MILK QUALITY CONCERNS AT THE FARM LEVEL

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Florida dairy products are of the highest quality when delivered to the retailer and consumer. All of Florida's products are Grade A and are produced and processed under sanitary standards established by the United States Public Health Service and the Florida Department of Agriculture and Consumer Services.

The long shelf-life of milk is remarkable, when one considers the fact that milk is perishable food and that addition of preservatives is prohibited by law.

On occasion, consumers inadvertently purchase milk that is seemingly not at peak-flavor, texture, and appearance. Until recently, most of these dairy product dropouts (edible, but not enjoyable) were blamed solely on dairy producers and processors. However, current studies are showing that retailers and consumers are sometimes responsible for mishandling of the product — with a subsequent loss of milk shelf-life and off-flavor development.

For instance, research conducted by the University of Florida Dairy Science Department showed that milk shelf-life can be decreased if the product is exposed to high temperatures for short time periods.

Hence, milk that is left in closed cars by shoppers during the hot summer months can be subjected to temperatures above 120°F. Even a thirty minute storage at these temperatures can affect product "freshness" and palatability.

Recent surveys of dairy case temperatures have indicated that many grocery stores are holding the milk above 45°F. This, too, can significantly decrease product shelf-life should psychrotrophic (cold-enduring) bacteria be present. Generally, the number of psychrotrophs in freshly pasteurized milk is very small; less than 100/ml and often less than 10/ml.2/ Nevertheless, these bacteria double in number every eight hours at 45°F, and multiply even faster at higher temperatures.

At 45°F, one bacterium would require 7 days to increase to one million, while 100 bacteria would require only five days to reach the million mark. Flavor defects such as fruity, bitter, putrid, stale, and unclean can occur at psychrotrophic concentrations of one million or more.

Then, too, increased marketing through retail stores, use of fluorescent lighted dairy sales cases, and greater utilization of single service plastic bottles have re-introduced an old off-flavor nemesis — light induced oxidized flavor.

At Penn State University, researchers purchased samples of pasteurized, homogenized milk from more than 300 supermarkets, corner groceries, and dairy stores in Pennsylvania over a 27-month period. The 957 samples were checked at the time of purchase for temperature, bacterial concentration, and flavor. More than 55 percent of the samples were in an acceptable to excellent category.
with another 28 percent rated as fair. However, the scientists felt that most consumers would object to the flavor of almost 17 percent of the samples. Oxidized flavors (cardboard or metallic taste) accounted for most of the 17 percent consumer rejects. The oxidized flavor defect was present in all types of packages — more in plastic than in glass, and more in glass than in paper.

Of 104 samples in blow molded plastic containers, 79 percent showed the defect, as opposed to 49 percent of the milk in glass and only seven percent in plastic coated paper cartons.

The light intensity, measured in foot candles, that reaches the milk by penetrating the carton barrier, has been shown to be directly associated with the oxidized flavor defect. It also causes partial or complete loss of certain vitamins (A, B, and C).

These Penn State dairy scientists concluded that the responsibility for milk flavor and keeping quality rests, to a large degree, in the hands of distributors in charge of merchandising practices carried out in store dairy cases.

Another study at the University of Kentucky validates this conclusion. Some 600 samples of homo milk, skim milk, low-fat milk, chocolate milk, half & half, and whipping cream were purchased from retail stores. The samples were placed in 40°F storage and checked for flavor on the 4th, 7th, 10th, and 14th days. Bacteria and taste analyses were made initially and after seven days of storage.

A few shocking facts from this study point up the severe shortcomings with dairy product keeping quality. Half of the whipping cream samples failed to keep seven days after purchase. Half and half was nearly as bad. Low-fat milks and skim milk kept somewhat longer, but even some of these spoiled before a week was out. Homogenized milk had the lowest keeping quality. Almost seven percent of the milk samples had a flavor score of less than 36 (edible, but not enjoyable) when brought into the laboratory for initial analyses.

Translating some of their findings into a consumer quality gamble, we learn that except for low-fat milks, the housewife has 1 chance in about 20 that the dairy product she buys won't be edibly enjoyable when she reaches home, and 1 chance in 8 that her milk won't keep more than 4 days in the refrigerator!

What's more, it has been shown repeatedly by extensive flavor surveys that 20 percent or more of the fluid milk on the market has recognizable off-flavors.

Realistically, not all dairy product dropouts are the result of consumer carelessness, supermarket stupidity, and processor passivity.

Producers are sometimes responsible for consumer rejects in the marketplace. It must be emphasized that the finished dairy product, be it homogenized milk, cream, or ice cream, is no better than the raw ingredient that went into making that product.

Superior quality begins on the farm. In spite of the tremendous amount of educational work on sanitation carried out during the past decade, far too much milk has been rejected at the farm and in the market place. Someone
has said that it is a strange anomaly, that the milk producer, who has per-
haps the greatest stake in the dairy industry, is, in general, the least con-
cerned about the flavor and quality of the product he has to sell. Frankly, 
such a premise for Florida producers is indeed questionable.

Clean milk is being produced by the majority of you, and can be produced 
by any dairyman having the will to succeed, the proper training and motivation 
in sanitation principles, and the fixed determination to get the job done.

My purpose for addressing this conference is to introduce myself and let 
you know that the Dairy Science Department is available to help you with milk 
quality problems which may plague you on occasion.

You've no doubt heard the following milk quality problems discussed on 
numerous occasions — and are aware of their causes and cures. Awareness, 
unfortunately, is not synonymous with motivation, involvement, or correction. 
Florida producers are still confronted with the following:

1. MILK OFF-FLAVORS

1. Rancidity - Rancid flavor in market milk often seems to follow a seasonal 
trend. It is usually more prevalent in late fall and early winter months, possi-
ibly owing to late stages of lactation and an increase in the percentage of dry 
feed in the ration.

This off-flavor, described as "dirty socks" and "goat smell", results from 
the attack of the enzyme lipase on milk fat triglycerides. The liberated short-
chain free fatty-acids, particularly butyric, are responsible for the off-flavor 
found in market milk.

Pasteurization in the processing plant destroys the lipase enzyme for all 
practical purposes. Hence, the prevention of rancidity is primarily a matter 
of handling the raw product properly.

Rations containing high levels of dry feed are more prone to cause spontane-
ous rancidity than rations with a good proportion of green feed. In addition, 
conditions which favor rigorous agitation and foaming of warm raw milk con-
tribute to the rancidity problem. Chief equipment offenders are pipeline milkers 
with risers in the line, and combinations of pumps and milk level activating 
devices which promote foaming.

This off-flavor can be minimized with proper installation of pipeline milkers, 
removal of cows from milking line which produce rancid milk, and properly balanced 
rations.

2. Oxidized - This off-flavor, described as cappy, oily, or cardboard is not 
only a retail problem, but it can, and frequently does, occur in raw milk on 
the farm which has been exposed to sunlight or contaminated with copper.

To prevent the occurrence of this off-flavor, it is best to keep milk covered 
at all times, use only stainless steel, glass, plastic or rubber on milk con-
tact surfaces, and supplement rations with a vitamin E additive if the problem 
persists.
II. BULK TANK PROBLEMS

Bulk tanks, if operating properly and efficiently, provide an inexpensive means of cooling and storing milk until picked up by the hauler for delivery to the processing plant.

Bulk tanks have eliminated some problems but they have introduced others. The tendency toward longer storage, greater transport distances, and increased refrigeration for raw milk have given an opportunity for a group of cold enduring organisms to gain tremendous importance in milk quality control. These are the psychrotrophs (or psychrophiles) which plague our products at the retail level.

The main sources of psychrophilic bacteria are soil and water, but they are also found to a significant degree in dirty equipment and raw milk.

To prevent psychrophilic spoilage of raw milk, it is imperative that the bulk tank unit be cleaned and sanitized properly. The five steps necessary for proper hand cleaning and sanitizing of bulk milk tanks are: rinse tank with tepid water as soon as the milk is removed; wash tank with alkaline cleaner (chlorinated foaming type) — non-foaming cleansers should be used with CIP systems; rinse residual detergent from tank with acid cleaner (if necessary); sanitize prior to placing milk in tank; make sure tank is clean before using again.

Bulk tanks must also have an adequate cooling capacity to minimize milk spoilage problems. The 3A standards for bulk milk cooler operations state that: A cooler designed for "every-other-day" pickup must cool 25 percent of the rated volume of the tank from 90°F to 50°F within one hour after it has been filled to 25% of its rated capacity. The cooler must cool this volume from 50°F to 40°F within the next hour. (The refrigeration capacity of a cooler for "every-day" pickup must be doubled).

Another nemesis which occasionally occurs in bulk tanks is fat clumping or churning. Look for these factors if you are experiencing the problem: agitator set at too high speed; air leaks and risers in line; excessive agitation when propeller isn't covered with milk; malfunctioning compressor; refrigeration not in operation before milk is added; operation of agitator at 70°F temps.; running agitator backwards; improper functioning of the controls on centrifugal pump.

III. HIGH BACTERIA COUNTS

Inordinately high bacteria counts generally arise from improper cooling of the milk and inadequate cleaning and sanitizing of milking equipment.

Successful circulation cleaning of milking systems depends on the adoption of a complete cleaning program, based on cleaners and sanitizers correctly matched to the water supply. Obviously, an adequate supply of hot and cold water is essential for circulation cleaning. The water should be checked with a test kit or by a technical soap and sanitizer representative for mineral content, pH, and hardness. If the water tests more than 10 grains hardness, it should be softened or used with hard-water cleaners.
The IAMFES Dairy Farm Methods Committee has reported that the four factors which are generally considered necessary for satisfactory circulation cleaning are:

- Adequate velocity.
- A 5-minute minimum circulation time with a 10-minute optimum.
- A solution of adequate strength.
- An endpoint temperature above 100°F. (Re-deposition of the cleaning solution and the minerals from water and milk will occur if the temperature drops too low).

Frankly, we can't afford to market any dairy product dropouts for the following reasons:

- Declining dairy product consumption.
- Increasing consumerism activities. Buyers are vocally claiming their rights to safe, wholesome, palatable, and nutritious products at a reasonable price.
- Eroding of our markets by substitutes. Readers' Digest, in an article titled, "Is That Really Milk You're Drinking?", had this to say: "Understandably, the imitation milks have the dairy industry in a turmoil. Dairy farmers have already lost one-fourth of their butterfat market to substitutes in the last 25 years. Imitations have stolen 35 percent of the coffee cream market and 80 percent of the whipping-cream market. Margarines outsell butter almost two to one."

"A basic reason for all this is that in the past, the dairy industry so shackled itself by laws designed to protect it from competition that it can no longer compete effectively by tailoring its products to consumer demands and improved technology."

- Misleading and fraudulent attacks on our products by certain segments of the medical profession.

- Poor funding for advertising, promotional programs, and new product development by our industry.

All of the preceding industry problems can be rectified with a unified effort on behalf of producers and processors. More monies must be spent on promotional programs and research activities to increase dairy product consumption and to offset the spurious negatives and vindictives hurled at our products.

And by all means, let's eliminate dairy product dropouts by keeping milk clean, cool, and free of off-flavors.


