for testing, the following outfit is required:—

	Probable Cost.
*A straight spring scale (fig. 1), capacity 40 pounds... .	\$1 25
A sample bottle for each cow (fig. 3), each...	0 6 to 10
A sample dipper (fig. 4), each...	0 10
A box for holding samples (fig. 5), each...	0 75
One package of 500 preservative tablets...	0 75

Such equipment can be obtained through the regular dairy supply houses. This department does not supply the articles.



FIG. 1.



*FIG. 2.

*These scales, to weigh 30 or 60 pounds, are made with a loose pointer which by means of a thumb screw on the centre may be set anywhere on the dial, thus taking the tare of a milk pail.

*A circular spring scale (fig. 2), costing about \$4, is more convenient.

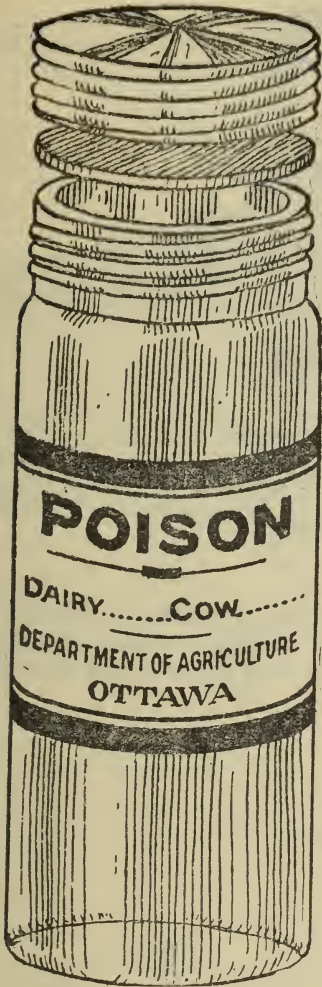


FIG. 3.

This bottle has a screw metal cap and a rubber washer.

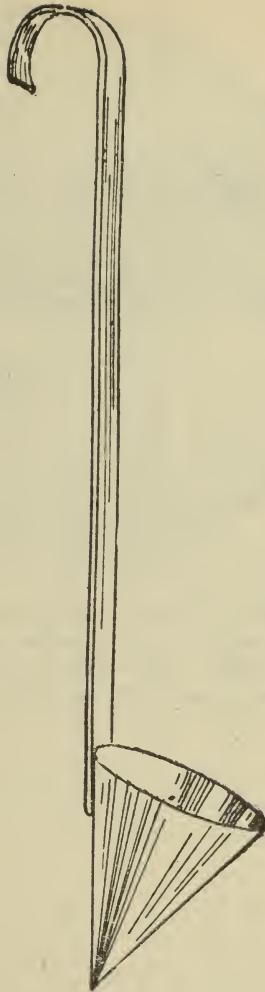


FIG. 4.

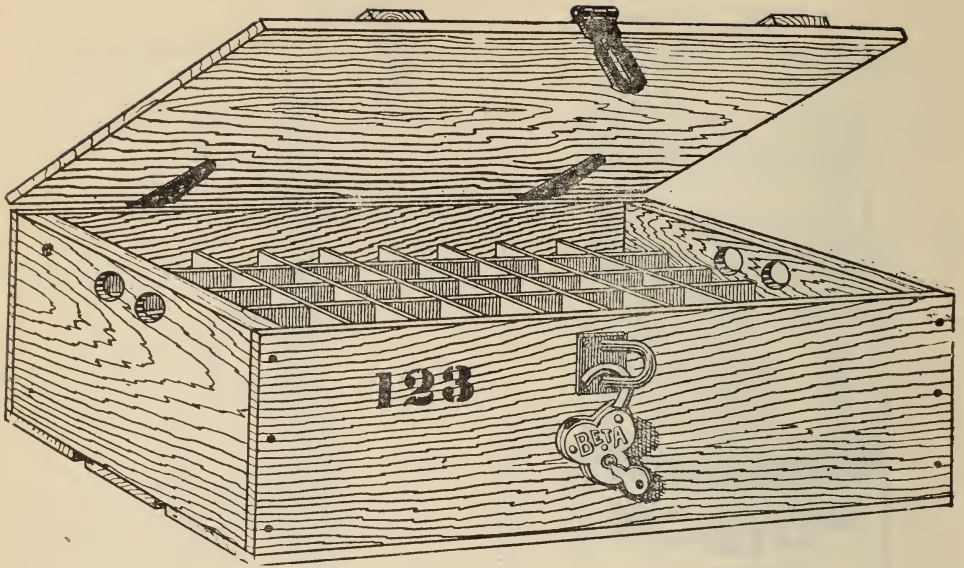


FIG. 5.

Each bottle should have a label pasted on it bearing a number or name for each cow. Two coatings of white shellac over the label will prevent it soaking off when the bottles are washed. These articles with the following form for recording the weights of milk, make up the outfit required.

INDIVIDUAL COW RECORDS.

For 30 days ending _____
 Name _____
 P. O. _____
 Province _____

DESCRIPTION OF COWS.				3 DAYS WEIGHINGS OF MILK.				Total Pounds of Milk Calculated.	BUTTER FAT.	
NAME.	BREED.	No.	Age.	Date of Last Calf.					Per Cent.	Total Pounds.
		1			A.M.					
					P.M.					
		2			A.M.					
					P.M.					
		3			A.M.					
					P.M.					
		4			A.M.					
					P.M.					
		5			A.M.					
					P.M.					
		6			A.M.					
					P.M.					
		7			A.M.					
					P.M.					

This form may be extended to take records for 18 or more cows. Copies may be obtained on application to the Dairy Commissioner, Ottawa.

INSTRUCTIONS FOR MEMBERS OF COW TESTING ASSOCIATIONS.*

One of the blank record forms should be posted in the stable, on a board with a pencil attached, in a convenient and well lighted place; the spring scale should be suspended close by.

Weigh the milk from each cow, morning and evening, on the three dates given at the top of the column for recording weight of milk.

Give fair weight, and enter the weight in the proper space; be sure to deduct weight of the pail.

The dates for weighing and sampling should occur every ten days, for instance, January 10th, 20th and 30th, and the totals of these six weights multiplied by ten will give quite closely the total yield of milk for thirty days.

TAKING SAMPLES.

Immediately after weighing each cow's milk, pour it into another pail, and while the milk is still in motion take one dip of milk with the small dipper provided for the purpose and pour it into the sample bottle, which bears the number corresponding to the cow. This will make six dips of milk in each bottle during the month, from the six different milkings of each cow. The cap should be kept well screwed on the bottle, to prevent evaporation.

Caution.—Keep the box containing the test samples undisturbed in a cool place and always safely locked to prevent access of children or other inquisitive persons, as the preservative to be used in the milk is generally a DEADLY POISON.

Mix the milk in the test bottles every time a fresh sample is added, by giving the bottle a rotary motion.

One preservative tablet should be placed in each sample bottle before the first sample of milk is taken.

When the sixth sample is taken, make a clean copy in ink on the other blank form and inclose it in the box.

Important.—The box must be returned to the testing station immediately after the six samples are taken.

CALCULATING MONTHLY TOTALS.

If six milkings a month are to be recorded as herein advised, the percentage of fat in the composite sample may be ascertained after the sixth sample is taken, and the yield of butter fat readily calculated. To obtain the approximate yield of butter, add one-sixth the quantity of fat. Thus if the six weighings during the thirty days are 16, 15½, 16, 14½, 15 and 15 pounds, respectively, the total of 92 multiplied by 10 will give 920 pounds of milk, which, testing 3·6 will yield 33·1 fat, or if one-sixth be added, a total yield of 38·6 pounds of butter for the month.

SOME NOTES ON THE USE OF THE BABCOCK MILK TESTER.

TESTING THE COMPOSITE SAMPLE.

Up to the present time no simpler or more accurate method of testing for fat has been devised than the well-known Babcock milk tester. With a little practice there is no reason why the careful farmer (or some methodical member of the household) should not do his own testing satisfactorily.

* These instructions apply also for the individual dairyman who is preparing to test his own cows.

A two-bottle machine is the smallest made, and costs about \$4.50. Other sizes are for 4, 6, 8, 10, 12 and 24 bottles. Where steam is available the steam turbine tester will be found the most convenient and satisfactory. About 45 pounds steam pressure is required to operate a turbine tester.

It is advisable to mix any cream that may have risen on the composite sample, by pouring the milk carefully two or three times from one bottle to another. Do not shake it, or partial churning may result. The test is worse than useless, quite misleading in fact, unless the cream is thoroughly mixed with the milk, and the sample taken is a fair average of the milk to be tested. Some samples may require to be warmed in hot water to about 110 degrees F. in order to loosen the cream which has become attached to the sides of the bottle. Should a sample be sour and thick, add a small quantity of powdered lye, mixing it in thoroughly till the curd is dissolved and the milk become fluid again.

With a 17.6 c.c. pipette take a small sample of the thoroughly mixed milk, by sucking it up slightly above the mark on the upper part of the stem. Place the forefinger quickly on the top of the pipette to retain the milk, and hold the pipette in an upright position.

Allow the excess of milk to slowly drip out, by allowing a little air to enter under the finger, until the surface of the milk stands exactly at the level of the mark or ring on the neck of the pipette. Place the lower end of the pipette in the neck of the test bottle, not too far in, release the pressure and allow the milk to flow down the side of the neck. By holding both pipette and bottle slightly inclined, the air will be allowed to escape without bubbling and causing loss of milk. Blow the remaining drop from the pipette into the bottle. Before adding the acid, bring the milk to a temperature of 60 degrees F.

ADDING THE ACID.

Procure good commercial sulphuric acid, having a specific gravity of 1.82 or 1.83. Keep the acid bottle tightly closed with a glass or rubber stopper. If an acid burette or other measuring device is not used, the acid may be poured from a small mouthed earthen or glass pitcher into the 17.5 c.c. acid measure, which is usually supplied with the machine.

Great care should be exercised in handling sulphuric acid (oil of vitriol), as it is intensely corrosive and will burn the skin or clothing quickly should it come in contact with either. Any stray drops should be wiped up immediately, using plenty of water. It is a good plan to have a supply of household ammonia handy, which will help to counteract any burning of skin or clothes, if applied immediately.

Holding the test bottle containing the milk at a moderate slant, pour the 17.5 c.c. of acid in very carefully, allowing it to flow slowly down the side of the neck, and on no account to drop straight on to the surface of the milk. The acid and milk will form two distinct layers, with the acid at the bottom, showing a slight brownish colouration where they touch. Have the acid also at 60 degrees F.

The milk and acid may be mixed by giving the bottles a careful rotary motion. This must be very cautiously done to avoid shaking any curd into the neck. Continue shaking until all the clots are completely dissolved. Be careful to have the mixing thoroughly done.

WHIRLING.

When the milk and acid are thoroughly mixed, place the bottles in the machine so arranged as to balance it. If an odd number of samples are to be tested, an extra bottle filled with water may be placed in the machine to make it run smoothly. Precaution must be taken to keep the fat melted, but do not let the temperature run above 130 degrees F. Hot water may be put in the body of the tester to keep the samples warm.

The bottles should be whirled for five minutes at the speed indicated on the machine. This will vary from 700 revolutions per minute for a machine twenty inches in diameter up to 1,200, for machines of smaller diameter.

Hot water, preferably rain water or condensed steam, at a temperature of 135 degrees F. must now be added to each bottle. Hard water may be used if about 10 c.c. of sulphuric acid is added to each gallon. A convenient method is to use a piece of rubber tubing, provided with a pinch cock and a glass tip like an eye dropper, leading from the hot water vessel placed slightly higher than the machine. Add enough water to bring the mixture up to the base of the neck and whirl for one minute. Then carefully add more water to about the 8 or 9 per cent mark on the neck of the test bottle and whirl for another minute. The fat should be quite clear and golden in colour when the test is finished. If the fat is very light coloured and there are specks of curd, use a trifle more acid, as it is probably weak. If the fat appears burnt or cloudy, use slightly less acid, and see that the temperatures of milk and acid are not too high.

READING THE TEST.

Hold the bottle level with the eye and perfectly upright. With a pair of dividers measure the extreme limits of the fat column. place one point on the zero mark, when the mark on the scale touched by the other point will indicate the percentage of fat.

Each large space on the graduated neck numbered 1, 2, &c., up to 10, represents one per cent of fat. Each small division represents two-tenths of one per cent. Thus, if reading without dividers and the top of the fat column is at 7.2 with the bottom at 3.3 the sample tested contains 3.9 per cent of fat. If there are many readings to take, keep the fat melted by placing the bottles in water at 130 degrees F. reaching to the top of the fat.

The bottles should be emptied before the fat solidifies, and always kept perfectly clean. A suitable brush may be obtained for cleaning the necks. Hot water and some common shot will scour the lower part of the bottle.

Copies of this bulletin, in English or French, may be procured, free of charge, by applying to the Dairy Commissioner, Ottawa, Ont.

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

SWEET-CREAM BUTTER

PART I.—A Critical Study of the Sweet-Cream Buttermaking Process

BY
FRANK T. SHUTT, M.A., F.I.C.,
Chemist, Dominion Experimental Farms

WITH THE ASSISTANCE OF
Mr. A. T. Charron, M.A.

PART II.—Directions for the Manufacture of Butter from Sweet or
Unripened Cream

BY
J. G. BOUCHARD

BULLETIN No. 13

Dairy and Cold Storage Commissioner's Series

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

FEBRUARY, 1907

