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COMMON DIFFICULTIES IN  
FARM DAIRYING, THEIR  
CAUSES AND REMEDIES

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# COMMON DIFFICULTIES IN FARM DAIRYING, THEIR CAUSES AND REMEDIES

By CHAS. N. SHEPARDSON

While milk and milk products are almost universally used and while practically every farm produces some milk, there are many conditions constantly arising which cause trouble. Frequently this trouble is due to a lack of knowledge as to the cause and remedy for the condition. It is the purpose of this bulletin to explain some of these causes and remedies. Most of the conditions herein discussed are compiled from letters received at the Colorado Agricultural College from farmers thruout the state.

## Why Fat Tests Vary in Milk

Variation in the test of milk and cream probably causes more arguments between the producer and the distributor or manufacturer than any other one thing. There are many causes of variation in the fat content of milk. Some of these are well understood but many of them are not.

**Breed.**—Practically everyone realizes the difference in test of the milk from different breeds. The average test of the common breeds is as follows:

Breed	Percent Fat
Jersey . . . . .	5.23
Guernsey . . . . .	4.95
Shorthorn . . . . .	3.78
Ayrshire . . . . .	3.67
Holstein-Friesian (B. A. I. Bul. 156) . . . . .	3.35

**Individual.**—It is equally well known that different individuals of the same breed may differ in test to a marked extent. In the college Holstein herd with which the author is familiar, the high cow has a yearly average test of over 4 percent while the low cow has an average of 2.9 percent, illustrating the wide variation in individuals.

**Stage of Lactation Period.**—In the first few days after calving the test increases slightly. It then runs fairly constant with only a slight decrease until the last three or four months when it increases quite rapidly and at the end of the period it is higher than at freshening. Due to this fact, the freshening of several cows in the herd will cause a marked falling off in the test. This change is more noticeable and causes more trouble than the increase in test. The increase occurs gradually and on decreasing amounts of milk while the decrease occurs rather suddenly with the addition of a large amount of low test milk from the fresh

cows. In general, it may be said that the more milk a cow gives the lower the test is likely to be.

**Feed.**—Opinions as to the effect of feed on the test vary widely. However, it is generally agreed that it is impossible to increase the fat production materially and permanently and at the same time maintain the flow by change of feed. If the cow is being underfed, giving her a proper ration will naturally increase the yield, but simply changing the feeds of a balanced ration will not affect the fat yield. The quantity of milk and the percentage of fat may be changed by the addition of succulent feeds. The increase in milk flow and the decrease in test during the spring months when the cows first go on pasture is the most common illustration of this fact. The feeding of wet beet pulp causes similar changes as shown by observation of a number of dairies in a sugar-beet territory when beet pulp is added to the ration in the winter. A striking illustration of this has just come to the attention of the author.

A farmer selling milk to the college dairy received a test of 3.4 percent in the second week of February on a daily production of 230 pounds of milk. On February 15 he started feeding beet pulp with the result that his production for that week went up to 245 pounds per day but the test dropped to 2.9 percent. The following week he discontinued the use of beet pulp and his test went back to 3.5 percent with a production of 220 pounds daily.

**Season.**—Some change in test is due to the season of the year. Tests are lowest in the spring and highest in the early winter. The cause of this change is not definitely known. The fact that the test usually begins to fall off before turning on pasture would seem to indicate that it is independent of the feed.

It will be readily seen that a combination of the three foregoing causes may make a very material change in test. A number of fresh cows in a herd turned on green pasture in April may show a drop of as much as one percent from the March test. This decrease, which is usually not understood by the farmer, causes dissatisfaction and suspicion of the man doing the testing, whereas he really has nothing to do with the change. While certain conditions may make it impractical, in general it may be said that fall freshenings, so as to have the peak milk production at the time of high tests and high prices, will be more profitable than the present all-too-common system of having cows freshen in the spring.

**First-Drawn and Last-Drawn Milk.**—The first milk drawn is very low in fat while the strippings may test 8 or 9 percent

and sometimes even higher. This simply points out the necessity of milking a cow dry. Failure to strip a cow causes a far bigger fat loss than the corresponding loss of milk would indicate.

**Time of Milking.**—Milk usually tests higher after a short interval between milkings so that if a cow is milked at 5 a. m. and 6 p. m. the morning milk will test higher than the night milk. If, during the winter, the hours are changed to 7 a. m. and 4 p. m., the night milk will test higher. This affects the test received from the milk plant, for the milk used at home is nearly always taken from one milking and the plant test will depend on whether it is the high or low-test milk that is kept out.

**Sickness.**—Any unusual physiological condition will be apt to cause a change in test. This may be either higher or lower than usual.

**Age.**—Age of the cow ordinarily has little or no effect on the test of her milk tho there may be a slight decrease after the sixth lactation period.

**Miscellaneous.**—Other factors that may cause a variation in test are weather conditions, flies, excitement, very cold drinking water, lack of water, etc. Usually these cause a falling off in quantity of milk and in most cases an increase in test of the milk.

### Why Fat Tests Vary in Cream

Variations in cream tests are also due to a number of causes. Everyone using a separator knows that changing the milk or cream screw affects the test of the cream. However, the complaint is frequently heard that the test varies even when the separator is not changed. This variation may be due to any of the following causes.

**Temperature.**—Milk separated when cold loses more fat in the skimmilk and is apt to give less cream of a higher test. Allowing milk to stand in a cold barn or milk room for several hours before separating is a common occurrence and its effect on the test is frequently not understood.

**Speed of Machine.**—The faster the machine is run the higher the cream will test and the smaller the quantity of cream will be. This variation is usually due to different people running the separator. If a man has been turning it right along and then for any reason he has the boy turn it, it is very probable that the boy will not keep it up to speed and the result will be a low-test cream.

**Test of Milk.**—A separator works on a purely mechanical basis taking a certain proportion of the whole milk as cream. If it is set to deliver 10 pounds of cream from 100 pounds of milk,

it will, under the same conditions, give that proportion regardless of the milk test. Then, if we are separating 4-percent milk, the cream will test approximately 40 percent, assuming that we disregard the fat loss in the skimmilk. However, if the milk test drops to 3.5 percent as it may frequently do, the cream will only test approximately 35 percent even tho all other conditions remain the same.

**Vibration of Machine.**—The separator should be set on a solid and level floor and loose bearings should be taken up or replaced, as any vibration of the bowl will cause variation in the cream test and increased losses in the skimmilk.

**Amount of Flush Water.**—Frequently the flush water is allowed to run thru into the cream can. Naturally this dilutes the cream somewhat and if the amount used varies from day to day, the dilution will also vary and the test of the cream will be affected accordingly.

The foregoing are the most important and most common causes of test variations. While creamery men are not infallible, the farmer will usually find that variations in his test are due to one of the foregoing conditions rather than to error or unfairness on the part of the creamery man.

### Defects in Flavor and Physical Condition

There are numerous flavor defects or objections. Many of them overlap somewhat and some of them may be due to more than one cause. In general these defects may be divided according to causes as follows: (1) **feed flavor**, (2) **condition of the cow**, (3) **contaminated utensils or surroundings**, (4) **other bacterial causes**. All of these off flavors can be detected in the milk and many of them are carried over to a noticeable extent in the cream and in the butter made from it.

With the exception of the feed flavor, many of the undesirable flavors are accompanied by physical changes which may cause difficulty. As these are so closely related, the flavor and accompanying physical changes will be discussed together.

**Feed Flavors.**—There are many objectionable feed flavors. The most common are beet tops or beet pulp, rye pasture, dandelions, clover, turnip, and cabbage flavors. These present a problem because they are all feeds that may be profitable or desirable to use. In addition to the above there are many undesirable flavors due to weeds such as wild onions, garlic, milkweed, etc. It has been found that all of these flavors can be eliminated from the milk by removing the cows from the undesirable feed three or four hours before milking. For example, if it is desir-

ed to pasture beet tops, this may be done by turning the cows in the field immediately after milking and then taking them up four hours before the next milking and putting them in another pasture or corral.

The pasture-grass flavor is usually only temporary, lasting for two to four days when the cows are first turned on pasture. This is a characteristic bitter, grass-like flavor. In most cases it passes off without being noticed. Occasionally, however, it may persist for several weeks or even thruout the pasture season. This condition occurred with the college herd in the summer of 1925 and continued until August making it necessary to handle the herd as above described for other obnoxious flavors. The same condition occurred again in the spring of 1926. After considerable investigation it was decided that dandelions were the probable cause of the trouble. The herd was moved to another pasture free from dandelions and the trouble disappeared.

**Advanced Lactation.**—Changes in the milk due to the physiological condition of the cow are varied and irregular. The most common is the change occurring late in the lactation period. In large herds this condition frequently passes unnoticed unless an exceptional number of cows go dry at the same time. But, in the small herds, particularly those of four or five cows or less, the condition becomes a serious one. The milk may have a rather salty or bitter flavor which frequently produces a strong flavor in butter made from the cream.

The physical condition of the milk at this time is usually the cause of more difficulty than the flavor. Toward the end of the lactation period the fat globules become unusually small. This causes the cream to be very slow in raising and in extreme cases the milk may show no cream line at all. When such milk is run thru a separator the loss of fat in the skimmilk is very apt to be higher than normal.

Frequently, attempts are made to churn this cream. In the creamery the condition is not noticeable because the cream is mixed with large enough quantities of good cream to mask the defect. If it is churned at home, the defect is very apparent as many have found out after churning several hours without getting any results.

There is no remedy for the situation except to wait until the cow freshens again. In the meantime it will be better to send the cream to the creamery rather than attempt to churn it at home.

**Excitement and Over-exertion.**—This also may cause a bitter or salty flavor in the milk. It results from running a cow to the point that will bring out perspiration and then milking her. This may be done by dogs or it may be done thoughtlessly in driving the cows up from the pasture. The same result has been noticed in milk from cows that are beaten with shovels, forks, milking stools, etc. All such practices are detrimental to the cow and to the production of an ample supply of good milk.

Fever, heat period, and other forms of sickness cause numerous variations in the milk. In general, milk from diseased cows should not be used until the diseased condition is entirely removed.

**Udder Infection.**—This most commonly causes ropy or gargety milk, a condition distinct from the ropy milk due to outside bacterial contamination which will be discussed later. Gargety milk is ropy or stringy as it is drawn from the udder and may also be bloody. It is very apt to be a source of infection for septic sore throat. The remedy must come thru clearing up the condition in the udder. If the case does not yield readily to home treatment a veterinarian should be called to clear it up and prevent its spread thru the herd. A few precautions should be taken by the milker to prevent the spread of the condition even tho a veterinarian is not called. A cow suffering from garget should always be milked last in an old bucket and the milk disposed of. If she is milked ahead of other cows, some of the milk may get on the hands of the milker and be carried to the rest of the herd. Likewise, milking her out on the ground leaves a pool in which some other cow may lie down and pick up the infection. This is particularly true in the case of a cow with only one bad quarter. The milker frequently sits down to milk drawing the good milk in the pail and that from the bad quarter on the ground. Such practice is not only unsanitary but is actually dangerous to the rest of the milk into which it may spatter and to the other cows in the herd who may pick up the infection from the floor.

Bloody milk may also result from udder injuries. In the case of true bloody milk, the red color appears thruout and is present at time of milking. This is not to be confused with red milk due to bacterial action which will be discussed later. True bloody milk is commonly due to a bruise causing rupture of some of the small blood vessels in the udder. Such milk is not necessarily dangerous, tho most people prefer not to use it. The condition, unless very serious, will usually clear up in a short time.

**Unclean Utensils.**—Unclean utensils are a possible source of contamination for all kinds of bacterial changes. In addition to

this, however, they are the cause of a typical unclean, greasy flavor, perhaps crudely but adequately expressed as a "dish-rag" flavor. This condition is entirely due to carelessness and is not to be excused. All utensils should be thoroly washed, rinsed and scalded or steamed after each using. Utensils with cracks, dents, open seams, rough spots, etc., should either be repaired or discarded as such places are very difficult to clean properly.

Frequently, the rapid deterioration of ranch butter is due to the above condition. In dirty and rusted utensils, some of the metal may be absorbed by the milk or more particularly by sour cream. The metal thus absorbed in the cream, acts as an oxidizing agent and hastens the development of rancid, fishy and other undesirable flavors in butter.

**Unsanitary Surroundings.**—Milk and all its products should always be kept in clean sanitary surroundings. Allowing the milk to stand in the stable, feed room or other place where barny, cowy, or feed flavors and odors may be absorbed, is a dangerous practice for milk picks up flavors and odors readily, and allowing it to stand in the stable for half an hour may give it a decided barny odor.

Cellars or other places that are apt to be damp and mouldy cause the development of a distinct mouldy condition in the cream. Do not make the mistake of thinking that the cellar is a good place to hold cream, just because it is cool. Some cellars may be perfectly clean and dry but most of them are not.

The yeasty condition which causes "boiling" of the cream in summer is due to holding the cream at too high a temperature. This favors the fermentation by yeasts which are always present. A suitable holding tank where the cream can be set in fresh, cool water is most desirable. In some cases, where there is an irrigation ditch handy to the milk house, a very simple and satisfactory arrangement can be made. A box is built into the ditch in such a manner that the water will flow thru it and around the cans of cream which are placed in it. In connection with holding the cream it should be remembered that each batch of cream should be cooled thoroly before adding to the can and that the whole canful should be stirred after each addition. This will prevent the formation of layers with an uneven souring and will give a smooth uniform cream of much better flavor.

The bitter flavor occasionally found in cream in the winter time is due to holding it for long periods of time at low temperatures. Under these conditions the souring organisms fail to grow but in their place we find the development of organisms which cause a breaking down of the casein with a resulting bit-



ter flavor. This is the first stage of decomposition which only requires time to go to a point where it is actually rotten. To avoid this, cream should not be held over one week and preferably not over four days.

**Other Conditions Due to Bacteria.**—In general it may be said that all abnormal conditions due to bacteria from outside sources develop some time after milking.

Much of the ropy milk is due to organisms of this class rather than to udder conditions previously mentioned. There are several of these organisms but the most common one is found in stagnant water. Cows having access to stagnant pools frequently pick up these organisms on the flanks and belly and from there, they drop into the milk. This accounts for the frequency of this condition in the late spring during flood season. The high water gets over into meadows along the river and when the water goes down it frequently forms pools in the low places which soon become stagnant and make an excellent medium for the growth of these organisms. Careful cleaning of the cows and sterilization of all utensils will remedy this trouble. Sometimes the barn also must be disinfected.

Colored milk is not common, tho we occasionally see cases of red, yellow and blue milk due to bacterial action. In such cases the color is apt to appear on the surface in spots, twelve to twenty-four hours after milking. Cleanliness and sterilization of utensils is the best remedy.

Sweet curdling of milk or the formation of curd before the milk sours is a condition found only occasionally. This is also due to bacterial action and calls for sterilization and other sanitary measures.

Thunder storms in themselves do not cause souring of milk. Just previous to a thunder storm, it is usually very hot, with a heavy atmosphere. This condition is particularly favorable to the souring of milk that is at all susceptible and the growth of the milk-souring organisms is so rapid that it may apparently pass from sweet to sour in a very few hours. Hence milk which was sweet at noon may be sour at supper time and the thunder shower is blamed for the difficulty.

### **Whipping Cream**

The use of whipping cream is becoming more and more common. To whip successfully, cream should be rich in fat, testing from 30 to 35 percent. It should be 24 hours old and should be kept at a temperature of 50 degrees or lower, preferably around 40 degrees. Usually, no trouble is experienced with the

first two factors. Frequently, however, the cream is not cold enough, in which case it may churn to butter or if it does not do this, the cream will be so weak bodied that it soon becomes liquid and will not stand up on the plate when served. To whip properly, cream must have sufficient viscosity to incorporate and hold a large proportion of air and this can only be done by due attention to all the above conditions.

### Churning Difficulties

Questions are frequently received as to the cause of difficulty in farm churning. Sometimes the trouble may be due to the cream as discussed under Advanced Lactation. There are a number of other factors, however, which may enter in.

The temperature of the cream should be controlled so that the butter will come in 45 to 50 minutes. If it takes longer than this, it involves unnecessary labor and when the butter comes it is apt to be in fine hard granules many of which will pass thru the strainer with the buttermilk causing a high fat loss there. If the cream is too warm, the butter comes quickly but in a soft greasy condition. Such butter will have a poor body and, as it is difficult to wash thoroly, it may have poor keeping quality. The proper temperature will vary with the season. Temperatures of 50 degrees to 52 degrees Fahrenheit will be about right in summer. In cold weather this may be increased to 58 or 60 degrees and in some cases even to 62 degrees. The time that the cream is held at churning temperature and the warmth of the room in which it is churned both have an effect on the most desirable temperature.

Sour cream ordinarily churns easier than sweet cream, other factors being equal. However, cream that is too sour will give a butter of very poor keeping quality.

The fullness of the churn is another factor in the length of churning. The churn should be one-third to one-half full. More or less than this amount decreases the agitation of the cream and increases the time required to churn.

The speed of the churn should be such as to give the greatest agitation. It does not hasten churning to speed up the churn, as the cream will stay in one end of the churn and whirl it without agitation. Too slow a speed allows the cream to stay in the bottom of the churn while the churn itself runs around the cream.

The best test for churning cream is between thirty and thirty-five percent. Thicker cream is more apt to make soft butter while thin cream is more difficult to churn.

Care should be taken to allow gas to escape frequently at the beginning of the churning. If this is not done the gas pressure may cause foamy cream and prevent its proper agitation.

Where color is used, it should be added to the cream before churning to give a more uniform color in the butter.

After churning, the butter should be washed only enough to remove the buttermilk and the butter should be worked quickly and firmly and just enough to properly incorporate the salt. Playing with the butter, stroking it with the paddle and unnecessarily working it cause greasy, weak-bodied butter.

Flavor defects in butter are chiefly due to off flavors in the cream or to dirty utensils, both of which have already been discussed.

### Conclusion

In general, it may be said that most of the difficulties experienced in all dairy products on the farm come from lack of proper cleanliness and sanitation. Clean cows, clean utensils, clean handling rooms and proper cooling facilities will eliminate most of the common troubles, particularly those that have to do with flavor and odor.