

University of Kentucky—College of Agriculture
EXTENSION DIVISION

THOMAS P. COOPER, Dean and Director

Circular No. 251

December, 1931

Published in connection with the agricultural extension work carried on by cooperation of the College of Agriculture, University of Kentucky, with the U. S. Department of Agriculture, and distributed in furtherance of the work provided for in the Act of Congress of May 8, 1914.

Variation in the Butterfat Content of Milk and Cream

By FORDYCE ELY

Milk and cream are usually bought and sold on the basis of the percent of butter fat they contain. This is determined by the Babcock test, a simple routine laboratory operation which when properly conducted offers little opportunity for error.

It is natural for variations to occur in the butterfat content of milk from a herd of dairy cows. Frequently dairymen fail to realize that certain conditions normally tend to increase or decrease the butterfat content of milk and cream. Failure to recognize these conditions often leads to a lack of confidence between buyer and seller and sometimes an unjustified change in patronage. The purpose of this circular is to explain some of the common causes of the variations in the butterfat test of milk and cream.

FACTORS INFLUENCING THE PERCENT OF BUTTERFAT IN MILK

1. The breed of the cows in the herd. Considerable variation exists in the percent of butterfat in the milk from cows of different dairy breeds. 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 and Holstein. In the 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 herd the butterfat test of the milk produced will have a tendency to rise, whereas, if Jersey cows are replaced by Holsteins, a larger volume of milk of lower butterfat test will result.
2. The individual cow. It is the rule rather than the exception

021967

for differences to occur in the butterfat test of milk from individual cows within a breed. 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 varying from 4.0 percent butterfat to 5.0 percent or even more. This variation also exists within other breeds and is an inherited characteristic.

3. **The stage of lactation of the cows.** A cow, shortly after freshening, has a tendency 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.

4. **The condition of the cows 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 during a period of one to three weeks after calving. As the flush of production approaches the butterfat test of the milk drops to normal.

5. **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, due probably to 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.

6. **Daily variation, and variation between milkings.** It is known that considerable variation in the butterfat test of milk from individual cows occurs from day to day and even between milkings the same day. Little is known regarding its cause. 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.

8610
19

Variation in the Butterfat Content of Milk and Cream. 3

7. **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.

8. **Completeness of milking.** Last-drawn milk (strippings) often tests 8 or 9 percent butterfat as compared with first-drawn milk containing 1½ 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.

9. **The influence of exercise.** The milk from cows which have been kept in stanchions for several weeks and then allowed moderate exercise has been found temporarily to be .2 to .3 of one percent richer in butterfat. Such moderate exercise, however, should be free from undue excitement.

10. **The effect of the 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. The use of feeds which induce a feverish, sick condition may greatly lower milk production and affect temporarily the butterfat test of the milk.

11. **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.

12. **The 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.

**FACTORS INFLUENCING THE PERCENT OF BUTTERFAT
IN CREAM**

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

1. **The 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 which is adjusted to deliver 40 percent cream

from 5 percent milk may be expected to deliver approximately 32 percent cream from 4 percent milk, when operated in exactly the same manner.

2. **The 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 skim-milk.

3. **Operation of the separator.**

Adjustment. A properly adjusted and operated cream separator delivers skim-milk testing less than .02 of 1 percent of butterfat, which is negligible. By adjusting a simple device in either the skim-milk or cream opening, the operator can control the *amount* of cream or skim-milk delivered by the separator. The result may be richer cream and more skim-milk, 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 skim-milk. Higher speed causes a smaller volume of richer cream and more skim-milk.

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 skim-milk.

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 skim-milk.

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 an excess of skim-milk to be forced thru 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 emerge 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.