generous support of the farmers is necessary. The gatherer should not pass a door without getting the cream. Very often I find where creameries are started, that a good many hold back the first year to see how it will work, and if it goes all right they will support it the following year. This is a cowardly and unmanly course to take. They are injuring their neighbors, and are expecting them to experiment for their benefit. It is not enough to furnish the cream, but they must see that it is in good condition, and use their influence to make their neighbors do the same thing.

The cow must have proper attention. She must be treated and fed properly, and if she is expected to pay, she must have more food than she requires to sustain life, otherwise there will be a loss. If it pays to convert food into butter, the more you can put through one machine the better. Cows must not be chased to and from the fields with dogs; it will pay better to treat them like pets. Treat them kindly, milk regularly, and give them plenty to eat, and clean, fresh water to drink. Every farmer should prepare himself with a few acres of green corn to feed his cows with during a drought, or when from any other cause the pasture fails. This should under no circumstances be neglected. If cows are allowed to break off in their milk on account of poor pasture, they are in a great measure spoiled for the season. Cleanliness in milking and handling the milk and cream is of the greatest importance. Not only must the cow's udders, the hands of the milker, the pails, etc., be clean, but the custom of setting the milk in wide shallow pans, and have the cream spread over its large surface to absorb the impurities and disease germs for several days in a damp, underground cellar, should be abandoned. It does not matter how cleanly the cellar is kept, it is never quite free from dust, nor of a musty smell peculiar to almost all cellars.

I just lately satisfied myself more than ever of the aptness of cream to absorb any odors or smells in the air, and of the folly of supposing that ordinary air will purify cream. I took some cream, and by means of bellows I forced air through a tube into the bottom of the vessel containing the cream, causing the air to bubble up through the cream. I kept this up for about an hour, and the flavor of the butter when churned was anything but pleasant. This shows that the cream retained the impurities of the air.

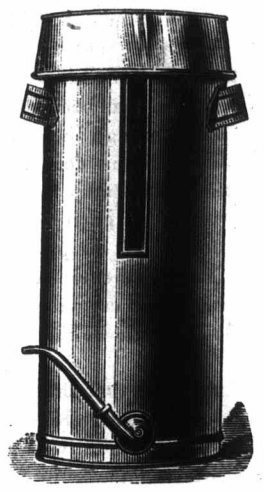
Prof. L. B. Arnold says a dairy farm costs ten per cent. less to operate than grain growing or mixed agriculture; second, the mean returns average a little more than other branches; third, prices are nearer uniform and more reliable; fourth, dairying exhausts the soil less; fifth, it is more secure against changes in the season, since the dairying does not suffer so much from the wet and frost and varying seasons, and he can, if prudent, provide against drouth.

Every advanced farmer recognizes the necessity of regularity in feeding milk cows, without any violent changes of food. This principle is often violated at the very outset of the dairy season in suddenly changing from hard feed to pasture, thus injuring the milking qualities of the cows not only for the dairy season, but for all time to come.

A New Creamery Can.

The accompanying cut represents a can recently invented and patented by Mr. M. Moyer, Walkerton, Ont., who has had long experience in the creamery business.

The can containing the milk is completely submerged in water, the air compressed under the lid preventing the water from running into the milk. The cover is arranged in such a



manner as to allow the surrounding cold water to absorb what the heat from the milk throws off. The tap is adjusted to suit the depth of cream as measured through the glass, and then the arrangement works automatically, stopping when the cream reaches the level of the mouth of the tap. By reversing the direction of the tap, the aperture is closed.

Principles and Practice of Cheese-Making.

After a long series of years, chiefly through the arduous labors of Willard and Arnold on this continent, and a few other noted experimenters in Europe, cheese has gone through a severe scrutiny, and a high degree of excellence has at length been attained. Its nutritive value, as well as its many other properties, has been rigidly solved, a tolerable uniform system of manufacture has been established, and there is little likelihood of material change in the near future.

Although cheese-making is largely taken out of the farmer's hands, yet he should be familiar with the process—not only because he can imitate the established system, should he wish to manufacture his own cheese, but also because he should know how to value it nutritively, as an article for his own consumption under different modes of treatment. The time is fast passing away when the farmer should be governed by market prices alone, for his success now largely depends upon his knowledge of the difference between the intrinsic value and the market price of everything he produces.

Although the system of cheese-making on the whole may be regarded as complete, yet much depends upon strict attention to details, a knowledge of which can only be acquired by experience and observation, not by arbitrary rules, so that science has not yet completely banished "luck." There are differences in the condition and composition of the milk in the ever-changing seasons, and the food, drink, and management of the herd produce variations which can only be controlled by the personal ingenuity of the operator. From these facts it will be seen that the greater the variety and conditions of the herds the greater the "luck" upon which the expert must depend.

COMPOSITION OF CHEESE.

Milk being composed of about 87 per cent. water and 13 per cent. solid matter, the first object is to separate the liquid from the solids. The solid constituents of the milk are not all alike, but are composed of about 3 parts casein, 3½ parts fat, ¾ parts mineral or saline matter, and usually about 4½ parts sugar. There is also another substance called albumen, which, however, has about the same composition, and performs the same nutritive functions as the casein. Now if all this 13 per cent. of solids could be turned into cheese, you would get over 13 pounds from every 100 pounds of milk, the weight of the moisture being included; but you know that 10 or 11 pounds are all that are usually procured, and there must therefore be considerable waste. Of all these constituents the sugar is the most valueless, and it causes the milk and whey to turn sour. In point of nutritive value the casein and the mineral matter stand highest, for they are required to build up the tissues of the consumer's body, or to repair the waste that is constantly going on. The next object then is to save as much of these valuable constituents as possible and to get rid of the sugar. The sugar being soluble, runs out with the water, but as some of the water is retained in the cheese, some sugar must be retained too. Some of the other constituents and all the albumen also go off with the whey, and the 10 pounds of cured cheese which are made from 100 pounds of milk, will then have about the following composition:—

Casein	3.00	pounds.
Fat	3.20	"
Minerals	.60	"
Water	2.90	"
Sugar and acid	.30	"
	10.00	

You will now see that, taking milk as a complete food, cheese cannot be regarded as such, even were it all digestible; for the sugar being a heat former like the fat, is mostly all gone, leaving the cheese rather rich in flesh forming substances.

THE OPERATION.

The first process is to apply heat to the milk, stirring it in order to mix the cream. The heat applied should raise the temperature of the milk to 80° in very hot weather; 82° in hot weather; 84° in warm, and 86° in cool weather. At a higher temperature the operation will be too fast, producing too dry a curd; at a lower temperature the curd works too slow, making it too tender. As soon as the milk is thus heated the rennet is put in, sufficient to coagulate in 15 or 20 minutes, stirring thoroughly for a few minutes. In 30 or 35 minutes after setting, the cutting of the curd should begin. The curd is stirred while heating, commencing gently and proceeding continuously and cautiously. The heat should be increased about one degree every five minutes, and continued until 96° or 98° are reached. If the curd still contains whey, or has not become firm, keep the temperature at 98° for a while. Continue to stir occasionally after the heat is removed to keep the curd from packing. Draw off a portion of the whey, leaving merely enough to