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Variation in Butterfat Tests

GEORGE FISHER
Extension Dairyman

DARWIN ANDERSON
Student Assistant

In cooperation with the North Dakota State Dairy Department

Dairy plants and dairymen are continually asking questions about butterfat tests, including: Why do we see variations in butterfat tests? Why is there a difference between the DHIA average test and the plant test? What effect does feed have on butterfat test?

The following is an attempt to answer some of these questions for both dairyman and milk processor, because it is important for both parties to understand that fat tests do vary and that there is usually a reason for such variation.

Why Do Plant Tests and DHIA Tests Vary?

The DHIA test is of great value to the producer when properly used, but it should never be considered to be a true test on all milk produced in a month.

Why?

The DHIA supervisor collects one sample per month while the plant may take random samplings throughout the month. DHIA tests may be higher or lower than the plant tests because of a number of variables.

Temperature on test day can affect the fat test. Perhaps a more complete milking job was done on the day a sample was taken (those last strippings are high in fat). The manner in which cows are handled, possible inconsistency in milking interval on test day and the normal day to day variance in a cow's butterfat production all play a part.

In an Oregon University Jersey herd test over an 18-day period, the percent fat varied from as low as 5.4 percent to a high of 6.8 percent with only three of the 18 tests turning out the same.

Milk from fresh cows, medicated cows or "soon to be dried up" cows may be included in only one of the two tests and introduce variability. Different sampling, testing or reading methods within a range of error of the test by the parties concerned may be a source of variation.

Certain mechanically-caused losses from storage and hauling may result in a variation between plant and DHIA tests. Improper operation of the bulk tank may cause freezing or churning which will usually lower plant milk tests.

If the compressor of a direct expansion tank is started at first milking before the milk level reaches the agitator, a thin layer of unnoticeable ice may develop, which can affect milk tests. Also, if the bulk tank isn't started before the second milking, small chunks of protein and fat may freeze onto the sides of the tank.

Churning is caused by excessive agitation at temperatures above 45 degrees and will cause a milk fat loss. The tank should keep the blend temperature below 45 degrees to avoid this loss.

What Affects a Cow's Fat Test?

Fat tests vary among breeds. Average breed fat tests are: Holstein, 3.5 percent; Ayrshire, 4 percent; Brown Swiss, 4.1 percent; Guernsey, 5 percent and Jersey, 5.4 percent.

Inheritance, transmitted from the cow's ancestors, establishes a ceiling of the cow's producing ability and butterfat test.

Condition affects fat tests. Cows which are fatter at calving time have higher initial fat tests. Cows in poor condition will tend to have lower tests regardless of stage of lactation.

Age of the cow is another factor. Tests tend to slightly decline as the number of lactations increases, probably due to higher susceptibility to fat-limiting diseases such as mastitis or ketosis.

Any excitement, such as that caused by a heat period, or any abnormal milking conditions such as roughness or a new herdsman can cause an improper milk letdown and incomplete milk removal which will lower the fat test.

Cool weather below 40 degrees will increase fat while weather above 70 degrees can result in a de-

Cooperative Extension Service
North Dakota State University
Fargo, North Dakota 58102

crease of 0.1 percent in milk fat for each 10 degree rise in temperature. If the temperature is so high that feed consumption and milk production is reduced, however, milk fat may increase.

How Can Feed Affect the Milk Fat Test?

To function normally the rumen requires the bulk and fiber furnished by forage. Forage stimulates chewing and rumination, which increases the secretion of saliva. The saliva provides a buffering action in the rumen. In the normal rumen, microbes tend to produce acetic acid from forage and proprionic acid from grain (starches).

The mammary gland uses these end products of rumen fermentation as energy sources for making milk. The acetic acid—derived from forages—is used for milk fat production.

When low amounts of forage are fed, the feed moves through the rumen faster, rumination is decreased and the rumen becomes more acid. The normal acid balance is changed so more proprionic and less acetic acid is produced. Lowered acetic acid can cause lower butterfat tests since it is used by the mammary gland to produce about half of the fat in milk.

The increased proprionic acid—derived from grains—also appears to have an effect. It is converted into blood sugar in the liver. The higher levels of blood sugar stimulate the use of acetic acid for body fat, diverting it from the mammary gland. Increased blood sugar may also result in a lower level of fat and ketone bodies, which the mammary gland also uses to make milk fat.

Milk fat production is a complicated process, so changes in milk fat test due to ration are gradual. It takes about two to three weeks for the test to fall to its lowest level and equal time to recover if the ration is involved. Dairymen often overlook this time factor when trying to determine the cause of a low fat test or when attempting to correct the problem by changing the ration.

A Lower Fat Test May Be Normal

While good management and feeding practices stimulate more milk production and even more total fat, the percentage of fat tends to go down as milk production increases. Small declines in fat test are really normal during periods of maximum milk production in the herd.

Also, continued selection of cows and sires for high milk yield can result in lower fat tests. Selection for total milk increases total fat yield, but the percent of fat will gradually decline.

Normal fat decreases or test differences between breeds or differences due to heredity cannot be equalized by adjusting feed rations, but ration-related fat test problems can be corrected.

Feed-Related Causes of Lowered Fat Tests

Rations that lack sufficient fiber in proper physical form are the usual cause of decreased milk fat percentage. The fat and coarseness of the fiber in the ration are as important as the level of fiber. Specific practices and conditions that may cause problems are:

FORAGE CHOPPED TOO FINE: Increased mechanization of forage harvesting, storage and feeding on many farms has resulted in feeding of more finely chopped forages. The dairy cow is a ruminant and has an essential requirement for roughage. For the rumen to function properly and fat tests to remain normal, this requirement must be met.

TOO MUCH CORN IN THE RATION: The use of corn silage and corn grain has increased on most farms, along with increases in concentrate feeding. This means less fiber is consumed. Many farmers feed shelled corn with about 2 percent fiber rather than corn and cob, which has about 8 percent. When either dry or high moisture corn is fed with the cob, cows are forced to eat the cob, a good source of fiber for maintaining fat test.

THE COMBINATION: Modern feeding trends have resulted in both finely chopped forage and additional corn in the ration. Many declining fat test problems result from this combination of factors. The more corn in the grain mix and the more digestible the forage, the greater the chances for fat test problems.

EARLY SPRING OR LUSH FALL PASTURES: Early spring or lush fall pastures are common causes of lowered fat tests. The total plant has less fiber, and fiber intake is reduced even further when cows top graze and consume only the more digestible portions.

THE FEEDING SCHEDULE: The feeding schedule influences the amount of forage eaten. Cows fed large amounts of concentrates before forages are offered often fail to eat enough forages for normal rumen function.

PELLETED GRAIN MIXES: Frequently milk fat tests decrease 0.1 to 0.2 percent when a conventional coarsely-ground grain mix is pelleted, even if the mix is fed at normal levels and the cows eat adequate forage. Heat and pressure produced by pelleting alters the soluble starch, and this change can affect rumen fermentation and decrease fat tests.

Prevention Is the Best Cure

Since lack of fiber or fiber chopped too finely are the usual causes of decreased milk fat percentage, the most practical recommendation for maintaining a normal fat test is to provide an adequate intake of forage in the cow's daily ration.

Some thumb rules for total dry matter intake are: provide one-third of the total dry matter from long or chopped forage (longer than quarter-inch cut); feed 1 to 1½ pounds of hay or hay equivalent per 100 pounds body weight, depending on quality and length of forage and form of the concentrate fed; the total ration should contain a minimum of 15 to 17 percent crude fiber; and limit grain dry matter to a maximum of 2 to 2¼ pounds per 100 pounds of body weight.

It is important to determine if the cows usually eat the minimum suggested in these thumb rules. Offering sufficient hay will not maintain normal tests unless all cows in the herd eat the minimum amount.

Keep alert for the diet factors which can change milk fat test and prevent problems before they occur. Follow these rules: monitor the amount of forage and concentrate consumed with a critical eye for fiber content; be aware of the physical form of the forage—forage chopped too finely often contributes to low fat tests; examine the cows' ration to see how much total corn is consumed; feed about 5 pounds of dry hay or 10 pounds of low moisture silage before turning cows out to graze early spring or lush fall pastures; and check the feeding schedule to provide adequate forage before feeding large amounts of concentrates.

Ration Additives to Maintain Fat Test

Following preventive measures should avoid fat test problems. If the ration is causing lowered tests, the long-term corrective measures should be instituted. Some practical methods are available for a rapid change to correct a fiber imbalance, such as feeding additional hay, haylage, corn silage, ground corn cobs or other roughage so the total dry ration is at least one-third forage.

As a last alternative, mineral compounds can be added to the grain mixture to help correct low test due to rations.

Feeding sodium bicarbonate (baking soda) is only partially effective in maintaining normal test and will not increase test when fed with a normal ration. Its buffering effect helps prevent excessive rumen acidity. To be effective, .8 to 1 pound is fed per day. Most research shows that sodium bicarbonate is not palatable and decreases feed consumption.

Feeding sodium bentonite is also only partially effective in maintaining normal test and will not increase the test when fed with a normal ration. It is an inert clay mineral that swells in water to 10 to 15 times its original size. One pound per cow per day increases milk fat test to about 90 percent or normal. Bentonite is palatable and does not lower feed intake.

The addition of 10 percent delactosed whey to the grain mix, feeding .4 pound of magnesium oxide per day or a combination of sodium bicarbonate and magnesium oxide have also been suggested as beneficial.

Feed portion of this circular by Allen N. Bringe and Clarence Olson, Extension Dairymen, University of Wisconsin, Madison.

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