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Why Milk Tests Vary
Michigan State University Extension Service
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WHY MILK TESTS VARY

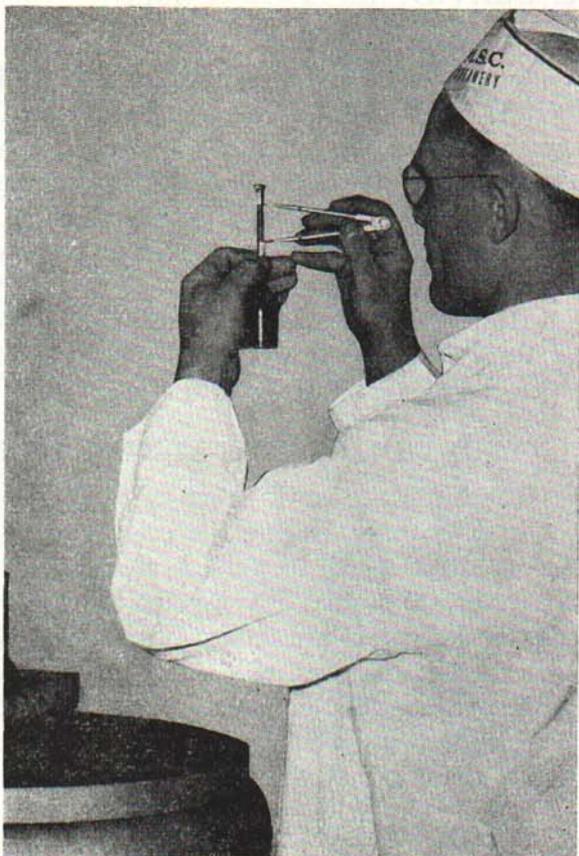
By G. M. TROUT and EARL WEAVER

Dairymen delivering milk to milk plants complain frequently of variations occurring in the milk tests. These variations often lead to dissatisfaction on the part of the patron. Too often they are responsible for a lack of confidence in the buyer, and a change in patronage results.

It is the purpose of this bulletin to explain the causes for some of the variations in the fat test of milk. The authors fully appreciate that unexplainable fluctuations in milk tests do occur and that many factors, some unknown, operating singly or in combination, do have a marked effect upon the percentage of fat in the milk.

1. THE BREED

There is a distinct difference in the fat



Reading fat tests is routine procedure in a milk plant.

MICHIGAN STATE COLLEGE
COOPERATIVE EXTENSION SERVICE
EAST LANSING

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content of milk from cows of different breeds. The average fat test of Jersey milk is slightly higher than that of any other breed. Milk from the Guernsey, Ayrshire, Brown Swiss, Shorthorn, and Holstein breeds ranks in its fat content about as in the order given. Milk from herds composed largely of Jerseys or Guernseys will test higher than that from herds composed largely of Holsteins.

2. INDIVIDUALITY OF ANIMAL

Milk from individual cows within a breed varies more in its fat percentage than the average milk from the different breeds. When the herd is composed of a large number of low-fat-testing cows, the average fat test of the herd milk will be low, and when it is composed chiefly of high-fat-testing animals, the average fat test of the milk will be correspondingly high. The introduction of a high-fat-testing cow into a small herd of low-fat-testing cows will slightly increase the average fat test of the herd.

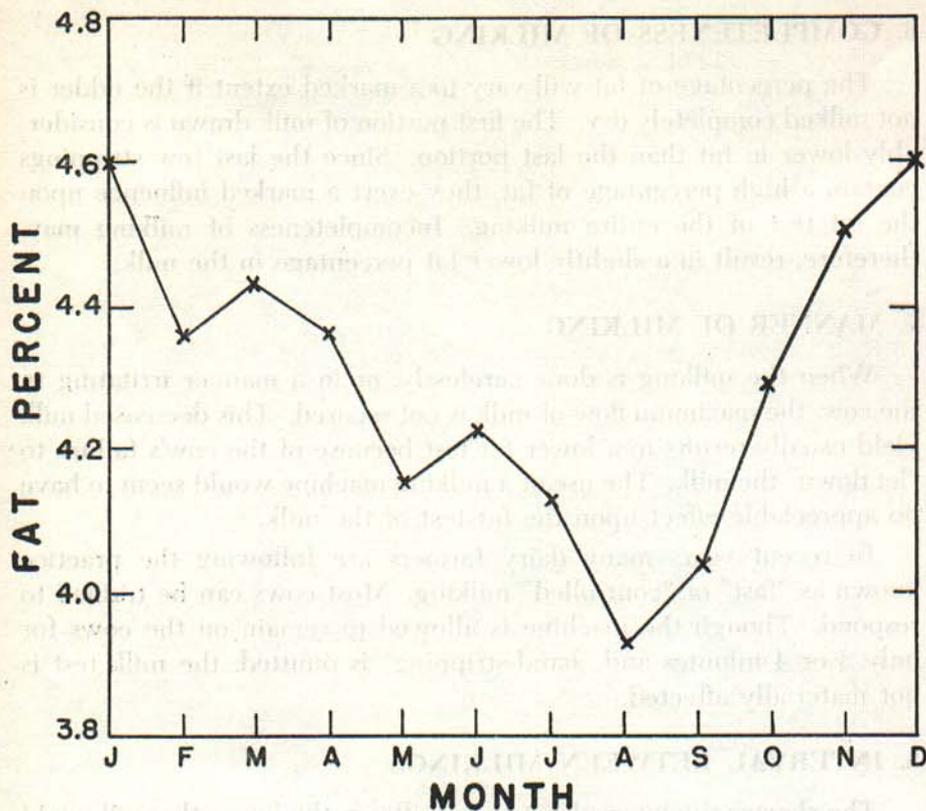
However, the addition of only one cow of high-fat-test to a herd of 10 or more low-testing cows will have little appreciable influence upon the average fat test of the herd.

3. CONDITION OF COW AT TIME OF CALVING

The fatter the cow at time of calving the richer will be the milk for a short time. During the early part of the lactation period the excess body fat will be milked off and the fat percentage in the milk will return to normal. Even when the cow is in poor flesh at freshening, the fat test of the milk will be slightly higher than normal. This high fat test, however, will not continue as long as if the cow were in high condition. If the majority of the cows freshen at about the same time, and are in good condition, the average test of the herd will be higher than normal for a few weeks.

4. STAGE OF LACTATION

The fat test of milk varies with the stage of lactation. This variation may be as low as five-tenths of one percent or even more than one percent. During a normal lactation period, the milk tests lower in the middle period than at the beginning or at the end of lactation. After about the fourth or fifth month the fat percentage increases as the lactation progresses and as the milk yield declines. Milk from a herd composed largely of strippers will test higher than that from the same herd earlier in the lactation period.



The average fat test of mixed milk from the Michigan State College herd for the years 1941, 1942 and 1943, by months.

5. SEASON OF THE YEAR

There is a decrease in fat content during the warmer months of the year and an increase during the colder months. The tests are generally lowest in June and July and highest in December and January. A low fat percentage in the spring and early summer is due to a combination of the higher temperature and the higher humidity rather than to the turning of the cows out to pasture, although when cows are turned to pasture, the fat tests of this milk usually decline. The variation in fat content due to seasonal changes is more pronounced when the cows freshen in early spring. This is true because the cows will be in their lowest testing period of lactation when the depression due to the high heat and humidity of summer arrives.

6. COMPLETENESS OF MILKING

The percentage of fat will vary to a marked extent if the udder is not milked completely dry. The first portion of milk drawn is considerably lower in fat than the last portion. Since the last few strippings contain a high percentage of fat, they exert a marked influence upon the fat test of the entire milking. Incompleteness of milking may, therefore, result in a slightly lower fat percentage in the milk.

7. MANNER OF MILKING

When the milking is done carelessly, or in a manner irritating to the cow, the maximum flow of milk is not secured. This decreased milk yield usually results in a lower fat test because of the cow's failure to "let down" the milk. The use of a milking machine would seem to have no appreciable effect upon the fat test of the milk.

In recent years many dairy farmers are following the practice known as "fast" or "controlled" milking. Most cows can be trained to respond. Though the machine is allowed to remain on the cows for only 3 or 4 minutes and "hand-stripping" is omitted, the milk test is not materially affected.

8. INTERVAL BETWEEN MILKINGS

The shorter the interval between milking, the lower the milk yield and the richer will be the milk. Evening's milk usually tests higher than morning's milk, even when the time between the milking is the same.

9. FEEDS AND FEEDING

A change in feed, or in feeding practice, may cause the fat test to vary. If the cow is in good condition, underfeeding will increase the fat percentage temporarily. Overfeeding does not appreciably affect the fat test. Watery feeds, such as beets, grass, or silage, have little or no permanent effect upon the fat content of milk. Neither the kind of feed nor the manner of feeding seems to affect the fat percentage permanently.

10. WEATHER

When the cows are exposed to extreme weather conditions the fat test will vary. When the temperature rises, the fat content tends to

decrease and conversely, when the temperature declines, the fat content tends to increase. During cool, clear weather the fat test is more uniform. Storms have no effect upon the fat content of milk when the cows are well sheltered.

11. EXCITEMENT

Any exciting influence, such as ill-treatment, fright, or the presence of dogs, which may affect the "letting down" of the milk results generally in a lowering both of the quantity of milk and of the fat content.

12. EXERCISE

Cows that are allowed to exercise moderately after having been stabled for a long period usually produce milk testing slightly higher in fat, but the quantity of milk is not so great. Violent exercise, such as is brought about by chasing the cows in from pasture, or even their walking long distances, results in a lowering of the milk yield with possibly a slight increase in the percentage of fat.

13. HEALTH

If a cow is in poor health there will likely be a decrease in milk flow and a slight increase in fat content. When the udder is infected with mammitis, or "garget," the milk secreted is generally quite low in fat.

14. "HEAT" PERIOD

During the normal heat period of a healthy cow, the percentage of fat may or may not be decreased depending upon the extent of normal secretion and "let down" of the milk. If secretion is less the milk will likely be higher in fat than normal; if the milk is not "let down" the fat percentage will likely be low.

15. AGE

The age of the animal has very little effect upon the fat content of the milk. The fat percentage of milk from aged cows is slightly lower than that of milk obtained when the cows were in their first few periods of lactation. The tendency is for a decrease in the fat content of the milk after the fourth or fifth lactation periods.

16. VARIATIONS DUE TO UNKNOWN CAUSES

The fat test of milk from individual cows may vary considerably from day to day. Likewise, the fat test of milk from herds will show variations approximately in indirect proportion to the size of the herd. These frequent variations may be caused by any one, or by a combination, of the factors previously mentioned.

17. CONDITION OF MILK

The condition of the milk, when sampled, may affect the fat test. If the milk is slightly sour or slightly churned, it will be difficult to secure an accurate sample, because of the presence of fine curd particles or butter granules.

Adequate cooling of the milk is imperative since it facilitates good creaming, a factor of importance in dumping the milk quickly and completely at the receiving platform. Thus good cooling makes possible more complete emptying and remixing of the cream layer when the cans of milk are emptied and the sample taken at the plant. Poorly cooled milk often yields a thin, sticky cream layer, a portion of which may adhere to the can during dumping, thus resulting in a lower fat test of the sample from that milk.

MISCELLANEOUS

1. Composite vs. Individual Samples

Payments for milk are made generally on the basis of tests of composite samples. A composite sample representing many individual samples of mixed night's and morning's milk taken daily, will seldom show extremes of variation in the test as sometimes encountered in individual, daily, mixed milk samples. Research studies show that composite tests check well with the average of individual daily tests. The cost of testing daily samples would be prohibitive.

2. Plant Tests vs. D. H. I. A. Tests

Occasionally discrepancies between tests reported at the plant and those reported by dairy herd improvement association testers are of much concern to the producer, particularly when the tests at the plant are lower. There are several possible explanations for differences which may occur in the test. These are in part: (a) sampling is done under different conditions of the milk; (b) seldom is a sample of the

mixed night and morning milk taken by the tester; and (c) the simple average of individual cow sample tests is not the true average test of the milk since the quantity of milk produced by each cow is not taken into consideration. Exhaustive studies made on this problem show conclusively that over a period of time the tests reported by the D. H. I. A. tester and those reported by the plant agree remarkably well.

3. Reliability of Sampling

The securing of a representative sample is the most important factor in testing milk. Often this is not appreciated by the producer having check tests made on the milk. If the sample is not representative, then no matter how perfect the test, the result is inaccurate. Even with accurate sampling—well stirred, mixed night's and morning's milk from all cows completely milked—the checking of the single test with that of the composite sample would be a coincidence and an exception. It cannot be overemphasized that many factors affect the fat test of the milk as indicated above.

4. Reliability of Testing

Persons employed to make fat tests in milk plants and at receiving stations are licensed yearly by the Michigan State Department of Agriculture. To qualify, they must pass a written examination and actually perform several tests in the presence of an inspector. Thus, they are qualified to make tests. Testing of samples by such a tester is routine. He seldom has a personal interest in the percentage of fat in the milk, but is concerned only in making a test as accurate as possible.

5. Removal of a Portion of the Cream Layer

If a portion of the cream layer formed on the night's milk is "lost" through spillage, or is purposely taken for home use, the fat test of the remaining milk will be lowered depending upon the amount of cream removed. The cream on adequately cooled milk will test approximately 25 percent fat. Obviously, removal of a pint or quart of such cream will have a marked effect on the fat test of the remaining portion. Care should be taken to prevent the loss of any portion of the cream layer.

6. Difficult to Explain Satisfactorily Fat Test Variations

While it is courteous for a plant operator to attempt to explain to a patron why the fat test of his milk was low, the facts are that it is often difficult or next to impossible to offer a satisfactory, specific cause of the low test. Attempts to do so have been embarrassing. For example, the reason often advanced in the spring of the year for decline in milk tests is that the cows were turned to pasture (which in itself may have little influence on the test of the milk) when actually they may not have been. Rather, it is more appropriate to be able to state sincerely and honestly that the sampling and testing of the milk was done as accurately as possible. However, it is only fair to point out that many factors affect the fat content of the milk as herein reported.

SUMMARY

Variations in the fat percentages of milk are the rule rather than the exception. When too wide a variation is encountered, the possible causes should be studied and corrected. It is obvious from the wide variety of factors which affect the milk test that such variations are more likely to result from some existing condition on the farm rather than because of incorrect testing. Before questioning the accuracy of the milk test, it would be well to check up on the factors which have been pointed out in this discussion.

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