Prevalence of Escherichia coli O157 and verocytotoxin producing E. coli (VTEC) on Danish beef carcasses - DTU Orbit (20/10/2019)

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The prevalence of verocytotoxin producing Escherichia coli (VTEC), E. coli O157, and VTEC O157 in 474 swab samples from Danish beef carcasses was determined. The presence of E. coli O157 was determined by a culture method that included immunomagnetic separation (IMS) followed by real time PCR testing of isolates for verocytotoxin (vtx) genes. E. coli O157 was recovered from 4.2% of the carcass samples and VTEC O157 from 3.4% of the samples. All VTEC O157 contaminated carcasses were from bull calves and the VTEC O157 prevalence on bull calf carcasses was 7.3%. The VTEC O157 contaminated beef carcasses were sampled again after one week of cold storage, and 15 of the 16 carcasses were then VTEC O157 negative. The presence of VTEC was determined by a duplex real time PCR assay for vtx1 and vtx2 in DNA from enrichment cultures of swabs. In total 45.4% of the samples were VTEC positive. VTEC were isolated from 21% of 77 vtx-positive samples that were identified by replication of colonies on hydrophobic grid membrane filters followed by hybridisation with vtx specific DNA probes. Fourteen of the 16 VTEC isolates were non-O157 and these strains were negative for the virulence gene eae. A real time PCR assay for the E. coli O157 specific rfbE gene was developed. In total 22.4% of the enriched samples were positive for the O157 rfbE gene. The combined results of the vtx and rfbE real time PCR screening showed that 17.5% of the carcasses potentially were contaminated with VTEC O157.

Screening of carcass swabs was expanded by real time PCR testing for eae in a subset of the samples. Of 244 samples, 25.4% were positive for both vtx and eae. The eae gene was detected in 81% of the vtx-positive samples and in 46% of 67 vtx-negative samples, indicating that bacteria harbouring eae are widespread on bovine carcasses. The present study shows that real time PCR screening of carcass samples for genes encoding virulence or other genetic markers is a reliable method for rapid identification of carcasses that potentially are contaminated with VTEC.

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