

Common Causes of Variation in Butterfat Content of Milk and Cream

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MILK AND CREAM are usually bought and sold on the basis of per cent of butterfat contained. Butterfat content is measured by the Babcock test, a simple test which when properly done offers little chance for error.

It is natural for some variation to occur in the butterfat content of milk and cream from a herd of dairy cows, and therefore in the "test" of the milk or cream. The purpose of this circular is to explain the more common causes of this variation.

Reasons for Differences in Milk Tests

Breed of cows in the herd

Percent of butterfat in the milk differs considerably from breed to breed of dairy cows. Usually Jersey milk is richest in butterfat and Holstein milk contains the least. The butterfat *content* of the milk of the leading dairy breeds ranks in the following order: Jersey, Guernsey, Ayrshire, Brown Swiss, and Holstein. In amount of milk produced usually the ranking is exactly reversed. Therefore, little difference exists between the breeds in butterfat *production*. Obviously, if a number of Jersey cows are added to a non-Jersey herd the butterfat test of the milk produced will tend to rise. On the other hand, if Jersey cows are replaced by Holsteins more milk will probably be produced, but the butterfat test will very likely be lower.

The individual cow

Cows of the same breed often differ considerably in the butterfat test of their milk. It is not uncommon for the milk of one Holstein cow to test 2.8 percent butterfat while that from another Holstein in the same herd, receiving the same feed and care, may test 4.0 percent. In the same way Jersey cows in the same herd normally may produce milk ranging from 4.0 percent butterfat to 6.0 percent or even more. This variation also exists within other breeds.

University of Kentucky • College of Agriculture and Home Economics, Extension Division • THOMAS P. COOPER, Dean and Director

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Stage of lactation

A cow shortly after freshening tends to produce milk relatively rich in butterfat. As she reaches her peak of milk production usually her milk tests lower in butterfat. As she nears the end of her lactation period and gradually drops off in milk production usually her milk becomes richer in butterfat. Plainly this is the reason why butterfat tests on each cow must be made at regular intervals in order to measure production properly, in the individual cow. A cow cannot be called a "high tester" or a "low tester" on the basis of one or two tests. If a considerable number of cows in the herd are "strippers" this contributes to a relatively high test of the milk from the herd. On the other hand, if a number of cows in the herd are in the "flush" of production, the average test of the milk of the herd may be somewhat lowered.

Condition of cow at time of freshening

If a cow is naturally a heavy producer and is in high condition when she freshens, her milk is likely to be especially rich in butterfat for one to three weeks after calving. As the flush of production approaches the butterfat test of the milk drops to normal.

Variation with the season of the year

The effect of the season of the year on the percent of butterfat in milk often is disregarded by dairymen. A lowering of the butterfat test often is noticed when the cows go on pasture in the spring. Later, as cool weather sets in, the average test of the milk of the herd rises. Often, it is assumed incorrectly that this is due to the succulent grass consumed by the cows. Much experimental evidence shows that the milk from the herd is richer in butterfat in the winter than in summer, probably because of the heat and high humidity during the summer. A lower test is especially noticeable in herds when many cows freshen in the spring. Such cows are in their low-testing stage of lactation during the warm weather.

Daily variation, and variation between milkings

Considerable variation occurs in the butterfat test of milk from individual cows from day to day and even between milkings the same day. Little is known as to the cause of this variation. These differences are of little importance when the test of the milk from an entire herd is taken into consideration. They do, however, suggest the importance of continued sampling and testing at regular intervals, in measuring the normal fat content of milk produced by individual cows.

Length of time between milkings

When the herd is milked at irregular intervals there is a slight tendency toward a higher test at the milking following the shortest interval. When the lapsed time between milkings is exactly the same

there should be little difference in the average test of the milk produced by the herd, if everything else is normal.

Completeness of milking

Last-drawn milk (strippings) often tests 8 or 9 percent butterfat, while first-drawn milk often contains only $1\frac{1}{2}$ to 2 percent. Cows often fail to "give down their milk" to strangers or inexperienced milkers. Unusual noise, abusive treatment, the presence of dogs, or extreme exposure may have the same effect. The result is an incomplete milking and a low butterfat test due to withholding the rich last-drawn milk.

Influence of exercise

Milk from cows kept in stanchions for several weeks and then allowed moderate exercise has been found temporarily to be 0.2 to 0.3 percent richer in butterfat. Such moderate exercise, however, should be free from undue excitement.

Effect of feed

Contrary to the opinion of many practical dairymen, neither the kind of feed nor the method of feeding affects more than very temporarily the test of the milk. Feeds, however, that make a cow sick and feverish, may greatly lower production and affect temporarily the butterfat test of the milk.

Miscellaneous causes of slight variation

Any illness may cause a decrease in milk production and variation in butterfat test. Milk from some cows tests higher during heat periods than at other times. This condition has little effect on the butterfat test of the milk of the herd because so few cows are in heat at any one time. Advanced age of cows has a very slight tendency to lower the butterfat test of milk.

Condition of the milk

Milk which is slightly sour, churned, or frozen may contain fine curd particles or butter granules. A truly representative sample for testing cannot be taken from milk in such condition.

Reasons for Differences in Cream Tests

Separating cream by any other method than with a centrifugal cream separator results in a loss of 10 to 20 percent of the butterfat.

Richness of the milk

Factors which affect the test of the milk also affect the test of the cream. A separator delivers approximately the same quantity of cream from a given quantity of milk regardless of the test of the milk. The difference is in the test of the cream. A separator adjusted to deliver

40 percent cream from 5 percent milk will deliver approximately 32 percent cream from 4 percent milk, when operated in exactly the same manner.

Temperature of the milk

As milk cools it becomes increasingly difficult to separate it efficiently. Cold cream does not flow so readily as warm cream, and is inclined to clog the cream opening. This results in a smaller amount of richer cream and a loss of butterfat in the skimmilk.

Operation of the separator

Adjustment.— A properly adjusted and operated cream separator delivers skimmilk testing less than .02 percent of butterfat, which is negligible. By adjusting a simple device in either the skimmilk or cream opening, the operator can control the *amount* of cream or skimmilk delivered by the separator. The result may be richer cream and more skimmilk, or vice versa, regardless of the test of the milk of the herd.

Speed of the machine.— Separators are designed to operate at a certain speed. Slower speed results in a larger volume of thinner cream and a loss of butterfat in the skimmilk. Higher speed causes a smaller volume of richer cream and more skimmilk.

Rate of inflow.— Usually this is regulated automatically by a float. If for any reason the rate of inflow is too slow the result will be a richer cream. If the separator is fed too fast the milk is forced from the bowl before the centrifugal force has been sufficiently applied and the result will be lower-testing cream and loss of butterfat in the skimmilk.

Vibration of separator bowl.— Worn bearings, an unbalanced bowl, or failure of the separator to be properly leveled may cause the bowl to vibrate. This results in a lower-testing cream and a loss of butterfat in the skimmilk.

Cleanness of the separator bowl.— When separators are washed so infrequently that curd particles or separator slime partially clog the bowl, efficient skimming is not possible. A clogged bowl causes too much skimmilk to be forced through the cream opening, which results in a low-testing cream.

Amount of flush-water used.— If the cream spout is allowed to drain into the cream just enough water should be used as a rinse to cause a very small amount to come from the cream spout. It will greatly reduce the chance for variation in the butterfat test of the cream if the same amount of water is used each time.

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