slowly revolving the churn. Allow the butter to remain in the churn from two to four hours; take out and give sufficient working to remove the excessive moisture.

By salting in the churn one working is quite enough, and there is little danger of ever having streaky or mottled butter. The streaks and mottles are caused by the salt not being dissolved and evenly distributed.

If the butter be in a nice, firm condition, it may be taken immediately from the churn after draining, weighed, put on the worker, the salt sifted on, worked, and made ready for the market at once.

The buttermaker who is still using the butter bowl and ladle should abandon it, and either buy or have made a lever butter-worker. It does not cost much and is such an improvement over the old style, saving both time and strength. *Be sure to have it large enough.* One 3 ft. across the front, tapering to 4 in. at small end, and 3 ft. at the sides, works from a few to 15 lbs. of butter nicely. The worker should stand 2 ft. from the floor at the wide end, and 21 in. at the lower end. The 3 in. slant allows the water to drain while working the butter.

Do not slide or roll the lever, but press it gently down on the butter. Avoid friction, using pressure only. By so doing you can give the butter much more working without injuring the grain.

When the moisture is nearly all expelled and the butter has an even color and a close texture, it has had sufficient working.

The packing and marketing of butter will be considered in our next article.

O. A. C., Guelph.

Science and Practice in Cow Feeding.

Professor Haecker has given the method of feeding cows at the Minnesota Station, a summary of which is made by *Practical Dairyman*. They are feeding ten parts of bran to two parts of oil meal, and are using fodder corn exclusively for roughage. The standard ration is ten parts of the bran and oil meal mixture to 15 parts in weight of the cut fodder corn. The cows are fed all they will eat up clean, but the proportion between the roughage and the grain is always maintained—once and a half as much roughage as grain. The reason cows are fed all they will eat is because we must first provide the food of maintenance, and the more they will eat over and above this the more they will have available for converting into milk or meat. Each cow is fed twice a day, half the grain feed and roughage in the morning and half in the evening. That generous feeding pays is clearly illustrated in our record for the five years ending December 30, 1897. During the years of 1893, 1895, 1896 and 1897 cows were fed all they would take, while during the year 1894 they were fed light.

	Milk.	Butter.	Cost of 1 lb. of butter.
1893	6,407	361	10.6 cents.
1894	4,909	272	10.9 cents.
1895	7,418	354	8.0 cents.
1896	7,454	349	6.3 cents.
1897	6,962	351	5.4 cents.

These are averages of the entire herd, and show that during the four years, when receiving all they would eat up clean, they averaged 354 pounds of butter each, while the average yield for the year 1894, when on comparatively light feed, was only 271 pounds. The cost of production was also the greatest that year. The kind of feed has little, if anything, to do with the yield, so long as they get the required amount of nutrients in the right proportion and in palatable form.

We get, he says, as much out of fodder corn as we do out of silage, and as much from a pound of protein in bran as we get in any other grain. Give just a trifle more milk when receiving some succulent feed, such as roots and silage, but practically the same amount of butter or other milk solids. We select the cheapest foods, and so mix them that the cow gets one pound of digestible protein to six of carbohydrates and fat equivalent. If we should feed a wider ration—that is, one that contained more carbohydrates and fat equivalent than the amount above stated—she would gradually lay on fat, shrink in milk, and failure to breed would likely soon follow. But when the above-mentioned nutritive ratio is maintained no such difficulties are encountered. Our records show that changes in feed during the winter are objectionable, as changes always cause shrinkage in milk. A more uniform flow is maintained by feeding the same ration all winter, if possible. If it becomes necessary to make a change, it should be very gradual, so the system can adjust itself to the variation in bulk and the muscular action required by the stomach to digest that particular ration.

Remedy for Kicking Cow.

We have noticed several remedies in the ADVOCATE recently for kicking cows, and have decided to let ours be known to your readers, which is as follows: Take a common spring leading ring for cows, and after putting it in the nostrils (of course, have a rope attached to it), tie her head to something in front of her. If she continues to kick, tighten the rope until she stops. If you have no ring, have one person insert his finger and thumb in the cow's nostrils, firmly squeezing them together, while another person milks her. We have never known this remedy to fail; besides being simple, the use of it will not injure the animal.

Huntingdon Co., Que. GILLIES BROS.

Keeping Milk in Summer.

Many creamery and cheese-factory patrons are unable to keep milk sweet longer than 18 hours in hot weather, and either feed the milk on Saturday night and Sunday morning or else set it and make butter for family use. They are not properly equipped for making butter, and most of them do not secure nearly all the butter-fat from the milk, while at the same time, as it only comes once a week, the work is a nuisance.

The Manhattan Creamery is 1½ miles from the college dairy, and during the summer of 1898 our milk was hauled to the creamery by a neighboring farmer who handled a milk route, the college milk receiving exactly the same treatment while on the road as that given the milk from the neighboring farms. We had a creamery room which cost us $100, and was fitted with a cement floor and ice box; but farmers who had difficulty in keeping their milk said that they too could keep their milk if they had such a place, but that the average farmer could not afford the expense. We therefore abandoned this room and built what one of our farmer boys called an "every-farmer-can-afford-it" milk house. We set some posts and nailed to them old fence boards, making a room 10 by 10 by 10 feet, with a dirt floor. As the old boards could not be set close enough to keep out either sun or rain, we covered them with building paper. This building, if made of new material, would not have cost over $10, and did not cost us over $5. The room was built around a well. We had a windmill, but did not use it, as we wanted to keep milk under conditions where a farmer could not afford one. For tanks, in which to set the cans of milk, we used oil barrels, sawing them in two. We also took a half barrel and boxed it in, packing the spaces with wheat chaff. This box was covered with quilts made from bran bags. The frontispiecegives exterior and interior views of this milk house. The only apparatus used not generally found where milk is handled cheaply was a milk cooler. At different times we used patent milk coolers.

In handling this milk the care was taken that previous experience had taught us was necessary for keeping milk under any conditions. Every utensil touched by the milk was thoroughly washed and then sterilized with scalding water. If even a small quantity of dirt is left in the seams or corners of pail, strainer or can, it supplies an abundant source of the bacteria which cause milk to sour. No matter how clean the milker's hands seemed to be, they were washed in hot water just before milking to destroy all milk-souring germs that might be in the dust or dirt on them. The sanitary milk pail was used. This pail has a cover into which a six-inch opening is cut. In this opening fits a removable strainer. The milk is milked directly into the strainer, and the cover keeps out of the milk the fine dust which falls from the cow's body during milking. This dust is full of the bacteria which sour milk. When the milker sat down to milk, he wiped the cow's udder with a damp cloth to remove as much dirt as possible and dampen the rest so that it would adhere to the udder and not fall into the milk. The milk was strained into 40-quart cans, and as soon as a can was filled it was taken to the milk room, where it was immediately cooled to 60° to 62° by passing over a milk cooler. The cans containing it were then placed in the half barrels, and these barrels filled with freshly pumped water and barrels and cans covered with bran bags. The water was changed morning and night. With this treatment, and without ice, milk was kept and delivered regularly through our hottest Kansas weather in good condition to the creamery when 40 hours old, the time required to hold Saturday night's milk for Monday's delivery at the creamery; and much of the time we were able to keep the milk in good condition 52 hours, the time required when Saturday morning's milk is kept for Monday's delivery.

We believe that this trial, extended through the summer, proves that any farmer in the State can deliver milk in good condition to the factory in the hottest weather, and deliver Sunday's milk as well as that of other days. Most farmers can afford very much better conveniences than we had, and those who can will be able to handle their milk with less labor than we had to use.

The sooner milk is cooled after being drawn from the cow, the longer it will keep. The usual way to handle milk is to set the cans containing it in a trough of cold water and stir occasionally until the milk becomes cool. It may be an hour or two before the milk in the center of the can becomes thoroughly cooled, and all this time the milk-souring bacteria are developing rapidly. In these machines cold water flows through the interior, while the milk flows over the outside in drops, each drop being quickly and thoroughly cooled. The saving in labor over the usual method of stirring will soon pay for the cooler, while the quality of the milk is made much better. With coolers the milk is aerated while being cooled. This removes the "cowy" odors from it.

We found in hot weather that the temperature of our milk rose 10° while on the way to the creamery, and that some farmers were delivering milk as high as 97°. Milk should be kept as cool as possible while on the road, and ought not to be over 70° when delivered at the creamery. If it is, the quality of the butter from it will be injured and the creameryman will have to pay a lower price for butter-fat.—*Bulletin No. 88, Kansas Agricultural College.*

The Coloring of Butter.

To existing differences of opinion on this subject there seems to be no limit, and we may pretty confidently conclude that such differences will be perennial until, haply, the Legislature puts an extinguisher upon them by prohibiting the use of artificial coloring matters altogether, not in butter only, but also in cheese, in milk, and in margarine. The use of some kind of pigment in buttermaking, to deepen the golden tint which is so much liked, is an ancient practice, and, like almost all other ancient customs, is dying hardly, slowly, reluctantly.

To condemn such a time-honored practice—a practice which is harmless enough in respect to health, and not without its practical side—is a somewhat difficult and ungracious thing to do. Fortunately, there is but little need to go in for hostile condemnation on grounds of sentiment, and we may argue against it, instead, on the ground of its being a deception—absolutely innocuous, if you will, on hygienic grounds—and on that of expediency. In the old days, which some of us are old enough to remember, the coloring of butter was perfectly harmless, and even excusable; but in those days the coloring matter was simplicity itself, and—which is still more cogent—there was no competitor in the form of margarine.

Well do I mind the time, long ago, when I was a lad, seeing the dairymaid scraping and grating carrots in order to use the juice in coloring her butter—at all events in winter time. Only that part of the carrot—the outer circumference of it—which contains the desired pigment was used, the pale-tinted core being useless for the purpose. The juice was pressed out and mixed with the cream in the churn, and eventually the pigment of the carrot was incorporated in the butter.

It may, perhaps, be taken for granted that carrot juice, as coloring matter in the manipulation of butter, is unexceptionable. Possibly the same result might be obtained by giving carrots to the cows to eat, in which event it would be not only unexceptionable, but highly commendable. The only trouble is that it would take too many carrots that way.

We know not what some of the modern and really effective "butter colors" contain in the form of color pigments beyond the annato of years ago—if, indeed, they do actually contain anything else, and this we do not intend to insinuate; but in any case it may be taken for granted that these "colors" are prepared with care on scientific lines, and that nothing injurious to health appertains to them. For all that, however, none of us would intentionally employ annato for the love of it as an article of food, though all the while we know that, taken in infinitesimal quantities, and incorporated with such diet as butter, it can do us no harm.

But we are bound to consider, when all else is said and done with, that artificial coloring in butter, even when that color is only carrot juice, is used with intent not so much to deceive as to persuade customers. There is, in point of fact, no intention or charge of deceit, *per se*, inasmuch as everybody knows, or ought to know, if he is to be reckoned as an intelligent being, that butter is generally colored artificially, to some small extent, whenever Nature falls short of her usual custom in that respect. But how about the thousands of housewives in towns and cities who are scarcely expected to know anything definite about these wiles of the dairymaid, but who still use butter which they buy from the dealers?—butter which they choose commonly enough, because of its persuasive color, and not at all on account of that less obvious property known as "quality."

We may benevolently sum the whole point up in this way—butter is artificially colored, wherever it is naturally too pale, not to deceive people, but to persuade them to buy. We will allow that the butter is none the worse because of the coloring pigment that has been put into the cream, but for all that it would be less attractive to the eye if not so colored. No doubt it is true that the food given to a herd of dairy cows may be readily made to contribute, even in winter, enough color to the butter to serve the purpose with customers. This, I say, may be done readily enough with a herd of cows from whose mixed milk the butter is made, and especially so when fresh cows are now and again coming into profit through the winter; but there are individual cows in almost every herd whose milk, used alone, will not produce butter that is deep enough in color to attract customers all the year round. One or two of these do not, however, count for much in a herd of five-and-twenty.

The chief reason why the question of coloring butter artificially is being so much discussed at times, in these days, is the advent of margarine as a competitor of butter. Margarine, as many of us are fain to believe, would stand a poor enough chance in the market against butter if it were not colored in imitation of butter; and it is this fraudulent point in margarine that has made people critical as to the moral right or wrong of coloring pale butter to make it look rich. Granted that it is a fraud on the public to color margarine to resemble butter, the question arises, How far is it defensible to color inferior butter to resemble superior butter? And out of this arises the further question, How can we fairly demand that margarine people shall desist from using coloring matter, while buttermakers are allowed to use it as freely as they like?

This, indeed, seems to be the crux of the whole thing as far as rival disputants are concerned. The