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Prevalence of fecal carriage of main enterohemorrhagic *escherichia coli* serotypes among slaughtered dairy calves in france (#11)

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Introduction

Enterohemorrhagic *Escherichia coli* (EHEC) strains are major worldwide occurring food-borne pathogens, causing hemorrhagic colitis and hemolytic uremic syndrome (HUS). HUS is the leading cause of acute renal failure among young children and is potentially fatal or results in a high rate of renal and non-renal sequelae in survivors. The key virulence trait of STEC is their ability to produce Shiga toxin (Stx), encoded by prophagic stx genes. The most common EHEC belong to one of the 7 following serotypes: O157:H7, O26:H11, O45:H2, O103:H2, O111:H8, O121:H19 and O145:H28, which cause more than 70% of EHEC diseases leading to HUS in France, mainly caused by consumption of contaminated food.

Ruminants' guts, especially cattle, are known to be the main reservoirs of human pathogenic EHEC, and food-borne outbreaks are frequently acquired through the consumption of undercooked ground beef. Several international studies were completed over last years to estimate EHEC prevalence of carriage in adult cattle, during breeding or at slaughterhouse. Very few dealt with calves, and even fewer with dairy calves slaughtered before 8 months old to produce white veal meat, product which can also be ground before consumption, like beef meat.

That's why the present study was carried out to evaluate the prevalence of fecal carriage of these Top 7 EHEC in dairy calves in French slaughterhouses.

Methods

A total of 500 veal calf fecal samples were collected from five French slaughterhouses over the period January - December 2017. They were analyzed using a methodological approach similar to ISO/TS 13136 which included an enrichment step followed by DNA extraction and real-time PCR screening of *stx*, *eae* variants and specific O-group DNA markers corresponding to the Top 7 EHEC serogroups. Immuno-magnetic separation (IMS) was then used for EHEC isolation. Genetic characterization of the recovered isolates led to the identification of EHEC strains.

Fecal samples confirmed as positive for Top 7 EHEC presence were subjected to EHEC enumeration using the most probable number (MPN) method.

Results

Out of the 500 individual fecal samples, 30 EHEC strains belonging to the Top 7 serotypes were isolated from 28 animals which equals a 5.6% prevalence among these 500 sampled dairy calves.

The isolated serotypes were identified as O103:H2 (43%), O26:H11 (30%), O145:H28 (17%) and O157:H7 (10%).

A seasonal effect was recorded and statistically significant, showing two higher EHEC shedding periods, respectively from April to June, and from November to December.

Consistent with the results of studies that evaluated the influence of age of animal on EHEC fecal shedding in 2010-2012, EHEC prevalence in French dairy calves fecal content was slightly higher to the one previously estimated in young dairy bulls (4.5%) but was significantly higher than EHEC prevalence determined in older cattle such as dairy cows (1.8%) and suckler cows (1.0%). This tendency is in agreement with international data stating that the younger a bovine is, the higher the risk to carry EHEC among fecal bacteria is. According to scientific literature, one exception of this tendency may be suckled calves.

Conclusion

These data confirmed previous study conclusions, that is to say that EHEC faecal carriage by calves is usually higher than among adult bovine, especially in dairy breed. Thankfully in France, ground meat currently represent only 3% of produced veal meat volume (as opposed to 30% of beef meat volume), which limits people exposure to EHEC through veal meat consumption.

Nevertheless veal meat manufacturers have already taken measures to ensure safety of sensitive products like transferring and adapting EHEC control standards developed for beef meat production to veal meat industry, monitoring veal cleanliness at slaughter, carrying out systematic research of O157 or Top 7 serotypes EHEC in frozen ground veal meat batches...

To this day, no case of EHEC foodborne disease has been linked to ground veal meat consumption in France.

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Notes