

Application and revision of microbiological criteria for the quality control of faecal contamination in Belgian slaughterhouses and cutting rooms

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Introduction

- The faecal contamination is likely the main source of potential human pathogens including *Salmonella*, *Campylobacter* and enterohemorrhagic *Escherichia coli* on animal carcasses and on meat. Leakage from the gastrointestinal tract or contact with the animal skin could cause widespread contamination. In warm-blooded animals, the best indication of faecal contamination is *Escherichia coli* numbering. This microorganism is widely present in the gastrointestinal tract and survives under refrigerated conditions but temperatures below 7°C prevent its growth.
- The USDA has chosen *E. coli* as indicator of faecal contamination and the enumeration has to be done mandatory for all industries commercializing meat in the United States of America.
- The Belgian surveillance of meat in 1998 has allowed the evaluation of the sampling method and criteria for the Belgian production surveillance are proposed.

Table 1: Matrixes investigated

Material and Methods

Since 1998, the Belgian surveillance program assess the contamination with *E. coli* of meat from beef, pork, layers, broilers, turkeys and fishes. The matrixes investigated are shown in table 1.

The enumeration of *E. coli* (in cfu/g or cm²) has been realised on the chromogenic Rapid *E. coli* 2 medium (Sanofi Diagnostics Pasteur) after an incubation of 24h at 44°C.

Control charts have been done for each company investigated and these charts have been linked to prevalence of pathogens (*Salmonella* and *Campylobacter*).

Results and discussion

Selected results of the enumeration of *E. coli* obtained in 1998, 1999 and 2000 (part) are presented in figure 1-10 and all criteria are listed in table 2. Figure 11 and 12 show the link between faecal contamination and prevalence of pathogens.

It is to be noted that, firstly, the criterion for fishes (figure 10) is useless as it corresponds to the detection limit of the method; secondly, all "3m" criteria are equal or better in 1999 than in 1998 except for ground minced meat of pork due to the sample origin (from cutting rooms in 1998 and from butchers in 1999).

Figure 1: Beef carcasses

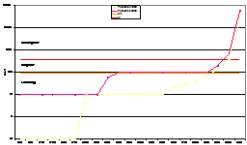


Figure 2 : Beef minced meat

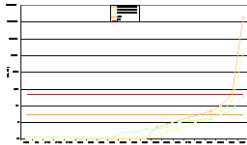


Figure 3 : Calf carcasses

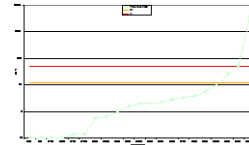


Figure 4: Pork carcasses

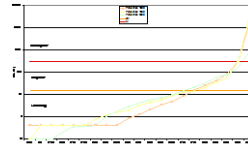


Figure 5: Pork retail cuts

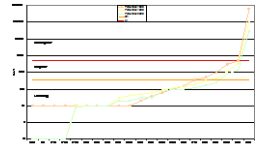


Figure 6: Pork minced meat

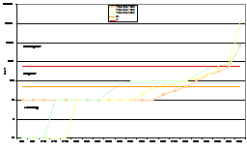


Figure 7: Broilers carcass

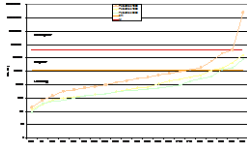


Figure 8: Broilers boneless breast

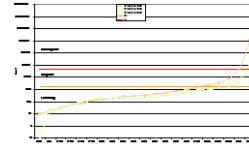


Figure 9: Layers carcasses

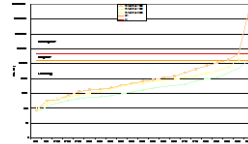


Figure 10: Fishes

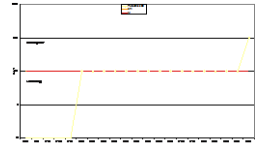


Table 2: Microbiological criteria in 1998 and 1999

	1998		1999	
	3 m	M	3 m	M
Beef carcasses	3	50	3	20
Beef ground meat			30	3.9 10 ²
Pork carcasses	15	3,0 10 ²	15	3,0 10 ²
Pork liver	21	1,5 10 ²		
Pork retail cuts	3,6 10 ²	5,0 10 ³	2,1 10 ²	3,5 10 ³
Pork ground meat	48	6,0 10 ²	1,2 10 ²	1,0 10 ³
Broilers skin	1,2 10 ⁰	4,0 10 ⁰	3,9 10 ¹	4,4 10 ²
Broilers liver	9,0 10 ⁴	3,0 10 ⁵		
Broilers breast	1,8 10 ³	4,5 10 ³	9,3 10 ²	7,9 10 ³
Layers skin	4,5 10 ⁴	5,0 10 ³	1,8 10 ⁴	2,0 10 ⁷
Turkeys skin	1,8 10 ³	9,0 10 ³		
Flesh from fish			10	10

Figure 11: Example of faecal contamination in a company with low pathogen prevalence

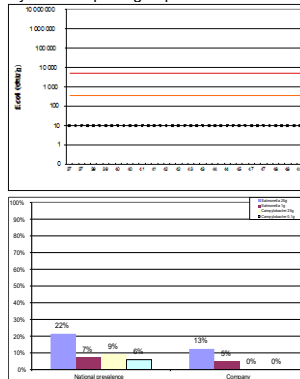
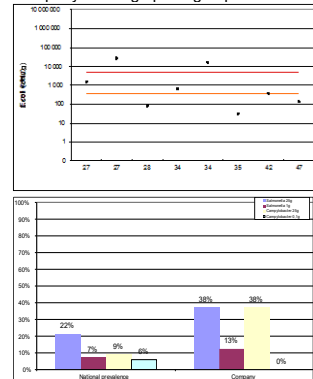


Figure 12: Example of faecal contamination in a company with high pathogen prevalence



Conclusion

These criteria are useful for internal quality control. They will allow an evaluation of the normal contamination rate of the industry, in excluding the accidental contaminations. These criteria must be completed and reviewed at the end of the surveillance program 2000.

Bibliography

Food Safety and Inspection Service (FSIS), Federal Register of Department of Agriculture, FSIS, Part II, 9CFR Part 304 Pathogen reduction; HACCP Systems; Final rules, partim pages 38846-38848.