

# Escherichia coli O157 prevalence in foods from animal origin in Belgium

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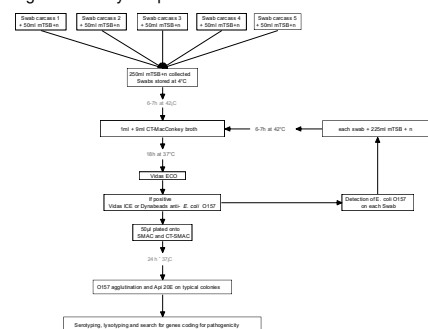
## Introduction

• Enterohemorrhagic *Escherichia coli* O157 is a serious health problem in various countries. In Belgium, all cases are sporadic and no outbreak has been detected. In USA and UK, the consumption of poorly cooked minced beef is an major risk factor. In order to evaluate the contamination rate of Belgian minced meat, samples were randomly investigated for EHEC.

## Material and Methods

- A total of 6010 beef carcasses coming from 41 Belgian enterprises were tested between June 1998 and February 1999 for the detection of enterohemorrhagic *Escherichia coli* O157 and enumeration of *E. coli* and thermotolerant coliforms.
- Each carcasse has been sampled on standardized zones (4 zones on a half beef carcass for about 400 cm<sup>2</sup>). Practically, 5 different carcasses were collected together in order to decrease the number of analysed samples (see figure 2). Individual swabs from positive pools were assayed as described above.
- The detection of *E. coli* O157 was carried out through a short step of selective pre-enrichment in mTSB + novobiocine (6-7 hours, 42°C), a selective enrichment in MacConkey broth with cefixime and tellurite (18 hours, 37°C) and an antigen detection with the immunoenzymatic Vidas ECO (bioMérieux). An immunoseparation step (Vidas ICE, bio-Mérieux or Dynabeads, Dynal) was realised on positive tested broth and the beads were plated onto Sorbitol MacConkey with and without cefixime and tellurite (24 hours, 42°C). An agglutination with anti-O157 latex allowed the detection from MacConkey medium with sorbitol (see figure 2).
- Isolates were serotyped and lysotyped and virulence factor genes searched as previously described (Piérard and al., 1997 ).
- Enumerations of *E. coli* and thermotolerant coliforms were performed with Rapid *E. coli* 2 medium as described by the manufacturer (Sanofi Diagnostics Pasteur)

Figure 2 : Analytical procedure



## Results and discussion

Results are shown in table 1

- Nine strains of enterohemorrhagic *E. coli* O157 have been isolated.
- All of them displayed genes coding for pathogenicity.
- Eight isolates were O157:H7 and one O157:H-
- Four different lysotypes have been detected.
- The rate is lower than that in living cattle (Table 2) but the lysotypes found in cattle and in food are also present in human (Table 3)

Table 1 : Characterisation of isolates

Isolates	Serotype	Lysotype	eae gene	VT gene	cfu fecal coliforms/20 cm <sup>2</sup>
1	O157:H7	RDNC	+	+	unknown
2	O157:H7	RDNC	+	+	unknown
3	O157:H7	RDNC	+	+	unknown
4	O157:H-	8	+	+	7,5.10 <sup>2</sup>
5	O157:H7	54	+	+	1,8.10 <sup>5</sup>
6	O157:H7	54	+	+	6,0.10 <sup>3</sup>
7	O157:H7	RDNC	+	+	5,8.10 <sup>3</sup>
8	O157:H7	54	+	+	< 2,5.10 <sup>2</sup>
9	O157:H7	4	+	+	1,7.10 <sup>4</sup>

Table 2 : Isolates in human, animals and food

		E. coli O157		EHEC O157		
Human*			17			
Animals**	Bovine faeces	1 year old	166	23	-	
		2 year old	154	8	-	
		8 year old	323	10	-	
		all ages	648	41	39	6.0%
Food***	Cattle	Calves	6200	10	10	0.2%
		Calves	186	0	-	
		Pigs	239	10	0	0.0%
		Broilers	182	3	0	0.0%
		Layers	60	3	0	0.0%
		Turkeys	60	0	-	
		Rabbit	60	1	0	0.0%

\* Data 1997

\*\* Data 1998

\*\*\* Data 1997 except for cattle 1998

Table 3 : Lysotypes in human and animals

	Human n=122	Cattle n=39	Beef n=14
1	2		
2	21	4	2
4	20		1
8	28	18	1
14	2		2
2/1/28	3	2	
23		1	
24	3		
31	1		
32	2	3	
34	2	2	
36	2		
39	4		
43		1	
49	12		
50	13		
54	1	5	3
73	1		
RDNC	5	8	5

## Conclusion

- This study shows that less than 0,15% of beef carcasses are contaminated in Belgium.
- The contamination rate is very low, but in some cases, more than 200 cfu/cm<sup>2</sup> of virulent isolates were found, which may be very dangerous for public health.
- Hygienic measures should be taken in slaughterhouses in which highly contaminated carcasses should be reserved for cooked meat.
- The Belgian diet contains raw or undercooked beef meat, which could endanger the risk population, children and elderly, if they eat contaminated meat, even at a low rate of contamination.
- Because of the repercussions for public health, surveillance must be maintained in Belgium and should also assess the contamination rate of meat (for raw consumption) in butchers.

## References

- De Zutter L., Prevalence of enterohemorrhagic *E. coli* O157 in Belgian slaughter cattle. Second International Symposium of European Study Group on Enterohemorrhagic *Escherichia coli*, Brussels, Belgium, April 16-17, 1999
- Piérard D. and al., Virulence factors of verocytotoxin-producing *Escherichia coli* isolated from raw meats, Appl. And Environ. Microbiol.; 1997; Vol 63; 11; 4585-4587.