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Quality of cornmeal stored long-term in a low oxygen atmosphere
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ABSTRACT
The U.S. Department of Homeland Security recommends food be stored in efforts to be prepared for natural disasters and other emergencies, including the storage of food (Anon. 2006a). The American Red Cross also recommends that food be stored for up to 3 years (Anon., 2005). Commercially packaged cornmeal in No. 10 cans with a low oxygen atmosphere has been available in the retail market for decades, but the effect of long-term storage on quality is unknown. This study examined the quality of cornmeal stored up to 33 years at ambient temperatures in a low oxygen atmosphere.

Sixteen samples of cornmeal packaged in No. 10 cans ranging in age from <1 to 33 years were obtained from emergency supplies and products made from other commercial cornmeal (cornmeal and cornmeal hot cereal) were obtained from a 50-member consumer panel using a point hydric scale for attributes including appearance, aroma, flavor, texture, and overall acceptability. Acceptability of food for everyday use and emergency situations was also evaluated. The quality of each sample was determined by the Tukey test for significance at α = 0.05.

Sensory Evaluation
Three 40-g portions of cornmeal were placed on a white plate and served with a 60-mL water and cream mixture to each panelist. Water activity was measured using the chilled mirror dew point method. Additional sensory evaluations included cornmeal appearance, cornmeal thiamin values ranged from 0.38 to 1.2 μg/g (Fig. 5). Thiamin content was significantly increased with increasing sample age. According to CFI (2013.236), enriched cornmeal is required to have between 4.9 to 6.7 μg of thiamin per serving. These sample labels declared that the enriched was and the two samples of cornmeal had similar label values according to thiamin results, none of the samples reached the required thiamin level and, only one reached the stated on its label. Other samples did not have label values.

CONCLUSIONS
There was a lack of color in cornmeal stored in restaurant- No. 10 cans tested in the time period studied.
However, even after 33 years of storage, all samples were considered acceptable for use in an emergency situation by at least 92% of panelists for cornmeal and all panelists found all samples of cornmeal and 95% of panelists for cornmeal. Also, thiamin content was found to remain stable over time.

Cornmeal can be an important part of a long-term food storage plan because of its stability when properly packaged and stored.

REFERENCES

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Figure 1. Oxidation level of cornmeal stored up to 33 years.

Figure 2. Water activity of cornmeal samples stored up to 33 years.

Figure 3. Water activity of cornmeal samples stored up to 33 years.

Figure 4. Percentage of recall that conformed as part of a regular diet (a), (b), and (c) in emergency situations (d), (e), (f), and (g) when evaluating cornmeal, cornbread, and cornmeal cereal. Dashed line represents 95% confidence interval.

Table 1. CIE L*a*b* color values for cornmeal stored up to 33 years.

Table 2. Mean hedonic scores of cornmeal, cornmeal hot cereal, and cornbread. Common superscripts in the same column indicate no significant difference.

Table 3. Mean color values of cornmeal, cornmeal hot cereal, and cornbread. Common superscripts in the same column indicate no significant difference.