Title Effect of different storage conditions on *E. coli* O157:H7 and the indigenous bacterial microflora on lamb meat

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Abstract

Lamb chops inoculated with 2.23–2.83 log cfu/g of *E. coli* O157:H7 strain NCTC 12900 were packed in air (AP), vacuum (VP), and two modified atmospheres (MAP) consisting of 100% CO_2 and a commercial mixture of 35% CO_2/35% O_2/30% N_2. All samples (initial total counts < 3.5 log cfu/g) were stored in a commercial cold storage facility set at 4 °C and one AP trial also at 12 ± 1 °C in a temperature controlled incubator. Pathogen and indigenous flora evolution, physicochemical and sensory changes, surface packages temperature and MAP gas composition were monitored throughout the lamb meat shelf life. Temperature monitoring revealed that during chilled storage packed chops exceeded 7 °C about 3% of the time for periods of 10–20 min at 6 h intervals corresponding to defrosting cycles. In AP samples under these conditions, the *E. coli* O157:H7 strain had an overall increase of 0.48 log cfu/g by day 12. This increase, which may be regarded as an artefact of the sampling procedure, might also be a response to fluctuating temperatures. Regardless of rapid proliferation of the background microflora on AP lamb meat kept at 12 ± 1 °C, the pathogen significantly increased by 2.35 log cfu/g after nine days. There was a slight decrease (0.20 log cfu/g) of the pathogen numbers after four weeks cold storage in VP despite a significant increase in lactic acid bacteria (LAB). With a relatively small outgrowth of LAB, chilled storage in 100% and 35% CO_2 resulted in significant differences compared to similar conditions in air (decrease from initial numbers of 0.80 and 0.45 log cfu/g, respectively). Our data confirm the importance of effective temperature control to prevent pathogen growth on raw meat and also that contaminated meat remains hazardous regardless of refrigeration and protective packaging. Further studies are needed to determine the behaviour of *E. coli* O157:H7 at temperatures that fluctuate around the minimum for growth.