

Practical Lecture:
Group (A, B)

2nd Semester

The Sensory Evaluation of Milk

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What is sensory evaluation?

The term “sensory evaluation” refers to the practice of using the five human senses (**smell, taste, touch, hearing and sight**) to evaluate the characteristics of food products.

Steps in the Sensory Evaluation of Milk

1. Look
2. Smell
3. Taste
4. Spit
5. Think
6. Score

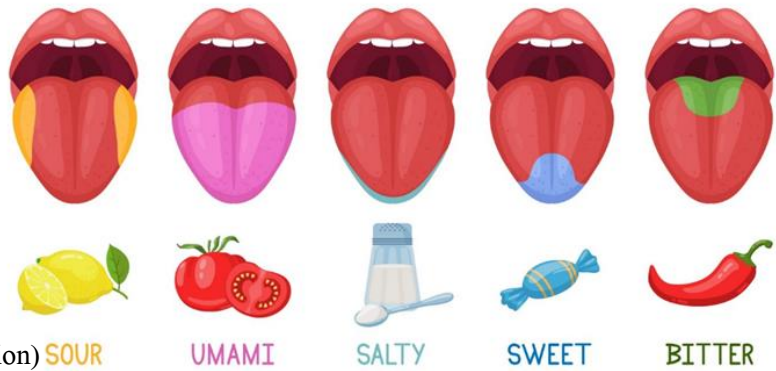
Texture

- Soft, hard
- Smooth, rough, gritty
- Chewy, sticky, slippery

Taste (tongue)

- Sweet
- Bitter
- Sour
- Umami *
- Salty
- other sensations

burning (pepper) cooling (menthol) fizzing (carbonation) **SOUR**



Smell

- pleasant
- not pleasant
- characteristic of the product
- volatile aromas

Hearing

- crispy
- crunchy
- snap

Factors Affecting a Judge

- Refrain from smoking for at least one hour before judging. Smoking or using tobacco in any form may cause inconsistencies in judging.
- Distractions include strong or heavily scented soaps, shaving lotion, hair conditioners, or perfumes.
- Also avoid eating strong or highly seasoned foods, such as onions or chili, or using chewing gum just before judging dairy products.
- Eating a heavy meal just prior to judging dulls the senses of taste and smell.
- These senses are keenest when a person has eaten only lightly or is slightly hungry.
- The judging room or area should be clean, orderly, well lighted and ventilated, and free from odors, noises, or other distractions.
- The temperature should be approximately 22.2°C.
- Waste container with a plastic bag or a sink with running water is necessary in judging. You should not swallow any of the sample.

a. The color of milk

1. The color of whole milk powders is of concern since dark-colored products may be considered old, or of inferior quality.
2. The heat treatment of milk, as occurs during the production of whole milk powder, has been found to affect the color.
3. The whiteness decreased because of early browning, this browning reaction being fastest at the highest temperature. the yellowness of the milk remained constant during the first part of the heat treatment at 100°C, while at 115°C and 130°C the yellowness started to increase at once. in addition, the dominating color of the milk changed from green at the start of the heat treatment to yellow red at the end. Reactions between lactose and milk proteins are responsible for these color change.
4. Seasonal changes in milk found that major color change took place when the cows were transferred on to or off pasture.
5. They attributed the color variation of milk to the variation in the color of the milk fat. The main component in the milk fat which was thought responsible for this variation in selective light absorption throughout the year, was the β -carotene content.

b. Flavor

Flavor is a combination of taste and odor.

Classification of Off-flavors

Off-flavors commonly found in milk can be classified in three basic categories – the ABC's of off-flavor development.

1. Absorbed - feed, barny, cowy, unclean, weedy, and musty.
2. Bacterial - acid, malty, unclean, fruity, and putrid.
3. Chemical - cowy (ketosis), rancid, oxidized, sunlight, and medicinal.

Flavors of milk may be caused, in general, by five factors:

- a. Health of the cow
- b. Feeds consumed by the cow

- c. Bacteriological action
 - d. Chemical changes
 - e. Absorption of foreign flavors after the milk is drawn.
1. Milk may either have a slight sweet character as a result of its lactose content, or a slightly salty character as a result of chloride salts.
 2. Acetone, acetaldehyde, butyric acid and certain other low molecular weight fatty acids, have been suggested as contributing to flavor.
 3. Off-flavor development in whole milk powder associated with the fat phase has been shown to be due mainly to the chemical rearrangement of certain fatty acids as a result of heat and moisture, independent of oxygen, and to the production of carbonyl compounds as a result of oxidation of fatty materials.
 4. Methyl sulphide imparts a flavor highly characteristic of fresh milk.

Type of flavors

- I. **Bitter:** taste may also result from certain bacterial growth, but normally this will not occur unless the milk is held several days at low temperatures. Bitter milk is sometimes confused with rancid milk. Remember that bitterness is only detected by taste and not by smell. caused by
 1. Strong feeds or weeds which may carry through into the milk.
 2. Conditions present in milk from cows in late lactation.
- II. **Cooked.** This flavor results from heating milk. It may appear when all or part of the milk has been heated too high or too long. Normally, the higher the heating temperature, the more intense the cooked flavor.
- III. **Feed.** The feed a cow eats may impart certain flavors to milk. Some stronger feeds will carry through more noticeable than others. Green grass, silage, turnips, and alfalfa hay.
- IV. **Flat (watery).** The source of this uncommon flavor is difficult to determine. The flavor may be described as tasteless. The characteristic flavor of normal milk is lacking, but the milk has no off-flavor. Flat-flavored milk resembles normal milk that has been partially diluted with water.
- V. **Foreign.** Any seriously objectionable flavor foreign to milk, such as fly spray, paint, oil, or a medicinal substance compound used in udder ointments.
- VI. **Garlic/Onion.** The obnoxious weed flavor, imparted to milk when the cow eats garlic, onions or leeks.
- VII. **High Acid.** Milk that has developed some acidity as a result of bacterial growth (generally *Streptococcus lactis*) will have a detectable acid flavor long before it may be classified as sour. Milk may have an acid flavor when only a small part of high acid milk is mixed with milk of lower acidity; yet the total acidity on the entire lot may be within normal range.
- VIII. **Malty.** This is not a common flavor but may be encountered in milk not properly cooled.
- IX. **Metallic.** Metallic flavor is rough and puckery on the mouth and tongue. It is caused when milk comes into contact with corrodible metal, such as exposed copper on equipment or rusty milk.
- X. **Musty.** This flavor is suggestive of musty or moldy hay. It may be absorbed directly by the milk but is more likely to come from feed or stagnant water consumed by the cow.
- XI. **Oxidized.** The oxidized flavor embraces many other flavors which represent various stages of oxidation or partial changes in the fatty portion of milk. "Papery" or cardboard, sunlight, and tallowy are forms of oxidized flavors with varying degrees of intensity. These oxidation processes continue under the influence of time, light, temperature and moisture. Oxidized flavors also occur in irradiated milk.
- XII. **Non-oxidized flavors**

These flavors which occur typically in the absence of oxygen, are often found in milk powders which have been gas-packed into consumer packs directly from the drying line. These fruity and coconut flavors have been found to result from the chemical rearrangement of hydroxy fatty acids by heat treatment to form lactones.

- XIII. **Rancid.** This flavor, resembling the flavor of stale fat, is not exists in fresh milk. A taste noticeable in fresh milk is sometimes referred to as “lipase” flavor, which is induced by the enzyme lipase. It is more noticeable either during winter, when cows are on dry feed, or during late lactation.
- XIV. **Salty.** Salty taste, which may be present in milk from cows in the late stages of lactation, is often characteristic of milk from cows infected with mastitis.
- XV. **Unclean.** The unclean flavor is seldom found except in pasteurized milk that has been stored too long or at a slightly high refrigerator temperature. Unclean flavor often accompanies the bitter flavor. Dust, dirt and manure can cause an unclean flavor of milk.
- XVI. **Weedy flavor**

Scoring of Milk Flavor Guide

Refer to the current scorecard being used at the national level. Scores may range from 1 to 10. On a quality basis:

10	excellent (no defect)
8 to 9	good
5 to 7	fair
2 to 4	poor
1	unacceptable/un-salable

c. Texture

The chemical composition of milk is influenced by the growing conditions of each individual cow example. climate and feed and this may produce differences in consistency.

Note. Feed flavors transmitted to milk in relation to the quantity of roughage and length of interval prior to milking.

No.	Feed	Amount of feed (kg)	Interval before milking (h)	Flavor of resulting milk
1	Alfalfa hay	1-3	2	Objectionable feed
2	Alfalfa hay	1-3	4	Occasional feed
3	Alfalfa hay	1-3	5	No criticism
4	Alfalfa silage	2.5	1	Definite feed
5	Alfalfa silage	7-11	11	No criticism
6	Clover hay	3	2	Pronounced feed
7	Clover hay	7-9	11	No criticism
8	Clover silage	2.5	1	Definite feed
9	Clover silage	7-9	11	No criticism
10	Green corn	11	1	Slight feed
11	Green corn	11	11	No criticism
12	Oat hay	5.5	2	No criticism

*Umami is a Japanese word created in the 1900s. Translated, it means “delicious”, “rich flavor”, “pleasant and savory”.

Scientists later identified umami taste receptors on the human tongue in 2002.