CORNELL ---------- *DAIRY SCIENCE FACTS*
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Light-Oxidized Flavor Defect of Milk

Good quality milk should have a pleasantly sweet and clean flavor with no distinct aftertaste. Milk, however, is a delicate food that is often mishandled in a manner that can result in off-flavors. Excessive exposure to light is one manner of mishandling that can result in a serious flavor defect known as **light-oxidized**. Light-oxidized milk is characterized as having a burnt protein (i.e. burnt feathers or hair), medicinal or plastic-like flavor. A more severe light-induced defect may be perceived as a flavor similar to old vegetable oil. Depending on the intensity of the light-oxidized flavor, consumers will generally vary in their ability to detect this defect; some may find the milk objectionable while others will detect no specific defect.

How does a light-oxidized defect develop in milk?

Light-oxidized defect develops in milk as a result of its exposure to sunlight or to fluorescent lighting (wavelengths below 620 nm) common in store dairy cases. Light initiates a chemical reaction in milk that modifies specific proteins and fats, resulting in the characteristic off-flavors. **Certain vitamins (i.e. riboflavin and vitamin A) are also susceptible to light-induced degradation in a similar manner**. Exposure to sunlight for as little as 10-15 minutes (5 minutes in very intense light) is sufficient to cause the defect, while longer exposure times are generally required for fluorescent lighting. The closer the milk is to the fluorescent light source (or the more intense the light), the quicker the development of the off-flavor. In general, the defect is more common in milk packaged in transparent glass or plastic, though it can also occur in milk in paper cartons if there is sufficient light intensity and exposure time.

How can light-oxidized defects be prevented?

Preventing light-oxidized defects in milk simply involves protecting the milk from light, especially sunlight, and especially milk packaged in transparent plastic or glass. A few minutes exposure to the sun on a loading dock or during consumer transport may be all it takes. In dairy plants and stores, milk handling areas, storage coolers, and display cases should be designed with minimum lighting and to facilitate product rotation. When selecting lighting, "warm white" fluorescent lights generally have less degradative energy than the "cool white" variety. Yellow shielding has also been used to reduce the intensity of light. In storage areas, milk crates should not be stacked in a manner that results in close proximity to fluorescent lighting. Unnecessary lighting in coolers and display cases should be turned off during hours when milk turn-over rate is slow. Though the convenience of plastic containers is attractive to most consumers, light-oxidized defect is more common in this type of packaging when compared to paperboard, so extra care is needed during transport and storage. Plastics containing light blocking agents or coloring (yellow) are used by some companies to protect their products from light-activated off-flavors and vitamin degradation. Lastly, protecting milk from light should not end at the store. Consumers should also be aware that milk needs to be protected from light during transport, storage and use.

MILK - BUY IT FRESH, KEEP IT COLD, PROTECT IT FROM LIGHT

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