The effect of short-time microwave exposures on *Escherichia coli* O157:H7 inoculated onto beef slices

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*Escherichia coli* O157:H7 is an important human pathogen causing haemorrhagic colitis, hemolytic-uremic syndrome and thrombotic thrombocytopenic purpura. In this study the effect of microwave irradiation of beef samples which were inoculated with *E. coli* O157:H7 were investigated. The portions of fresh beef slices weighting 200 g each and about 10 × 10 × 2 cm in size, were soaked in fully growth of *E. coli* O157:H7, in BHI broth. The swab samples were taken from the contaminated samples, after different times of radiation (10, 20, 30, 40 and 50 s), using a domestic microwave oven at full power. The bacterial counts were performed by using surface plating on sorbitol Mac Conkey agar supplemented with cefixime and potassium tellurite. After each experiment the surface temperature of treated samples were measured. The experiment was carried out in triplicate and it was concluded that the microwave radiation which enhance the surface temperature more than 70°C, can eliminate the superficial contamination of cattle beef slices with *E. coli* O157:H7.

Key words: *Escherichia coli* O157:H7, microwave, beef.

INTRODUCTION

Meat is a rich nutrient matrix that provides a suitable environment for proliferation of meat spoilage micro-organisms and common food-borne pathogens, therefore adequate preservation technologies must be applied in order to preserve its safety and quality. Verocytotoxin-producing *Escherichia coli* (VTEC) strains are the most important recently emerged food-borne pathogens (Armstrong et al., 1996). VTEC may belong to many serotypes, but most severe human infections are caused by strains of *E. coli* O157:H7 (Mead and Griffin, 1998). Due to the severity of infection which *E. coli* O157:H7 causes and an infectious dose which may be as low as 10 organisms (Coia, 1998), it has emerged as an important food borne pathogen of considerable public health concern. It causes haemorrhagic colitis, Hemolytic-Ureemic Syndrome (HUS) and Thrombotic Thrombocytopenic Purpura (TTP) (Zhao et al., 1998; Nataro and Kaper, 1998).

Cattle especially the young ones have been implicated as a principal reservoir of *E. coli* O157:H7 (Trevena et al., 1996). Cattle frequently excrete this bacteria in their feces (Molina et al., 2003; Van Donkersgoed et al., 1999). Feces and hides are significant sources of bacterial carcass contamination (Gun et al., 2003). Meat and environment become contaminated from intestinal content of cattle at the time of slaughter, and processing may introduce the organism when performed in non hygienic conditions (Mead and Griffin, 1998). Undercooked beef is the major vehicle of food-borne outbreaks (Zhao et al., 1998; Oldfield, 2001).

High frequency energy includes microwave and radio-frequency energy belongs to the non-ionizing radiations;, microwaves lie between the infrared and radio frequency portions of the electromagnetic spectrum (Jay et al., 2007). In a microwave oven the heating of food results from molecular friction between water molecules under an oscillating electric field of specific frequency (Pucciarelli and Benassi, 2005). Heating by microwave (MW) energy is used for several purposes, e.g., cooking, pasteurization, sterilization and Blanching of foods (Giese, 1992; Datta and Davidson, 2001). The safety of microwave cooking in relation to food borne pathogens is questioned. There are studies reporting in complete...