Dairy.

Points Noted in the Manufacture of Best Butter.

BY PROF. L. B. ARNOLD.

The best samples of butter I have ever seen were made in private dairies where only a few cows were kept. These samples have not been the result of accident. They have, in all cases, come from skill and judgemnt in adapting means to ends. The food employed has been grass and grain or some of its products. The cows have been well selected for the richness of milk, and for high flavor and color in its butter elements. The best butter never comes from cows that secrete low flavored milk, stearine instead of flavoring oils. Where the best butter is made, the cows are all in good health and well supplied with fresh water, as well as with good food. No matter how good the normal quality of milk, thirst and starvation will spoil it for prime butter. It has also been noted that the cows have been gently treated. They are never hurried to or from the yard by dogs, or clubbed or stoned or harshly treated at milking or any other time. They are provided with shade, and protected against the annoyance of flies, and against the inclemencies of weather of every kind; in other words there has been a steady care to secure for them comfort and quiet. Then the milking has been regular, and the spaces of time between milkings equal; much depends on this. Milking at 4 o'clock in the morning and 8 at night never makes the finest butter or cheese. Sixteen hours, or an approximation to it, are too long a time for the milk to remain in the udder, for the good of the milk or of the cows, especially when the flow is large. By crowding and straining the bag it becomes painful and feverish, and the butter fats, as well as other elements of milk, become altered in consequence. There is nothing like a sound and healthy udder, free from all feverishness, congestion and swelling, for secreting good milk. After milk has been once secreted it continues to suffer from change and absorption, so long as it remains in the bag. It would be better to milk three times a day than to make a long space between milkings. It is hardly necessary to say that wherever the finest butter is made, the milking is done in the most cleanly manner. It is so neatly done that straining is of very little use; it might even be dispensed with, but for the occasional dropping of a stray hair. Whoever places much dependence on the strainer for securing clean milk, will never make gilt edged butter. Allowing dirt to get into the milk, and then depending on the strainer to get it out, is a poor apology for cleanliness. More or less of the dirt, especially everything of a soluble nature, and some that is not, is sure to find its way through the meshes of the strainer with the crowding current of milk. The practice of using one cow's milk to wash the filth collected from another cow's milk, as is frequently done by continuing to strain mess after mess through the same strainer without cleaning, does not contribute anything toward gilt edged butter, and is not allowed where the best butter is made. Then the tin pails (for I noticed wooden pails are not used where I find the best butter) and all the vessels used for handling or setting milk, are kept scrupulously clean. When used they are not left for the milk, and particularly the milk sugar, to dry and form a gummy coating to serve as a reservoir for infection, and which it is difficult to get off. They are attended to promptly, rinsed in cold water, washed in warm, and scalded in water actually boiling hot, and, to avoid contamination from a sour dish cloth, are left to drain and dry without wiping. They are kept bright by scouring with salt, and as a protection against greasy and infectious matter, sal soda is employed instead of soft soap, which, though it may possibly be clean, is generally too filthy to be used about milk vessels, to say nothing of the injury it does to tin ware from the potash it contains.

Another peculiarity noticed in the manufacture of the finest samples of butter I have met with, is that the milk when set for the cream to rise has been spread out pretty thin in temperate air which is free from foreign odors, currents, and unusual dampness. I have met with plenty of fine, and even fancy, butter made by various modes of deep and cold setting; but the most exquisite flavor has come from an exposure of the cream to pure air, at about 60° for 30 to 40 hours, while rising on milk spread out 2½ to 3 inches deep. By such an exposure the butter fats acquire a new and delicious flavor, which does not exist in the milk when it comes from the cows, and which I have not found developed in any other way.

Early skimming and churning are also essential to the best butter. They must be done while there is a fresh and new taste to the cream, and before anything of a stale condition has been reached. The churning is best done when the milk is thus set right away after skimming. It should not be delayed beyond the first stage of acidity, and is better done just before acidity is perceptible. The mode of churning is also important. The force of the churn must at every impulse operate on all the cream at once and equally, as with a thud or concussion. The butter is always unfavorably affected by friction, and unequal action; it becomes greasy and salvy and low flavored. In these respects as much depends on working as on churning. The more working the poorer the butter. Gathering it in a mass in the churn is sure to detract something from quality, because the working which will be necessary to get the buttermilk out, will break the grain more or less, and thus lower its merits. In dairies where the best butter is made, little or no working is done. It is avoided by gathering the butter in granules, by chilling and slow churning when it is about ready to gather. It can then, without any working, be freed from buttermilk by washing in cold brine, with benefit instead of injury to the butter. These and various other items which contribute to the highest excellence, can be more easily secured in a small private dairy than in a creamery. Where the milk is gathered from 20 or 30 patrons it would be very difficult to find everything just right. It could hardly be expected. Somebody's cows would be sick, or give poor milk, or get stagnant water or perhaps not enough of any kind, or be worried too much with dogs or annoyed with flies. Somebody may not milk cleanly, or keep his pails and cans in order, or neglect something which he ought to do, or do something he ought not to do. It would be almost impossible to get everything just right in the milk where so many are concerned in its collection, and hence perfection would not be so likely to occur, as in a small dairy where all the necessary conditions would be more easily controlled. But creameries have their points of peculiarity and importance, which, though not likely to give the acme of perfection, may still be superior in general results. But their consideration must be left for another occasion.

The Manufacture of Butter.

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In describing shortly the details of successful butter-making, we will first mention a few of the causes of inferior quality—(1) a want of cleanliness in dealing with the milk, and of suitable dairy rooms for setting the milk well-ventilated and free from any strong odours; (2) leaving the cream so long on the milk that it becomes sour; (3) not churning often enough, churning at wrong temperatures, or too fast, and not stopping soon enough when the butter begins to come; (4) not getting out all the buttermilk, or leaving too much water mixed with the butter; (5) over salting or using imperfectly mixed coarse and inferior salt; (6) working the butter with the hands; (7) want of tidiness in preparing and sending it to market; (8) feeding cows on turnips or other strong flavoured food, or giving them foul water or injudicious driving of the cows before milking.

There are two distinct systems of setting milk, each of which has its advocates. The one the setting of milk in shallow pans in dairy rooms of the temperature of from 50° to 60°; the other the deep setting of milk at a low temperature of about 40°, obtained by the use of ice or very cold spring water. The latter system finds much favour in the North of Europe, and also in America, varieties of it being known by the name of the "Swartz," the "Cooley," and the "Hardin" systems. The chief advantage of these systems is that the milk is kept sweet, pure, and excellent keeping butter, free from casein, and therefore not likely to taint, is produced.

Where butter is made for sale, whilst fresh, an equally good result may be obtained on the shallow setting system, and as supplies of ice or water sufficiently cold are frequently unattainable here, we do not think the system is likely to become general. It is found that cream rises best when the temperature of the milk is falling somewhat rapidly, and though this separation takes place under the cold setting system, the cream obtained is thinner and less concentrated than that obtained by shallow setting.

A comparatively recent invention is the centrifugal cream separator (Laval's), by which cream can be almost perfectly separated immediately after milking. This plan, however, requires the application of power, and is scarcely likely to become general, except in creameries or very large dairies. One advantage of the system is that the skim milk is obtained perfectly fresh and suitable for sale wherever there is a demand for it. Excellent pure flavoured butter is obtained from the cream resulting from this use of the separator. It is usefully employed in some of the large London dairy establishments.

We will now describe the shallow setting of milk. The milk, when brought from the cow, is carefully strained and put in shallow pans, from 2 to 4 inches deep, made of well-tinned iron, glazed earthenware, or glass, all materials which are not porous, and can be kept perfectly sweet by the use of hot water. The pans are set in a dairy the temperature of which in winter should not sink much below 50°, and in summer should be kept as cool as may be. The room should be well ventilated, and no strong odours of meat, vegetables, or smell from drains, should be permitted. The cream should be carefully skimmed off at twenty-four hours, and the milk be used for feeding pigs or rearing calves, for either purpose having considerable value when suitably mixed with meal. Some farmers churn all the milk without setting for cream. This plan has, however, nothing to recommend it. If churned sweet it is a wasteful plan, and all the butter is not obtained, whilst if, as is usually the case, it is lappered or soured before churning, the quality of the butter is sacrificed, there being a considerable mixture of curd in the butter. The purest butter is made from perfectly sweet cream, but many makers prefer the cream taken off sweet milk, but slightly soured before churning, and thus obtain excellent butter. Cream when put in the churn should be of the temperature of about 60°, or a little lower in the summer season. The cream is in cold weather best raised to the required temperature by floating some of it in a tin vessel within a furnace of hot water. The churning should be done steadily, a pace of from fifty to sixty revolutions per minute being found desirable. There is a ventilating peg in some of the best churns, which is removed occasionally during the first ten minutes of churning to give ventilation. Churning should be stopped as soon as the butter forms, or the quality will be injured. The time occupied in churning usually varies from twenty to sixty minutes; but where the temperature is too low, or the cream is from the milk of old-milched cows not liberally fed, churning is sometimes a tedious and unsatisfactory operation.

As soon as the butter is formed in small particles the buttermilk is let off by means of a plug, a hair sieve being used to prevent waste, and the little butter which flows through the tap is returned to the churn. The churn is then half-filled with pure cold water, and after a few revolutions the water let off. This process is repeated until the water comes out of the churn as clear as when it was put in. The butter may then be taken out with a pair of wooden patters without coming in contact with the hand. The water may be pressed out, and if desired a little fine salt mixed with the