been heated at all to destroy its germs or taint. It is to improve quality that an exceptionally high temperature is advocated *for milk that is unusually defective*. The writer would not advise higher heating than 145° where quantity only is the object.

A third mode of preparing milk for keeping it sweet is aerating it. If a considerable portion of the milk can, either while warm or while being cooled, be exposed to the air, it will become purified of very much that is objectionable such as odor, taint, &c. Of course the air that purifies must itself be pure, else it is likely to give to the milk new germs rather than to remove what were in it before.

The second requirement in milk-setting was that the germs or seeds of fungi in the milk, which cause early decay be destroyed, or their action arrested. This need has been treated of in other connection where it was shown that milk by being heated to a certain temperature would kill the germs, and on the other hand by being quickly cooled would arrest their action. If milk were ordinarily sound and in the best condition, this matter would not be of so much importance, but taking things as they are, it is evident that not only the quality of the future products of milk but the *needs of the processes* by which the product is obtained, demand the best treatment possible of the milk. From what has already been written it will be admitted that of the two methods of heating or cooling, the former is the better one.

The third requirement was that the milk be ventilated, and yet no objectionable odors be allowed access to it. When milk has been purified thoroughly, there is less need or no need of ventilation. Indeed, when by any means milk has been made quite pure, ventilation is not to be desired. Milk will take in germs from any atmosphere, and its decay be accelerated. But so long as there remains anything of taint or odor in the milk that it can throw off into the atmosphere, there should be a provision for pure atmosphere to take such taint or odor. At the same time it is desirable that provision be not made for the milk taking in more than it gives off. In actual practice it is almost impossible to have a pure atmosphere in which to set milk. One setting of milk being of a different temperature, will take in the odors given off by another setting. To meet this difficulty and secure our requirement, cold water may be utilized to stand between the milk and the general atmosphere to seal it as it were. The water will act as an absorbent, condensing and absorbing odors that escape from the milk, and will stand between the outside atmosphere and the milk, are effectual protection of the milk. A way of accomplishing this result is to have a cover over the milk, the flanges of which rest in a reservoir of cold water outside and around the upper portion of the milk. There should be a sufficient body of water to be kept (with or without ice) always at a lower temperature than the milk, or changed often enough to produce a similar result.

The fourth requirement was that a wide range of falling temperature be secured. Prof. Arnold was first to learn and tell dairymen the important fact that cream rises better in a higher than a lower temperature, where the temperature is unchanging, but still better in a temperature that is falling. Professor Sheldon gives the best endorsation of the Arnold theory by quoting at great length the full argument, and speaking of it as a theory "based on facts supplied by experiment and clearly enough set forth in Prof. Arnold's close reasoning." All the experiments and experience of the writer go to corroborate the position taken by Prof. Arnold, and they are such as to prompt a desire to do his part, to encourage a better appreciation of the great value to the world of Mr. Arnold's discovery of an important principle.

It has been shown in the last paper that the widest range of falling temperature can be secured by heating. After heating the process of cooling will follow. This should be neither too fast nor too long delayed. If too fast, currents will be formed that will carry both cream and milk upwards and downwards. The result will be that the cream that finds its way to the top, and remains there, will be more or less mixed with milk. Slower cooling will give a better result. Yet if the cooling be too slow, the milk will be kept too long at the higher temperatures, and souring will be hastened. There will, of course, be less danger in this respect if the milk has been heated to a degree sufficient to kill the germs of decay, and is during the cooling process protected by water from impurities in the air. Heating here again has the merit of allowing slower cooling so as to get the benefits of a more slow-falling temperature. If milk be heated up to from 130° to 145°, the cooling process may, under the favorable conditions referred to, be comparatively slow, and a range of falling temperature of 70 degrees may by the water resources of any dairy be brought about. If heating is not employed, the condition of ordinary milk will usually demand a hurried cooling down from about 85° to 70°, after which slower cooling to say 60° may be followed.

There are two ways of bringing about a fall of temperature, one by the application of cold water or ice, and the other by setting the milk where the air is cold enough to lower the temperature. Cold water or ice has over air two advantages. First, its action is more speedy. A larger body of milk may be cooled in the same time. Second, it is less difficult in ordinary dairies to adapt the changing temperature of air than the more even temperatured water or ice to the requirements of the milk. The quantity of milk setting must be increased or lessened to suit the temperature of the atmosphere. In the other case the same body of milk may be always set, and enough water or ice be applied to bring the temperature down. It is a case of adapting the quantity of the cooling milk to the ever changing outside influence, air, as against applying to the quantity of cooling milk as much, or as little of the outside influence, water, as required. The advantage is certainly in favor of the use of cold water or ice.

The application of water or ice evidently requires something different in a milk-setting vessel from the little open pans. It is very desirable in scientific butter making that something different be employed. It must not be said that butter cannot be made in a scientific way by using the old pan system for raising the cream. But it may be truly claimed that to get the best result it requires with these old-fashioned appliances far more skill than it need require with larger vessel properly adapted for the application of ice. It requires in the former case an amount of skill such as is very rarely found, while in the latter case good results may be obtained by very ordinary intelligence and care. Milk should be heated at the bottom, and always gradually. Milk should be cooled at or near the top, and also gradually. The vessel to be used should be one adapted for either heating or cooling, in the manner stated.

The fifth requirement was that the cream be separated from the milk without unnecessary waste, and clean—free from dirt and sediment. One of the best ways of accomplishing this is by skimming. The objections to skimming are the amount of work involved, and the difficulty of taking of the cream—especially in deep-setting—without mixing cream with milk. If other means of separation be required, it becomes, of course, a question of the sort of vessel in which the milk is set—its construction. It should be perfectly adapted for drawing off the cream as pure and unmixed as possible.

The sixth requirement was the reduction of cost and labor, and the adaptability to the resources of the common dairy. Here, again, it is a question of the construction of vessel employed. Very few dairies are supplied with ice, and not many with running water. Most dairies are supplied with cool or cold water, if only in limited quantities, that can be brought in by the pailful. It is an absolute essential of all dairies that there be means for heating water, and so the heating of milk is within the resources of all dairies. What is wanted then is a vessel that other things being equal, is cheap, and easily manged, and is adapted for both heating and cooling in the simplest and easiest way, so that it may be suitable for all dairies.

The main points in milk-setting have now be touched upon, and it will be seen that, like in all butter-making processes, the vessel employed has much to do with the attainment of a good result. It is hoped that the argument is strong enough to convince the reader that the position taken is a right one, and that the directions are explicit enough to enable him or her, if provided with suitable utensils, to follow out a method adapted to the right principles of cream-rising. If there is a living in butter-making after the hard and difficult old-fashioned way that produces varying results, there should be a better living, and some profit in an easier method that will give very uniform and always satisfactory results, which is necessarily a *scientific* method.

SOILING COWS.

Who of the readers of the CANADIAN FARMER have practiced the system of soiling cows, and with what results? Will some of them let us hear how they like it? F. H. D.

A SAINT AT THE ZOO.

Capt. Harry Piper, Alderman and Superintendent at the Zoological Garden, lately communicated the following facts to a reporter of one of Toronto's most influential papers. "Some time ago we purchased from the collection of animals at Central Park, New York, a monstrous Russian bear, which we have named 'Peter the Great,' on account of his tremendous size. Not long after 'Peter' arrived we found that he was suffering from Rheumatism, and in a pretty bad state. Pete was not the only one in the 'Zoo' which had a touch of that delicious torture; the lion likewise had it, and in fact I was just being cured of the rheumatism myself, by the use of St. Jacobs Oil, the Great German Remedy. I found St. Jacobs Oil an excellent remedy, for it cured me in a short while and my case was a very aggravated one. I argued that if it cured men it must be good for animals as well.

APIARY.

OFFICERS OF THE ONTARIO BEE-KEEPERS' ASSOCIATION.

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JOHN MCMILLEN writes. What bee-hive do you advise me to use?

It is a difficult thing to answer the above question satisfactorily, as there are so many styles of hives in use, and nearly every bee-keeper has a prejudice against all other hives but the one he uses himself—certain it is that every supply dealer believes, or affects to believe, that the hive he manufactures is superior to all others. There are three or four styles, however, in general use, for each of which some advantage may be claimed over the others. There is the Langstroth hive in its various modifications, the Jones hive, the Simplicity hive, and the Thomas hive. Each of the above has merits peculiar to itself. Jones' hive is perhaps the cheapest in the market, and for extracted honey it has (all things considered) perhaps no superior. The Simplicity is generally made as a two-storey hive, and will cost twice as much as Jones'. The former can be got from D. A. Jones, Beeton, and the latter from John Mills, Owen Sound, or from Mr. Richardson, Port Colborne. We are unable to give Mr. McMillen the name of anyone who manufactures the Langstroth or Thomas hive, and we think those who do so, and desire the fact to be known, ought to advertise in the FARMER. Nearly any of the moveable frame hives in use will answer the purpose, as success depends more on the management than on the style of hive, provided the hive is such as to be managed in connection with the appliances used in modern bee-keeping.

A LITTLE son of Mr. D. B Campbell, of Parkhill, playing among some hives last Sunday, was attacked by the inhabitants, and would doubtless have been killed had not assistance speedily arrived. The dear little fellow was unconscious from the effect of the stings before the bees were driven off.

SPRING MANAGEMENT OF BEES

The queen stops laying at the approach of cold weather, thus leaving the hive destitute of brood during the winter, but resumes her duties on the approach of spring. Usually brood rearing commences some time in February in the bee house or cellar, either earlier or later, according to the condition of temperature, and somewhat later on the summer stand. As the life of a bee is very short—only a few weeks at most in the summer when in full activity, and as many months of the winter—the occupants of the hive at the close of the winter are aged and infirm, and their lease of life necessarily short, if no brood were raised to supply the places of the rapidly dimin-