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## Raw milk quality - milk flavor

### Abstract

Flavor control in market milk begins on the farm and continues through the processing plant and into the home of the consumer. Flavor control is directly or indirectly related to the health of the cow, the feeding of the cow, the cleaning and sanitizing of utensils, the cooling of the milk, transportation to the processing plant, and all the steps in processing and distribution of the milk. Consumers judge the quality of milk largely by taste and appearance. Therefore, it is important that each load of milk be checked for off-flavors before it is loaded on the tank truck and again when it is received at the processing plant. Learning to recognize and distinguish certain characteristics of each possible off-flavor that may be present in milk is important. This will help the dairyman and the fieldman in tracing the source of any off-flavors in milk and assist in reducing or eliminating the cause. At the end of this article, you will find a chart explaining some of the milk flavor defects, possible causes, and preventions. Cut this page out and place it near your milk tank for reference.; Dairy Day, 1993, Kansas State University, Manhattan, KS, 1993;

### Keywords

Dairy Day, 1993; Kansas Agricultural Experiment Station contribution; no. 94-149-S; Report of progress (Kansas Agricultural Experiment Station); 694; Dairy; Dairy products; Milk quality; Milk flavor

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## RAW MILK QUALITY - MILK FLAVOR

*H.A. Roberts*

### Summary

Flavor control in market milk begins on the farm and continues through the processing plant and into the home of the consumer. Flavor control is directly or indirectly related to the health of the cow, the feeding of the cow, the cleaning and sanitizing of utensils, the cooling of the milk, transportation to the processing plant, and all the steps in processing and distribution of the milk.

Consumers judge the quality of milk largely by taste and appearance. Therefore, it is important that each load of milk be checked for off-flavors before it is loaded on the tank truck and again when it is received at the processing plant.

Learning to recognize and distinguish certain characteristics of each possible off-flavor that may be present in milk is important. This will help the dairyman and the fieldman in tracing the source of any off-flavors in milk and assist in reducing or eliminating the cause.

At the end of this article, you will find a chart explaining some of the milk flavor defects, possible causes, and preventions. Cut this page out and place it near your milk tank for reference.

### Introduction

**Milk Flavor:** Milk normally has a slightly sweet flavor. Occasionally, certain undesirable off-flavors and odors such as salt, bitter, acid, rancid, and feed, occur. The causes of milk flavors are numerous.

Some are due to feed, others are due to physiological processes of the cow that upset the normal balance of milk constituents and result in the excretion or secretion of substances that cause off-flavors. Sometimes the flavors are due to bacterial contamination which results from poor care of utensils, improper handling and cooling of milk, etc.

The common off-flavors found in milk can be classified in three basic categories -- the ABC's of off-flavor development. These are absorbed, bacterial and chemical. Some off-flavors, however, can be caused by more than one of these actions. Consequently, some are listed in more than one category.

- (1) Absorbed - feed, barny, cowy, unclean, weedy, foreign
- (2) Bacterial - acid, malty, unclean, putrid
- (3) Chemical - cowy (ketosis), rancid, oxidized, sunlight, foreign

Absorbed flavor defects can develop before, during, and after milking.

Bacterial degradation generally results from contact of the milk with improperly washed or sanitized equipment; external contamination from dirty teats, etc.; and improper cooling.

Chemical defects can occur both before and after milking. The cowy flavor is the result of the animal suffering from acetone-mia or ketosis. Because of their genetic makeup, the feed consumed, or the stage of lactation, certain cows can produce milk that is spontaneously susceptible to rancidi-

ty or oxidation. Most rancid and oxidized flavors, however, are induced by poor handling techniques or faulty equipment after milking. A foreign flavor can be caused by medications, a reaction to pesticides, disinfectants, or any number of contaminants.

**Flavor Defects:** The flavor of normal whole milk is pleasantly sweet, possessing neither a foretaste nor an aftertaste other than that imparted by the natural richness. Many beginners make a mistake of expecting a sample of good flavored milk to have a "taste". The beginner should remember that when milk does possess a so-called taste, something is usually wrong with the flavor.

### **Bitter**

**Description:** Bitter flavor can be detected by taste only. There is no odor. Reaction time is slow, and taste persists long after the sample has been expectorated.

**Cause:** This defect can be caused by stripper cows, bacteria action or certain feeds.

### **Foreign**

**Description:** Foreign or disinfectant flavor in milk can be detected by the sense of smell or may not be noted readily except when the sample is tasted. A strong aftertaste will be noted.

**Cause:** Foreign defect occurs when any seriously objectionable flavor foreign to milk, such as fly spray, paint, kerosene, creosote, or a medicinal substance, which may have gotten into the milk or been absorbed by it, renders the milk unpalatable or unfit for use. A residue of strong chlorine or other similar solution, if left in equipment, is absorbed by the milk, imparting a flavor characteristic of the disinfectant.

### **Feed**

**Description:** Feed flavor is characteristic in that it is aromatic and somewhat pleasant and can be readily detected by the sense of smell. The feed flavors disappear quickly, leaving the mouth clean.

**Cause:** Many feeds affect the flavor of milk by transmission of their flavor through the cow. Feed flavors are caused by feeding silage and certain pasture grasses.

### **Flat-Watery**

**Description:** Because this defect is not associated with an odor, the sense of smell furnishes no indication of its presence. When milk is tasted, the flatness is apparent soon after the sample reaches the tongue. A very slight oxidized flavor may suggest a flat taste. It resembles normal milk that has been partially diluted with water, even though this may not have been done.

**Cause:** This is an uncommon flavor, and its source is difficult to determine. It can be caused by low levels of total solids in the milk or by water added to the milk. **Note:** It is against the law to dilute milk with water.

### **Onion or Garlic**

**Description:** This defect is very easy to recognize by its characteristic pungent odor and persistent taste.

**Cause:** This is an obnoxious weed flavor and is not classified as one of normal feed flavors. Milk from cows that have been eating wild garlic or onion will have this defect.

### **High Acid**

**Description:** The high acid flavor is easily detected by both the senses of smell and taste. The sense of smell detects this odor easily. High acid milk conveys to the

tongue a peeling effect, leaving both the tongue and the mouth with a feeling of cleanliness.

Cause: Normal bacterial growth from unsanitary milking practices, unclean utensils, and poor cooling cause this defect.

### **Oxidized-Cardboard**

Description: This flavor is characterized by a “quick” taste reaction when the sample is taken into the mouth and by its relatively short adaptation time. The defect can be detected also by the odor. The flavor is quite pungent in advanced stages, but it is not persistent after the sample is expectorated.

Cause: This defect is caused when milk comes into contact with such metals as copper and iron. It also develops in milk that is left in the sun for a short time. It may be noticed in raw milk in winter months or dry lot feeding.

### **Rancid (Lipolytic)**

Description: The rancid flavor can be detected both by the sense of smell and taste. The flavor is disagreeable and often exhibits a soapy characteristic. It may also resemble a spoiled nut meat that has turned dark in color.

Cause: Rancidity is caused by the hydrolysis of milk fat by the enzyme lipase when conditions are favorable. This results in the liberation of volatile acids, especially butyric. Milk from cows in late lactation usually develop rancidity quite rapidly because of a higher lipase titer. Rancidity is enhanced by extreme agitation of milk, the dumping together of night and morning’s milk, and the mixing of raw and homogenized milk. Pasteurization destroys the enzyme.

### **Salty**

Description: The sense of smell is valueless in detecting this flavor, because as there is no odor from salty milk. The salty flavor can be perceived quickly upon placing the sample into the mouth. Salty milk gives a cleansing feeling to the mouth.

Cause: Salty flavor can be present in milk from cows in the late stages of lactation and is often characteristic of milk from cows infected with mastitis.

### **Unclean**

Description: This flavor seldom appears to a pronounced degree in milk. Its presence can be noted by failure of the mouth to clean up after expectorating the sample.

Cause: This defect can result from inadequate washing or sanitizing of tanks, pails, pipelines, or milking machines. It develops from the activity of certain types of bacteria in milk. This flavor also could be present as a result of cows drinking unclean water.

### **Malty**

Description: This flavor can be readily detected by either the sense of smell or taste. Malty flavor is suggestive of malt, walnut, maple, or Grapenut flavor.

Cause: This is not a common flavor, but it may be encountered in milk not properly cooled. Certain bacteria from improperly cleaned equipment, especially milking machines, can contaminate milk.

## PRODUCER MILK FLAVOR CHART

Milk of good flavor has a pleasant, slightly sweet taste and no odor.

Off-flavor	Possible Causes	Prevention
OXIDIZED cardboardy	Exposure to "white metal," worn tinned, or rusty surfaces on milk- handling equipment Winter or dry lot feeding Exposure to daylight or artificial light Copper or iron in water supply	Use stainless steel, glass, plastic, or rubber on all milk contact surfaces Provide green feed Protect from artificial light and daylight Water treatment may be necessary
RANCID bitter soapy	Late lactation (over 10 months) or low producing cows Excessive agitation or foaming of raw milk  High blend temperatures	Discard milk from low producing or late lactation cows Keep fittings tight and air admission to a minimum Avoid risers and don't run milk pumps in starved condition Cool milk to at least 40°F and hold
FEED OR WEED unnaturally sweet aromatic	Eating, or inhaling odors of, strong feeds (grass or corn silage, green forage, wild onion or other weeds) prior to milking  Sudden feed changes	Feed after milking Ventilate barn Withhold objectionable feed or remove cows from pasture 2 to 4 hours prior to milking Store silage carts out of barn Change feed gradually
UNCLEAN barny cowy	Damp, poorly ventilated barns  Dirty cows or barn Dirty milk-handling equipment  Improper preparation and milking  Cows with ketosis (acetonemia)	Keep barns clean and well ventilated Clean cows or barn Clean and sanitize all milk- handling equipment Wash and dry cow's udder prior to milking; handle milker to avoid sucking up bedding Withhold milk, treat cows
MALTY OR HIGH ACID Grapenut-like sour	Dirty milk-handling equipment  Slow or insufficient cooling	Clean milk-handling equipment after each use Sanitize milk-handling equipment prior to use Promptly cool milk to 40°F and hold
<b>OTHER OFF-FLAVORS</b>		
Medicinal	Medications, insecticides	Use according to directions Use odorless medications
Disinfectant	Certain disinfecting or sanitizing agents	Avoid strong smelling disinfectants Use sanitizers properly
Salty Flat	Mastitis, late lactation cows Low total solids	Discard milk Evaluate feeding program Thoroughly drain equipment before use

Source: Cooperative Extension Services of New Jersey, New York, Pennsylvania.