The Center of Excellence for FOOD SAFETY RESEARCH IN CHILD NUTRITION PROGRAMS

COOLING OF TOMATO SAUCE & CHILI IN SCHOOL FOODSERVICE OPERATIONS

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Introduction & Background

- Schools serve an estimated 32 million meals daily through the National School Lunch Program (USDA, 2011).
- Schools are increasing the amount of scratch cooking, which may result in a need for more cooling.
- To keep food safe, the current Food and Drug Administration Food Code (2009) requires that food be cooled to 70°F within two hours and then below 41°F within a total of six hours.
- Cooling procedures are needed to ensure adequate cooling and should be part of the school's Food Safety Program.
- There is limited research that allows foodservice managers to make informed decisions about cooling methods to assure that food code requirements are met.

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Purpose

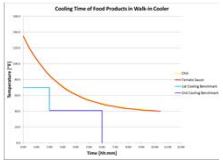
- The purpose of this study was to determine the effectiveness of food product cooling methods used in school foodservice operations. Methods examined included:
  - Walk-in cooler
  - Walk-in freezer
  - Walk-in cooler with the use of a chill stick
  - Walk-in cooler with an ice bath

Methodology

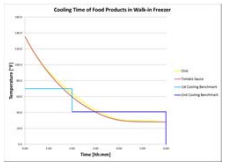
- Two common food products were tested : Chili con Carne with Beans and Tomato Sauce (Meatless).
- Both products were prepared using USDA recipes developed for school foodservice operations.
- Food was cooled in a walk-in cooler and freezer filled to 80% capacity.
- Food was placed at two- and three-inch depths (or 3 gallons of product in a stock pot when using the chill stick) and remained uncovered during cooling.
- Food product temperatures were recorded at one-minute intervals during the 135°F to 41°F cooling range.
- Three replicates of each method were conducted to establish the average cooling curve.
- Three pans of food product were tested in each replicate.

Results

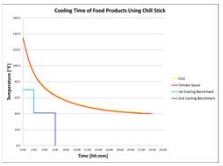
- Walk-in Cooler
  - Neither product met either cooling benchmark (135°F-70°F, M = 187 minutes ± 19 minutes; 70°F-41°F, M = 386 minutes ± 48 minutes).



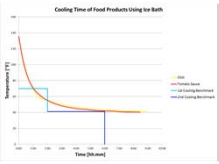
- Walk-in Freezer
  - Both products in the walk-in freezer met FDA food code requirements (135°F-70°F, M = 102.5 minutes ± 11.5 minutes; 70°F-41°F, M = 81.5 minutes ± 11.5 minutes).



- Walk-in Cooler with Chill Stick
  - Food products showed the longest cooling time (135°F-70°F, M = 274.5 minutes ± 35 minutes; 70°F-41°F, M = 1,018 minutes ± 133.5 minutes).



- Walk-in Cooler with Ice Bath
  - Both products met the first cooling benchmark (135°F-70°F, M = 63.5 minutes ± 8 minutes), but did not meet the second (70°F-41°F, M = 416.5 minutes ± 87 minutes).



Conclusions

- Three of the four cooling methods did not cool foods within the time guidelines of the FDA Model Food Code.
- Cooling food products in the walk-in freezer was the only cooling method that met FDA Model Food Code requirements.
- Food cooled using a still chill stick did not meet cooling requirements. This method required the longest cooling time.