



RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY

Beef Science Cluster



Impact of Carcass Processing Procedures on Food Safety

Project Title:

Control of microbiological contamination of product at beef packing plants

Researchers:

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Background:

Canadian beef packing plants have progressively modified their processes to reduce hazardous microbiological contamination of beef. Studies in the early 2000's showed that carcass pasteurizing was generally effective in commercial practice, and produced carcasses that carried about 1 viable *E. coli*/1000 cm² (roughly 40 bacteria per carcass). However, beef was contaminated during carcass breaking; so cuts and trim carried between 1 and 10 *E. coli*/cm². A recent survey found that Canadian retail beef carried only 1 *E. coli*/100 cm², which indicated that the microbiological condition of Canadian beef had substantially improved in recent years. The processes at two Canadian beef packing plants were investigated to determine how this had been achieved.

Objectives:

To determine how beef carcass dressing and breaking processes, carcass and cut treatments and cleaning of both plant (e.g. conveyors) and personal (knives and gloves) equipment affect the microbiological condition of beef carcasses, cuts and trim.

With current practices at Canadian plants, the risks from pathogens on carcasses are largely eliminated.

What They Did:

At two beef packing plants, swab samples were collected from randomly selected sites on carcasses after skinning, evisceration and dressing before and after decontaminating treatments. Samples were also collected from cooled carcasses entering the carcass breaking facility and from cuts, trim and the surfaces of conveyors used for cuts and trim. Rinse samples were collected from the hands, gloves and knives of workers in the carcass breaking facilities before work and after breaks. Bacteria were counted in each sample.

What They Learned:

In addition to other modifications, one plant had installed equipment to wash hide-on carcasses with 1.5% caustic soda. These new processes resulted in the dressed carcasses carrying about 1 cfu/10,000 cm² (approximately 4 viable *E. coli* cells per carcass). The second plant did not use the same elaborate carcass cleaning treatments. Instead, they ensured that carcasses dried as they were chilled. This reduced *E. coli* numbers by 99%, to 1 cfu/1000 cm² (40 *E. coli* per carcass).

At both plants, beef was contaminated with bacteria during carcass breaking. At one plant the numbers were about 1 cfu/100 cm² (roughly equivalent to 1 viable *E. coli* on the average steak) and 1 cfu/1000 cm² on trim. Personal equipment was the source of most of the *E. coli* deposited on cuts, with fewer coming from conveyor belts. At the second plant, cleaned personal equipment was largely free of bacteria and therefore was not a source of contaminants. However, conveyor belts were a source of contamination, resulting in about 1 cfu/100 cm² on both cuts and trimmings.

What it Means:

Careful dressing and effective carcass cleaning practices used in large commercial packing plants can essentially eliminate *E. coli* from whole carcasses. Smaller plants that cannot afford to install costly equipment can still produce carcasses that carry very few *E. coli* by drying carcasses during chilling. Carcass decontaminating treatments and carcass drying are likely just as effective against *E. coli* O157:H7 and *Salmonella* as they are against generic *E. coli*. With current practices at Canadian plants, the risks from pathogens on carcasses are largely eliminated.

Following treatment of carcasses bacterial contamination can occur during carcass breaking. Contamination from personal equipment can be wholly avoided by ensuring that hands, cotton gloves, steel mesh gloves and knives are thoroughly and regularly cleaned, and by wearing disposable rubber gloves between cotton gloves and steel mesh gloves. Control of microbiological contamination from conveyors and other fixed equipment has benefited from improved equipment cleaning processes developed in recent years, and can be enhanced by thoroughly drying equipment after it has been cleaned. It should be possible for commercial packers to essentially prevent bacterial contamination of beef during carcass breaking, to further improve the current very good microbiological condition of Canadian beef.

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