Quality attributes of dried milk products packaged for long-term storage

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Quality attributes of dried milk products packaged for long-term storage

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ABSTRACT

There is a market for dehydrated foods, such as nonfat dry milk (NFDM), that are packaged for long-term storage for use in natural disasters or other emergencies. This research was conducted to determine the nutritional and quality characteristics of dried milk products stored in No. 10 cans for long-term storage.

Introduction

Many studies have evaluated the quality of NFDM stored for up to one year (e.g., Driscoll, 1985; Driscoll, 1988; Driscoll et al., 1985; Okamoto, 1979; Parris, 1980; Okamoto, 1985). These studies have shown that NFDM can last much longer under proper conditions (Henry, 1947; Driscoll, 1985). Various manufacturers of dried milk products have packaged products in No. 10 cans in a reduced oxygen environment to lengthen shelf-life. The objective of this research was to determine the variation in quality between 10 brands of dried milk products packaged for long-term storage.

Methodology

Ten brands of dried milk products (5 instant NFDM, 3 regular NFDM, and 2 whey beverages) packaged in No. 10 cans were obtained from retail distributors. Each winning manufacturer was presented 7 samples in 4 visits. Product codes indicated the samples were less than 1 year old, except brand J (2 years), and brands A and C (unknown). Duplicate samples of each brand were evaluated.

RESULTS

Headspace Oxygen, Seams, and Water Activity

Headspace oxygen (Fig. 1) varied widely from brand to brand, and was influenced by oxygen removal method and can seam quality (Fig. 2). Cans with higher than expected oxygen levels also had poor seams. Oxygen absorbers reduced the headspace oxygen better than a nitrogen flush, as long as the seams were hermetic.

Sensory Results

There were significant differences in aroma, flavor, and overall acceptability between the samples (Fig. 4). The brand that scored highest in overall acceptability had a poor can seam, suggesting that quality would not last over an extended storage time.

Vitamin Content

Thiamin content (Fig. 6) was not significantly different between brands, with the exception of one of the whey beverages, which was extremely high at 17.0 μg/g. All of the products claimed to have been fortified with vitamin A, yet it was detected in only 4 of the 10 brands (Fig. 7). Those brands containing vitamin A were near or at the target fortification level of 5000-3000 IU/Quart.

CONCLUSIONS

There is wide variation in sensory and nutritional quality of dried milk products available at the retail level packaged in cans for long-term storage. Good manufacturing practices must be observed to optimize product quality, giving careful attention to can seam quality, product labeling, and vitamin fortification levels.

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Conclusions

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