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MINNESOTA DAIRY PRODUCTS PROCESSOR

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The American Dairy Science Association recently held its 76th annual meeting at Louisiana State University in Baton Rouge, Louisiana. This issue of MDPP highlights some processing related papers presented at this meeting.

MARKET MILK

Several papers focused on various considerations in market milk processing and storage. One evaluated use of time temperature monitoring tags as quality control devices for market milk in commercial storage (10). Such tags give evidence of temperature changes that might lead to reduced shelf life. They serve much the same function as a pull date, indicating when a product has reached the end of its useful shelf life. In this study, the monitoring devices served well for milk stored at 40° and 44°F, but not 50°F. By using them to determine when appropriate storage temperatures had been exceeded (thus allowing corrective action to be taken), it was possible to extend shelf life to some extent.

Other work (9,11) undertaken to evaluate market milk quality showed cooked flavor to be the most common off-flavor of day-old milk, with feed and oxidized flavors also fairly common. Fermented/fruity and rancid off-flavors were the most serious defects after 13 days of storage. Acid Degree Value, a measure of rancidity, increased an average of 0.06 units per day during the first six days of storage, and 0.10 units per day during the next seven days. Bacteriological examination of those milks showing the presence of fruity, malty, or unclean flavors indicated a correlation with microbial growth. Those milks deemed unacceptable within 13 days gave evidence of presence of coliform organisms by the sixth day. High psychrotrophic counts were also observed. Together, coliform and psychrotrophs point strongly to post-pasteurization contamination as the main source of trouble.

In addition, a Clemson University study (3) indicates that light of as low an intensity as 200 foot-candles caused pronounced light-induced off-flavor in milk in blow-mold containers exposed for five successive treatments of 12 hours duration. Twelve hours of exposure were alternated with 12 hours of nonexposure. Riboflavin decreased in measurable amounts within 48 to 60 hours.

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IODINE IN MILK

California studies (5) seem to point to a continued decrease in the iodine content of milk as use of iodine-containing feed additives goes down. Milk produced in California between November 1980 and February 1981 averaged 406.1 μg of iodine per kg of milk. Milk from outside that state produced during the same time period averaged 431.4 μg per kg. A level of 500 μg per kg is sometimes taken as a maximum acceptable level. It appears that progress is being made on this front.

CHEDDAR CHEESE YIELD

Using a special device for measuring curd strength at cutting time, University of Wisconsin Workers (6) find somewhat higher yields in cheddar cheese in which curd has been cut at slightly higher than usual firmness. They suggest losses can be reduced by monitoring curd firmness and cutting at the appropriate curd strength.

At Cornell University, reverse osmosis has been studied (2) as a way of improving cheese yield. Scientists there concentrated raw, skimmed milk (8.7 SNF) to 10 and 12 percent SNF. Cream was added to provide a casein/fat ratio of approximately 0.7. Yield ranged from 11.16 to 13.53 kg per 100 kg of concentrated milk. In all cases, the yield was equal to or greater than that which would have been predicted by the Van Slyke formula.

In other work by Cornell scientists (8), the product of ultrafiltration (UF) was investigated as to its influence on cheddar cheese made from low-heat whole milk powder. Typically cheese made from reconstituted dry milk is crumbly. Addition of UF product did not eliminate the defect entirely, but some improvement was noted. Presence of UF product, however, did increase cheese yield to some extent.

UF and MOZZARELLA

Products of UF treatment of whole milk have also been added to milk for making mozzarella cheese (7). Supplementation in these studies was at 20 and 40 percent. Volume of mozzarella cheese was higher in the supplemented milk than in the nonsupplemented milk (16.3 kg vs 11.1 kg cheese per 100 kg of milk at 40 percent supplementation).

AFLATOXIN AND DAIRY PRODUCTS

Aflatoxin M_1 still poses some concern to dairy processors; thus work has been undertaken to determine the influence of different processing functions on the level of aflatoxin in various dairy products. Ways of removing the toxin from milk are also under study. Three papers were presented on this topic by University of Wisconsin researchers (1,4,12). Findings can be condensed into the following general facts, specifically regarding aflatoxin M_1 which reaches milk through cows' feed.

1) Pasteurization of skim and whole milk (145^{o}F for 30 minutes) causes a reduction of aflatoxin M_1 of 30 and 38 percent, respectively.

2) Aflatoxin content of buttermilk does not change during storage.

3) Aflatoxin content of refrigerated butter shows a slight decrease in M_1 after one month of storage. Frozen butter shows an apparent increase in level of the toxin.

4) Aflatoxin M_1 level varies during storage of yogurt, which may simply reflect changes in the efficiency of extraction of the toxin.

5) In stirred curd cheddar cheese, M_1 content tends to decrease initially, then increases and levels off during storage of up to one year. Processed cheese spread made from this cheese shows no decrease in toxin level and the level appears to rise slightly during storage at 50^{o}F. Increases are thought to be due likely to more efficient recovery of the toxin either during ripening of the natural cheese or processing of the cheese spread.

6) Up to 98 percent of aflatoxin M_1 may be removed from milk by treatment with one percent hydrogen peroxide and 0.5 mM riboflavin (vitamin B_2). The mixture is allowed to react for 30 minutes at 86^{o}F and is then followed by pasteurization at 145^{o}F for 30 minutes. As much as 93 percent of aflatoxin M_1 can also be removed by adsorption on bentonite (0.6 g bentonite per 20 ml) with 30 minutes agitation at 86^{o}F.

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