



Survival of Possible Pathogens in Ground Beef during Basic Food-Handling Practices

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Objectives

Foodborne illnesses are still a major health concern in the United States and around the world. Bacteria are the source of many food poisoning cases, usually due to improper food handling such as inadequate cooking or heat processing, improper cooling, cross-contamination, poor hygiene, and extended intervals ($> 12\text{h}$ or more) between preparation and eating. Therefore, the objective of this study was to evaluate the presence of *Campylobacter jejuni*, *Escherichia coli*, and *Staphylococcus aureus* during three different thawing methods using three hand preparation treatments prior to cooking.

Materials and Methods

A batch (13,607g) of fresh ground beef (20% fat) was mixed by hand with sterile gloves to guarantee even distribution. Ground beef (150 g) was individually packaged in Nasco Whirl-Pak bags (Fort Atkinson, WI) and frozen at -25°C . One g samples were collected from each individual package to evaluate bacterial presence from three thawing methods; refrigeration (RF), cold water (CW), and room temperature (RT). Each patty was made by hand after designated hand preparation treatment was followed. Hand preparation treatments included: Centers for Disease Control and Prevention method (CDC), which involved wetting hands with cold running water, rubbing hands and between fingers with soap, scrub for at least 20 s, rinse well under clean, running water, and drying with a clean paper towel. Liquid sanitizer (SANT) method consisted of 2 pumps from a Purell bottle and

rubbing hands together to distribute product evenly. The third hand preparation method entailed not washing the hands (WW). One gram samples were collected from each individual patty to evaluate possible bacterial presence. Finally, fresh ground beef patties were cooked to an internal temperature of 71.1°C then allowed to cool to 21.1°C , a final 1 g sample was collected to evaluate possible pathogen survival after cooking.

Results

When analyzing the main effects on pathogen presence, *Staphylococcus aureus* was more prevalent ($p = 0.002$) when using the RF thawing method, however, hand preparation treatment had no effect. Interactions between thawing method and hand preparation were analyzed to determine significance. Data indicates that *E. coli* presence was higher ($p = 0.001$) when using the RT thawing method and WW hand preparation treatment. Presence of *Campylobacter jejuni* remained higher ($p = 0.003$) in RT and RF thawing methods using SANT hand preparation method.

Conclusion

The study indicates that using SANT hand preparation treatment does not reduce the presence of *Campylobacter jejuni* in ground beef patties when using RT and RF thawing methods. Data also implies that the presence of *E. coli* in ground beef patties is not lowered with WW hand preparation treatment while thawing ground beef using RT thawing method. The presence of *Staphylococcus aureus* was not reduced using RF thawing method.