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Beef Science Cluster

Using Recirculated Water in Beef Carcass Pasteurizers

Project Title:	
Bacterial spores in water recirculated in beef carcass pasteurizers	

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Researchers:

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Background:

Some bacteria form spores when the environment becomes stressful. These spores are difficult to destroy, and allow bacteria to survive in dry, hot, acidic, etc. conditions. When the environment returns to normal, the spores germinate and bacterial growth resumes. *E. coli* and *Salmonella* do not form spores, but some less common pathogens, such as species of *Bacillus* or *Clostridium,* do.

Some Canadian beef packing plants use recirculated hot water to pasteurize beef carcass sides. The European Union (EU) only allows carcasses pasteurization using potable (but not recirculated) hot water. An EU expert committee recently found no difficulties with using recirculated hot water to pasteurize carcasses except for the possibility that bacterial spores of potential pathogens may accumulate in the water.

Even with successful negotiations for expanded Canadian access to EU beef markets, product from Canadian plants that use recirculated hot water to pasteurize carcasses will still be ineligible for export unless the concern about spore accumulation in pasteurizer water is addressed.

There is no basis for concern about risks to consumers from the use of recirculated water in beef carcass pasteurizers.

Objectives:

To determine if spores of *Clostridium* spp. or Bacillaceae accumulate in water recirculated in beef carcass pasteurizers at two Canadian packing plants.

What They Did:

Water samples were collected from the carcass pasteurizers at two beef packing plants that each process about 1000 head per shift. Samples were obtained from water that had been sprayed over carcasses as it was returning to water heating tank. Samples

were obtained at different times throughout the day and at the beginning and end of different working days. Each 600 ml sample of water was collected into a plastic bottle containing 100 g of salt. This strong saline solution prevented growth of spoilage bacteria and preserved bacterial spores.

The water samples were heated to kill any bacteria that had not formed spores, then filtered, cultured and incubated with air (to encourage Bacillaceae to germinate and grow), or without air (to allow *Clostridium* species to germinate and grow).

What They Learned:

The numbers of colonies recovered on filters increased during the first hour of the pasteurizers were operated, and fluctuated after that. Bacterial spores did accumulate in pasteurizer waters, but the numbers of spores remained low. This is not surprising because carcasses at both plants are washed after evisceration and after dressing, which would remove most of the spores that might otherwise be washed into pasteurizer water. At most, only one spore per ml was recovered from any water sample.

No *Clostridium* spp. were recovered; only *Bacillus* or *Paenibacillus* spp. were isolated. These bacteria are commonly found in raw milk (up to 10,000 cells/ml), survive pasteurization, and can grow to high numbers in pasteurized milk. They are not regarded as a health risk, so they cannot be a risk in beef pasteurized using recirculated water.

What it Means:

Recirculated beef carcass pasteurizer water would pose no more of health risk than pasteurized milk. There is no basis for concern about risks to consumers from the use of recirculated water in beef carcass pasteurizers

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