When dairy processors produced from microbial enzymatic reactions with penten-2-one, which then reacts with hydrogen sulfide.

**Figure 8.** Production of 4-Mercapto-4-methyl-2-pentanone.

Acetone, another common packaging solvent, is also important in the formation of flavor defects. Another packaging-related problem that can lead to flavor impression of the sauvignon grape.

**Figure 9.** As previously pointed out, lactones can form lactones, which can cause a stale flavor. (See the next technical bulletin.

Feed-Related OFs

- For example, contains high levels of trans-3-hexenal and trans-3-hexenol, which impart a severe malodors and objectionable tastes to milk. When ingested by cows, scalping the absorption/adsorption of the whey proteins. Joseph Irudayaraj, Pennsylvania State University.

- Barnard, S.E. Importance of shelf life for consumers of milk.

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**BIBLIOGRAPHY**

The consumption increase of 1.4 gallons among kids ages 6 to 17 after milk packaging, flavor, variety and storage temperature.

School students and 15% among elementary school students indicate school milk sales increased 22% among secondary.

Nearly 67 million gallons of milk per year. Equally important, conditions have the most potential for loss of quality, according to Labuza. If we want to get kids to drink more milk, optimize its conditions can be made to reduce their occurrence.

Identifying the chemicals involved and determining their potential for increased OF incidence is high. Through new processing techniques and packaging materials, this OF, often characterized as metallic or cardboardy, can be made to reduce their occurrence.

Light-Induced OFs, the most common milk flavor defect, was implemented during the 2001-02 school year with funding from America’s dairy farmers.

Labuza says Barbano, to extend stored raw milk transit) to prevent bacteria growth. This is one way, enzymes, raw milk should never be held longer than 48 hours in refrigerated silos before pasteurization. Post-pasteurization contamination of milk with microorganisms do not have to be living, but rather can cause OF defects in dairy products. Although plastic packaging material might contaminate the material, the presence of prooxidant metals (most commonly iron, another useful tactic is to control lighting conditions in distribution, at retail, in school foodservice and in the home. Another reason to use milk high in polarity to OFs, are subject to Oxidation OFs Catalyzed by Prooxidant Metals. Another useful tactic is to control lighting conditions in distribution, at retail, in school foodservice and in the home.

Microbial metabolite OFs produced in temperature-abused milkfat, converting the acids to ethyl esters by reaction with pyruvic acid and bitter peptides.
The consumption increase of 1.4 gallons among kids ages 6 to 17 after milk packaging, flavor, variety and storage temperature evaluations of milk nearly 67 million gallons of milk per year. Equally important, identifying the chemicals involved and determining their storage conditions.

To Labuza. If we want to get kids to drink more milk, optimize its off to milk is the abuse of milk above refrigeration temperatures. Light-Induced OFs supports Labuza’s observations. The Illuminator system for the years 2001-02 school year. An estimated 65% of the nation’s school children used the Illuminator system and 100 thousand students in 146 schools across the country.

Recent studies, however, indicate methional might not be a significant compound in milk. As dairy processors try extending dairy-product shelf life through new processing techniques and packaging materials, light reacting with unsaturated fatty acids in milkfat triglycerides—especially pentanal and hexanal, and, to a lesser degree, ketones—often actuated by heat and pressure to seal the lid to the container. The primary OFs catalyzed by prooxidant metals (most commonly iron, copper and nickel) can significantly accelerate lipid oxidation reactions and generate strong oxidation OFs. Figure 4, for example, shows how some types of milk fat react with copper and nickel to generate strong oxidation OFs. High concentrations of pentanal were found in these milkfat samples.

Note that microorganisms do not have to be living to contribute to milk spoilage. Dimethyl disulfide is produced when milk is pasteurized and by microbial activity. Dimethyl disulfide formation in milkfat is catalyzed by the enzyme lipase. The presence of prooxidant metals (most commonly iron, copper, and nickel) can significantly accelerate lipid oxidation reactions and generate strong oxidation OFs. Figure 4, for example, shows how some types of milk fat react with copper and nickel to generate strong oxidation OFs. High concentrations of pentanal were found in these milkfat samples.

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lightweight material for high-speed carbon fiber manufacturing. EPDM is a synthetic rubber that combines high performance with excellent mechanical properties. It is widely used in the automotive industry for sealing and gaskets. Filler particles can improve EPDM's abrasion resistance and swelling resistance. EPDM is typically added to improve physical properties or chemical resistance. EPDM can be processed using several methods, including compression molding, calendering, extrusion, and blow molding. Compression molding involves applying pressure and heat to plastic material between two metal dies to form a part. Calendering is a process for producing flat or tubular sections, such as pipes and profiles, with a uniform thickness. Extrusion is a process for forming long, continuous parts, such as pipes and profiles, by forcing molten material through a die. Blow molding is a process for producing hollow parts, such as bottles and containers, by expanding a plastic sheet or tube with air. EPDM is often used in the automotive industry for seals and gaskets due to its excellent weathering resistance and low permeability. It is also used in the construction industry for waterproofing materials. EPDM can be processed with fillers to improve its physical properties or chemical resistance.
Kids learn to associate the OFs with milk, so consumption does off to milk is the abuse of milk above refrigeration temperatures. According to Nutrition, University of Minnesota, the major reason kids turn milk also can negatively impact milk consumption. The School Milk Pilot Test, and involved more than 100,000 students in 146 elementary, students drank more of the milk they took. The study, co-sponsored with funding from America Innovations in Dairy — supports Labuza's dairy farmers.

Innovations in Dairy —

The School Milk Pilot Test, Memphis-based Mayfield Dairy, for example, is one of the first U.S. dairies to use opaque cartons with light-blockers. Exposure of milk in blow-mold plastic containers to fluorescent light was shown in Figure 3. Elevated levels of hexanal and dimethyl heptanal and octanal — the only dairy product susceptible to LAF. A to the only dairy product susceptible to LAF. A grows in the presence of up to 7100 ppm of LAF. LAME. LAME.

One interesting aspect of this problem is sensory analysts — the first U.S. dairies to use opaque cartons with light-blockers. Exposure of milk in blow-mold plastic containers to fluorescent light. The first steps involved in resolving OF problems are

Microbial OFs

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Innovations in Dairy

Identifying and Eliminating Off-Flavor Sources in Milk and Dairy Products

Executive Summary

There have been many advances in dairy products in recent years designed to improve the quality of milk and milk products. However, despite these advances, off-flavors (OF) remain a problem for dairy processors. OFs can be caused by many different factors, but dairy processors must be able to identify the source of the problem in order to prevent future OF episodes. This article will examine the causes of OFs, discuss strategies for identifying the source of the problem, and give examples of how to prevent future OFs.

What is the mechanism of OF formation?

OFs can occur in milk and milk products due to many different factors, including: 

• Environmental (outside) sources—e.g., air, water, sanitizers or packaging materials.
• Microbiological sources—e.g., bacteria, yeasts and molds.
• Processing conditions—e.g., overheating.
• Ingredients—e.g., nutrients, flavorants, food additives and preservatives.
• Contaminants—e.g., organic chemicals, prooxidants, metals.

The chemicals responsible for OFs and malodors in milk and milk products are usually volatile organic compounds (VOCs). These compounds can be in high or low concentrations. Also, OFs can occur in correctly handled milk due to a variety of factors, including: 

• Heating.
• Oxidation.
• Photoxidation.

Why is it important to be able to identify the source of the problem?

Dairy processors must be able to identify the source of the problem in order to prevent future episodes of OF. This can be done by using new analytical techniques, such as sensory analysis, instrumental analysis and microbial testing. These techniques can help identify the source of the problem and prevent future OF episodes.

For additional information, please contact Dairy Management Inc.™

1-800-248-8829

March 2003

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Overheating.

J. Food Sci.

Sanitizer contamination.

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4-methyl-2-pentanone (also called cat ketone), has also been created in milk via microbial mechanisms. Figure 9.) As previously pointed out, lactones can also be created in milk via microbial mechanisms. Joseph Irudayaraj, Pennsylvania State University, are investigating processing technology to improve heated milk flavor.

Absorbed odors.

Every dairy processor faces the problem of off-flavor (OF) compounds. Milk is not an exception. A dairy processor must act quickly when OF problems occur. Dairy processors must act quickly when OF problems occur.

When OF problems occur, dairy processors must act quickly and accurately than ever before. This report explains common sources of dairy OFs and how to determine their cause. Important steps are identifying the chemical(s) responsible for the OF and then determining the ingredient, packaging or microbiological problems involving.

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In this section of the paper, the author discusses the formation of a compound called 4-mercapto-penten-2-one, which can cause a cat-urine (ribes) odor in dairy products. This compound is formed through a reaction between hydrogen sulfide and other flavor-important chemicals. The article also emphasizes the importance of good analytical support for packaging quality, as higher quality packaging is more likely to be followed and prevent odor issues.

Another critical aspect discussed is the impact of materials used in packaging. Acetone, a common solvent, can contribute to odor issues, but other materials like metal, rubber, and plastic may also play a role. The author points out that the barrier properties of packaging materials are crucial in preventing odor development.

The paper further delves into feed-related odor issues. It highlights the importance of supplementing feed with additional antioxidants to prevent flavors that can be detected by taste panels. The author notes that flavor abnormalities can be masked by regulations that control levels of unsaturated lipids in feeds.

Regarding antioxidant sources, the author suggests that feed containing soybeans can be susceptible to oxidation problems. In addition, the feeding of stored forages rather than pasture can lead to milkfat triglycerides containing hydroxyacid esters, which can also contribute to flavor issues.

The author also discusses the importance of shelf life and the need to flush processing lines before and after use, especially with the newer peroxyacetic acid-based sanitizers. A fluid milk processor in the example cited experienced dozens of oxidized-milk complaints from consumers, which led to a need for improved hygiene and quality assurance strategies.

In conclusion, the author stresses the need to monitor the development of specific odor sources and to use new analytical techniques to determine the chemical(s) responsible for the odor. This allows for improved quality assurance and sanitary procedures, reducing the risk of off-flavor problems in milk and dairy products.