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The Effects of the Cecure® Antimicrobial[1] Applied as an Electrostatic Spray on the Shelf-Life and Levels of *Escherichia coli* on Raw Beef Briskets

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ABSTRACT

During the hide removal process in beef slaughter, cross contamination of the carcass surface can occur. Most of the contamination comes from the initial cut into the carcass beginning at the bung region and extending to the neck of the carcass. As the knife penetrates the hide, bacteria can be transferred from the outside hide area to the sterile underside of the hide. It was theorized that application of an antimicrobial at this point could reduce both initial contamination and further cross-contamination during subsequent processing procedures. Hence, the objective of the following study was to determine the effects of an electrostatic spray of the Cecure® antimicrobial (Safe Foods Corporation, N. Little Rock, AR) on the natural microflora and inoculated generic *Escherichia coli* on beef surfaces over time. To accomplish this, five brisket samples were obtained from a local beef retailer. Each brisket contained a natural mixture of both fat and lean surfaces. Samples were transported, on ice, to MCA Services (Rogers, AR). Upon arrival at the laboratory, each of the five briskets was cut into two equal pieces with one half for the control and the other half for the Cecure® spray treatment. Each individual brisket half was inoculated (fat-side up) using a hand-held sprayer with 1,000 generic *Escherichia coli* cells. Cells were allowed to attach for 30 min. Control briskets halves (n = 5) did not receive any further treatment. The five brisket halves that were to be treated with the antimicrobial were placed on a wire rack and received 133 µg cetylpyridinium chloride/cm^2 (using a 0.4% Cecure® solution). On Day 0, both the control and Cecure®-treated brisket halves were swabbed (Neutralizing Buffer) using a sterile template (5 x 5 cm^2) Cecure®. The swabbed area was marked with red dye so that on subsequent sampling days (Days 1 to 8) the previously swabbed area would not be sampled again. Each brisket was then placed on a large sterile plastic tray which was placed in a sterile plastic bag. All samples were held at 40°. All microbiological samples were analyzed in Butterfield's Phosphate Diluent using Aerobic Plate Count and EC Petrifilm™[3]. On Day 0, there was a 2.4 log reduction in Aerobic Plate Count (from 4.5 to 2.1 logs) and a 1.1 log reduction in *Escherichia coli* (from 2.3 to 1.2 logs) on the Cecure®-treated briskets. The initial log reductions in both groups of organisms remained consistent throughout the remainder of the shelf-life period. The control brisket halves reached spoilage levels (10^7 colony forming units per cm^2) by Day 4 whereas the treated brisket halves did not reach spoilage levels until Day 7. The slope and shape of the control and Cecure®-treated microbial growth curves were identical indicating that the increase in product shelf-life was due to the initial reduction in microorganisms (specifically Aerobic Plate Count) on the day of treatment (Day 0) and that there was no continued technical effect during the shelf-life period. The level of *Escherichia coli* on the brisket halves remained fairly constant throughout the refrigerated storage period as would be expected. But, as previously mentioned, the level of *Escherichia coli* on the Cecure®-treated brisket halves was reduced by greater than 1 log on the day of treatment (Day 0) and remained 1 log lower than the level on the control brisket halves throughout the remainder of the study. In conclusion, the application of 0.4% Cecure® via an electrostatic spray treatment is an effective means for lowering the Aerobic Plate Count and *Escherichia coli* levels on raw beef briskets resulting in control of potential pathogens and increased product shelf-life.

Key words: Cecure®, electrostatic spray, beef, shelf-life, *Escherichia coli*

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