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Beef Science Cluster

Practical and effective food safety procedures for beef packing plants

Project Title:	Project Code:	FOS.04.13
Identification and validation of commercially practicable practices and procedures for improving the microbiological safety and storage stability of beef	Completed:	*2016*

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Background

Recent work has shown that *E coli* can essentially be eliminated from dressed carcasses in commercial packing plants. Carcass chilling processes can be operated to supplement or largely substitute for decontaminating treatments. Machinery and personal equipment can be cleaned and used in ways that prevent such equipment from recontaminating meat during carcass breaking. As a result, food safety issues with beef may arise if known best practices and treatments and practices necessary to produce cuts and trimmings free of pathogenic *E. coli* and *Salmonella* are incompletely or inappropriately implemented.

Objectives

The objective of this research is to characterize how effectively commercial beef packing plants are implementing effective commercial treatments and intervention procedures to control pathogenic and spoilage bacteria.

What they did

This study was conducted at a commercial beef packing plant that processes 200 head of cattle per week and routinely dry-chills carcasses for three days before fabricating them. Groups of 25 carcasses were selected at random, and swabbed for surface bacteria at the start of chilling, and again after they had been chilled for 1, 2, 4, 6, 8, 24 and 67 hours. Numbers of aerobes (bacteria that grow in the presence of oxygen and are indicators of general hygiene), coliforms (common indicators of fecal contamination) and Escherichia coli were determined. Other carcasses at various locations in the cooler were fitted with probes to

measure carcass surface and deep leg temperatures. Ambient air temperature, movement and relative humidity were set to 0°C, 1.65 m/s and 88% and monitored throughout the chilling process.

What they learned

On average, shoulder and rump surfaces took between 13 and 16 hours to reach 7°C, and the deep leg took up over 32 hours to reach 7°C. The numbers of aerobes on carcass surfaces was reduced by 90% when the first hour of chilling had passed, and by 99% once the first day of chilling was complete. The subsequent 43 hours of chilling didn't reduce the numbers of aerobes any further. Numbers of coliforms and E. coli on carcasses were reduced by more than 90% within the first hour, and by more than 99% by the time the first day of chilling was complete. No coliforms or E. coli were found after the full 67 hours of chilling were completed.

What it means

This study showed that numbers of aerobes, coliforms and E. coli on carcass surfaces could be reduced by 99% within a 24-hour dry chilling period with appropriate air temperature, speed and humidity parameters. Dry chilling process may be a cost-effective method to control microbiological contamination of beef carcasses in abattoirs where daily kill volumes don't justify an investment in hide-on or hide-off carcass washes, sprays, or carcass pasteurizers. It may also be useful for facilities serving export markets that do not yet recognize the effectiveness of some of the interventions commonly used in large commercial packing facilities. Small and large packers can both produce carcasses that are essentially bacteria-free, they just need to use different approaches.

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