

## BEEF AS A SOURCE OF MULTI-RESISTANT *ESCHERICHIA COLI* O157 HARBOURING TRANSFERABLE PLASMID AND RESISTANCE PHENOTYPE

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**Abstrak:** Enam puluh lima pencilan *Escherichia coli* enterohemoraj (EHEC) O157 yang diasingkan dari daging lembu yang diimport, dikaji untuk kehadiran plasmid DNA dan kerintangan mereka terhadap 17 ejen antimikrob. Empat puluh pencilan didapati membawa plasmid DNA bersaiz dari 1.8 hingga 86 megadalton. Semua pencilan peka terhadap sefalosporin, sepoferazon, kanamisin, asid nalidiksik, tetapi kerintangan pelbagai terhadap sekurang-kurangnya empat antibiotik dikesan dimana kerintangan kepada basitrasin (100%), metisilin (100%), vankomisin (100%), klindamisin (97%) dan novobiosin (92%) didapati lebih kerap. Dalam dua pencilan yang berkerintangan pelbagai dan membawa plasmid, kerintangan adalah berkaitan dengan kehadiran plasmid 60 megadalton (EC1.21) dan plasmid 1.8, 3, 3.9, 5.1 dan 60 megadalton (EC1.38), yang boleh dipindah kepada penerima *Escherichia coli* K12. Adalah disimpulkan bahawa daging lembu beku yang diimport menjadi pembawa *Escherichia coli* O157 yang membawa plasmid R dalam kawasan yang dikaji.

**Abstract:** Sixty five strains of enterohaemorrhagic *Escherichia coli* (EHEC) O157 isolated from frozen imported beef, were examined for presence of plasmid DNA and their susceptibility to seventeen antimicrobial agents. Forty isolates were found to contain plasmid DNA ranging in sizes from 1.38 to 86 megadaltons. All were susceptible to cephalosporin, ceftiofazole, kanamycin and nalidixic acid, but multiple resistance to at least four of the antibiotics tested was observed with resistance to bacitracin (100%), methicillin (100%), vancomycin (100%), clindamycin (97%) and novobiocin (92%) most common. In two of the selected multiply-resistant and plasmid containing isolates, resistance was associated with carriage of a 60 megadalton plasmid (EC1.21) and 1.8, 3, 3.9, 5.1 and 60 megadaltons (EC1.38) plasmids, which were transmissible to the *Escherichia coli* K12 recipient. It is concluded that imported frozen beef form a reservoir of R plasmid carrying *Escherichia coli* O157 in the study area.

### INTRODUCTION

Since 1982, food-related diarrheal outbreaks caused by highly virulent strains of enterohaemorrhagic *Escherichia coli* O157 have been responsible for outbreaks of haemorrhagic colitis and haemolytic uremic syndrome (Griffin and Tauxe 1991, Padhye and Doyle 1992). It has been established that cattle are the major reservoir for *E. coli* O157 (Chapman *et al.* 1994, Sanderson *et al.* 1995, Zhao *et al.* 1995) with outbreaks of disease directly associated with consumption of foods of bovine origin (Synge *et al.* 1993, Willshaw *et al.* 1993) with additional cases being associated with the consumption of raw milk, fresh meat products such as pork, poultry and lambs (Doyle and Schoeni 1987, MacDonald *et al.*

1988). The organism appears to be a relatively common contaminant of food products of animal origin.

Antibiotics are used in animals both therapeutically and for prophylaxis but, unlike man, drugs used prophylactically are often applied to a whole herd or flock; antibiotics may also be added in low concentrations to animal feeds to promote growth (Hinton *et al.* 1986). The role of antibiotics in promoting the emergence and spread of drug-resistant pathogenic bacteria which infect humans through the food-chain has been a contentious subject for the past three decades. In the 1960s, the use of antibiotics in animals to combat infections and promote growth was to a large extent being negated by the selection of microorganism resistant to these valuable