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Introduction

Enterohemorrhagic *Escherichia coli* (EHEC) responsible for the majority of human cases worldwide belong to seven serotypes, i.e. O26:H11, O45:H2, O103:H2, O111:H8, O121:H19, O145:H28 and O157:H7 (also referred to as the « top7 EHEC»). As data on the occurrence of top7 EHEC in calves are limited compared to adult cattle, we evaluated the prevalence of carriage of these top7 EHEC in veal calves slaughtered in France.

Materials et methods

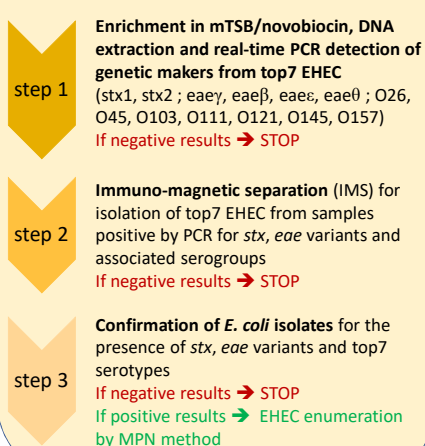
- A total of 500 fecal samples were collected throughout the year 2017 from 101 veal calf fattening units representative of the French production (Table 1).
- Fecal samples were obtained at the time of slaughter, in five french slaughterhouses.

Table 1 : Sampling plan

Month (2017)	Slaughterhouse	No. samples collected	No. fattening units
Jan	B	30	7
Feb	A	30	6
Mar	C	30	8
Mar	E	35	10
Apr	D	30	6
Apr	A	30	6
May	B	30	6
June	A	25	5
Sept	C	30	5
Sept	D	30	5
Oct	B	40	9
Oct	E	45	11
Nov	C	35	4
Dec	D	40	5
Dec	A	40	8
TOTAL		500	101

- Top7 EHEC were screened in fecal samples using a real-time PCR approach similar to ISO/TS 13136 (Bibbal *et al.* AEM 2015; Fig. 1).

Fig. 1 : Screening method



Results

- Among the 500 individuals tested, 28 carried 30 EHEC strains belonging to 4 serotypes (Fig. 2A). Two animals carried two different EHEC strains simultaneously (i.e. EHEC O26:H11 and EHEC O145:H28 for one calf, and EHEC O103:H2 and EHEC O145:H28 for the other one).
- During attempts to isolate EHEC from PCR-positive samples, 39 EPEC strains were also recovered (Fig. 2B). Only one EPEC O103:H2 strain was isolated, contrasting with the 13 EHEC O103:H2 strains obtained.
- EHEC enumeration ranged from less than 0.5 to 2.5 10⁴ MPN per gram of feces (Fig. 3). Only two super-shedders (excreting EHEC O157:H7 or EHEC O103:H2 at 2.5 10⁴ MPN/g) were identified.

Fig. 2 : Serotypes of EHEC (A) and EPEC (B)

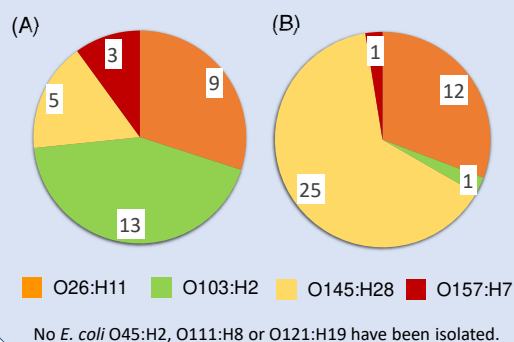


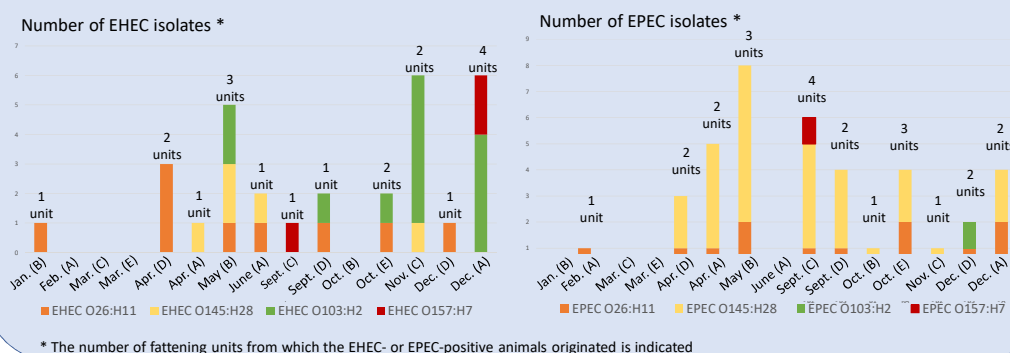
Fig. 3 : EHEC enumeration in the positive fecal samples

MPN/g	No. samples
<0,5	7
2.5	2
2.5 10e1	8
1.3 10e2	1
2.0 10e2	1
2.5 10e2	6
6.0 10e2	1
2.5 10e3	2
2.5 10e4	2*

* December; serotypes O103:H2 and O157:H7

- A seasonal variation in the carriage of top7 EHEC and EPEC was observed, with two highest periods of excretion, i.e. during spring and fall (Fig. 4).

Fig. 4 : Variation of carriage of EHEC and EPEC over time



- Overall, 28 out of the 500 slaughtered veal calves tested carried EHEC strains, corresponding to a prevalence of carriage of top7 EHEC of 5.6% .

Conclusion

- The prevalence of top7 EHEC in veal calves was 5,6%. It was higher than that found previously in France for adult cattle (1,8%) that included the sub-category of young dairy beef (for which a prevalence of 4,5% was found) (Bibbal *et al.* AEM 2015).
- Two serotypes (O103:H2 and O26:H11) accounted for the majority (73%) of EHEC strains isolated.
- Veal calves were more contaminated during spring and fall, which contrasts with the usually observed higher shedding of EHEC by cattle during the warmer months. The factors that may have affected EHEC carriage in the raising farms are under investigation.
- This study also highlighted the carriage by veal calves of top7 EPEC strains that only differentiate from top7 EHEC by the lack of stx genes. The ratio of EHEC to EPEC isolates differed between the serotypes, which could indicate variation in stability of Stx prophage from serotype to serotype.