ON THE METHOD OF MILK SHIPMENT IN GLASS JARS.

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No more important subject can engage the attention of a community than that of the purity and abundance of its food supply, and no one article of food is of more importance to every class in the community than that to which I wish to direct your thoughts for a few moments this evening, constituting in some form an essential ingredient in the food of almost every one, from the cradle to the grave. Even among savages its value is appreciated ; and as men rise in civilization we find them more and more dependent upon it and using it in more various methods. The natural food of all young mammalia, it still constitutes the best and most available form of nutriment in health and disease. How important, then, that it should be as fresh, pure, and rich as possible. Here, however, comes the difficulty. It is perishable, quickly prone to change and very susceptible of becoming tainted by contact with impure substances—nay, even of becoming the vehicle through which organic poisons, such as that which produces typhoid fever, may be disseminated according to some authorities. And the difficulty increases with the size of a community, which involves increased distance from the source of production and renders it necessary that it should pass through one or more hands between the producer and the consumer. In the sharp competition of trade this renders it liable to adulteration as well as to the certain deterioration which ensues upon the loss of time in transit. No wonder then that the article which in town we know as “milk” is so different from that we find in a country spring-house. I do not mean that good milk is not, very often, delivered by the milkmen in Philadelphia ; on the contrary, I believe that our milk supply here will contrast favorably with that of most other large cities. But there is room for improvement—in many cases a great deal of room—and it is much to be desired that any means to affect this should be made known as widely as possible. Having been engaged practically and, I may add, successfully in an effort toward this for more than a year, I wish to lay my method before you, and thus contribute my mite for the public good.

The cows at my farm, near Westchester, are all pure Devons, and are fed on good nutritious food—hay, bran, corn meal, potatoes, beets, or ruta-bagas—and are well housed, so as to maintain them in good health. Their udders are carefully washed before they are milked. The milk, as soon as drawn, is strained into a 40 quart can, in the centre of which is suspended a 10 quart can containing a freezing mixture of ice and salt, so as to reduce the temperature as rapidly as possible to 50°F. When the thermometer shows this to have been accomplished (which will require 15 to 20 minutes) the milk is drawn off by a faucet into quart jars (I use the Cohansey fruit jar, as being convenient and meeting all requirements), and each jar is closed and sealed with a label bearing the name and address of the producer, date of shipment, and quality of the milk. This label (a slip of paper pasted or gummed) cannot be removed or tampered with in transit without destroying it. Twenty of these jars are packed in a box, and are ready for shipment and delivery to customers. In warm weather one jar in the middle is filled with ice. The milk may be kept in them until required for use. The empty jars are to be rinsed and returned when fresh ones are delivered. The advantages of this method are as follows:

1. The milk must be clean, as any dirt would show at the bottom of the jar.

2. It is free from contamination by foul air, etc., in transit. This is a very important advantage, as any one can appreciate who has happened to enter an ordinary milk car and noticed the foul putrescent odor which results from the slopping of milk over the car floor, when it soaks in and undergoes decomposition.

3. Each quart of milk contains its own share—no more, no less—of cream. When 40 quarts are sent, as is usually the case, in a “churn,” the cream soon rises to the upper part, and the abstraction of more or less cream from the milk is easy. To obviate this the milkman may frequently be seen stirring up the contents of his can, but it may readily be surmised that favorite customers may receive some share of cream that properly belongs to others less fortunate.

4. If the jars have been properly filled no “churning” is possible. In the ordinary method more or less churning is apt to take place.

5. The consumer can be sure that he gets the real article furnished by the producer.

6. It is the interest of the producer to send the best article he pos-

sibly can, as the price he will receive depends upon it, and consumers will not be slow to show their appreciation of his merit or demerit. In the ordinary mode this is not the case. Milk is milk, and the man who really and honestly tries to send the *whole* produce of his herd finds he receives no more for it than his dishonest neighbor who removes part of the cream, or adds a little water.

The average yield of a good cow may be estimated at 2400 quarts per annum, or between $6\frac{1}{2}$ and 7 quarts daily. At the usual prices of corn, hay, etc., the cost of keeping would be nearly 80 cents daily. The cost of production, therefore, is not less than $4\frac{1}{2}$ to 5 cents per quart. It will readily be seen that when the risks and cost of transportation are considered the farmer does not make a large profit, even if he gets his fair proportion of the 8 or 10 cents per quart, which are the ruling prices—the former in summer, the latter in winter. But even this he does not get, as the price of milk at the railroad depots is $2\frac{1}{2}$ cents in summer and 4 cents in winter. Of course somebody suffers for this.

To return to the quality of milk, and especially to the variation which occurs in different breeds.

The *Durham*, or short-horn cow, yields a large quantity of milk, rich in casein but poor in butter and sugar. The ordinary or "common" cow is largely "grade Durham," and may be classed under the same head. Rather richer in butter and less watery is the yield of the *Holstein* or Dutch cow, a variety of the short-horn class. Next comes the *Ayrshires*, a very useful class.

The *Jerseys*, or Alderneys, yield a comparatively small quantity of milk, very rich in butter but poor in cheese and sugar; hence when the cream is removed there is only a very poor skim milk left. These animals are not fit for dairy cows for milk purposes. But "grade" Jerseys yield abundantly a good article.

The *Devon* cow stands intermediate between the Durham and Jersey as to amount of yield and percentage of butter, but yields a milk richer in sugar than any other, and hence better adapted for general use, more nutritive and palatable.

As to the sort of glass jar required, it should have a large opening, so as to be cleansed readily; it should be capable of being completely filled, and should be easily closed and opened. Any jar fulfilling these conditions may be used. After I had used the Cohansey for six months I saw Mr. Lester's jar, which is good but cumbrous. That

used by Mr. F. Ratchford Starr of New York, as well as the bottles employed by M. D'Arcy in Paris, seem to me not so convenient, on account of the narrowness of the mouth; cream could not be taken separately from them so readily.

The importance of this branch of trade may be estimated when it is known that the milk supply of Philadelphia is nearly 150,000 quarts daily, costing the consumers, at eight cents per quart, nearly \$12,000, or annually about \$4,376,000. And yet the quantity daily consumed by each individual, supposing the population of Philadelphia to be 850,000, is less than one-third of a pint for each man, woman and child. This is rather more than the average of England, though less than half that of Wales, and not one-third of that of Scotland or Ireland.

The nutritive value of milk is hardly sufficiently appreciated by us. According to the best and most recent analyses, good milk contains, in each quart:

Butter,	543.3 grains, or nearly	1 $\frac{1}{4}$ oz. avoirdupois.
Casein,	1026.3 " " "	more than 2 $\frac{1}{4}$ " "
Milk-sugar,	452.8 " " "	1 " "
Salts (phosphates, etc.),	90.6 " " "	nearly $\frac{1}{3}$ " "

Two quarts, therefore, of milk, with 12 oz. of bread, contain sufficient nutriment for a laboring man daily—more than the French cavalry ration. No cheaper food of equal nutritive value and easy assimilation can be found.

The Satellites of Mars.—On the 10th of October Prof. Hall found Deimos, the outer satellite, almost precisely in the calculated position. The place of Phobus was not predicted so accurately, because its proximity to Mars made observations more difficult, and some of the auxiliary estimates were calculated for the orbital plane of Deimos. But these difficulties have exerted only a very slight influence on the results. Both positions are within the limits of probable error, which were announced by the discoveries in 1877. The 2443 intervening revolutions of Phobus require a diminution of only 1.074 sec. in the predicted time, showing an error of less than $\frac{1}{275}$ of one per cent.! A very careful and exact reduction of observations will be necessary in order to determine whether any correction is needed in the elements of Deimos.—*Comptes Rendus*. C.