This study reports a rapid and molecular approach for the detection of *Escherichia coli* O157:H7, which has become a major public health problem for the last decade by causing a range of symptoms from mild to bloody diarrhoea, haemolytic uraemic syndrome (HUS) and thrombotic thrombocytopenic purpura, from ground beef meat samples. For this purpose, 25 grams of artificially contaminated ground beef meat samples were enriched in buffered peptone water (BPW) at 35°C for 16 h and then DNAs were extracted from these enriched cultures by using the foodproof® Sample Preparation Kit I, which enables the DNA extraction of this pathogen from difficult food matrices such as ground beef. Next, the isolated DNA was analyzed by real-time PCR assay which incorporates primers and hybridization probes for advanced sequence-specific PCR detection of *Escherichia coli* O157:H7 in a time-frame relatively faster than current classical PCR methods from ground beef meat samples by allowing both real time visualization with the ability to continuously monitor the progress of the PCR in each sample after each cycle and confirmation of presence or absence of target organism without the need for further confirmation. The enrichment, DNA isolation and the foodproof® *Escherichia coli* O157:H7 Kit detection procedures used in this study provide a rapid routine-based molecular method for the detection and differentiation of *Escherichia coli* O157:H7 from ground beef meat.