INTRODUCTION & OBJECTIVES

The beef industry has been testing numerous interventions to reduce/eliminate pathogens in beef. While various steps for decontamination are currently used, they are less effective when organisms are embedded into the fat and/or muscle tissue. The only way to eliminate these microorganisms is to use a process capable of penetrating a short distance into the meat.

Hot water treatment has already been determined as an effective microbial intervention for beef carcasses. Due to the possibility of cross-contamination along the production line, implementation of a decontamination step on trimmings would act to further reduce microbial numbers on muscle prior to processing into ground beef.

Suitability for hot water treatment of beef trimmings would be commercially acceptable only if the ground products produced from treated meat retained the processing and sensory characteristics of ground beef that is prepared using current standards.

The objective of this study was to determine the effects of hot water pasteurization of beef trimmings on processing characteristics, shelf-life stability and consumer acceptability of ground beef.

MATERIALS & METHODS

- Fresh beef trimmings at two target fat levels (15% [85/15] and 35% [65/35]) were subjected to Hot Water Treatment (HWT) at 85°C for 40 s using an industrial continuous pasteurizing system. Non-treated trim served as Control (C).

- After HWT, all trimming groups were stored in aerobic conditions at 2°C for 1, 7, 10, 14 days.

- Following the designated storage intervals, the trimmings were ground (4 mm) and ground beef was formed into 5 oz patties.

Evaluation of raw ground beef

- Microbial evaluation
  - Total aerobic plate count (APC), Lactic acid bacteria (LAB), Coliforms, Enterobacteriaceae

- CIE L*, a*, b* colour during simulated retail display

- Sensory evaluation of appearance (9-point hedonic scales)
  - Overall acceptability, colour acceptability

Evaluation of cooked patties

- Patties were grilled to a final internal temperature of 71°C before evaluation

Textural characteristics

- Cook yield
- Bird strength

Sensory evaluation

- Consumer panel (n=100 for each processing rep [n=3]) evaluated overall acceptability and acceptability of appearance, flavour, juiciness, texture and aftertaste (9-point hedonic scales).

Focus groups

- Four focus groups (n=33) were conducted in Edmonton during June of 2014.

Data were analyzed using the PROC MIXED procedure of SAS including fixed effects (fat level, hot water treatment, storage time), and their interactions in the model. The Tukey test was used to determine the differences between treatments means (p<0.05).

RESULTS

- HWT enhanced the microbial quality of beef trimmings during refrigerated storage. The effectiveness of the treatment for microbial control did not depend on fat level of the trimmings.

- HWT had no significant effect on instrumental colour of a*, b* and hue angle parameters (p>0.05). Samples from trimmings subjected to HWT were significantly (p<0.05) lighter in colour and had lower saturation index than those processed from control trimmings.

- The patties processed from trimmings stored for 1 week had significantly lower L* (lightness) and saturation index values and tended to have lower a* (redness) values compared to patties made one day after HWT (p<0.05).

Hot water treatment DOES NOT affect the CONSUMER ACCEPTABILITY of raw and cooked ground beef patties.

- Through FOCUS GROUP sessions, consumers expressed positive attitudes towards trim pasteurization and products produced using this technology.

CONCLUSION

Hot water treatment of beef trimmings could be a commercially applicable technology for improving the microbiological safety of ground beef. Consumer attitudes towards the technology are positive, and it confers no detrimental effects on the processing and eating quality of beef.

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