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Assessment of microbiological criteria for regular checks of faecal contamination and general hygiene in Belgian establishments producing meat

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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 in 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. 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 of E. coli has to be done mandatory for all industries commercialising meat in United States of America.

In its Decision of 8 June 2001 (2001/471/EC), the European Commission lays down the Enterobacteriaceae and total viable counts as regular checks on general hygiene in establishments producing and marketing fresh meat. However, after establishing appropriate criteria, E. coli counts may be used instead of Enterobacteriaceae counts.

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For cooked products, the determination of *Enterobacteriaceae* is a better hygiene indicator than *E. coli*.

The Belgian meat surveillance between 1998 and 2001 has allowed the evaluation of the sampling method and has proposed criteria for *E. coli*, *Enterobacteriaceae* and total plate counts.

### MATERIAL AND METHODS

Since 1998, the Belgian surveillance program has assessed the contamination with *E. coli* of meat from beef, pork, layers, broilers, turkeys and fishes. The following matrices were sampled for *E. coli*:

- Swabs of: beef and calf carcasses (4 zones on a half beef carcass for about 400 cm² in 1998 and 1600 cm² since 1999), pork carcasses (4 zones on a half pork carcass for about 600 cm²)
- Minced meat of beef, retail cuts and minced meat of pork, skin and boneless breast of broilers, skin of layers and turkeys and, in 2000 meat products (ham, pâté, salami).

In 2001, the contamination level of beef, pork carcasses, and meat products with *Enterobacteriaceae* has been assessed. In 2001, the total plate counts was also realised on beef and pork carcasses.

The enumeration of *E. coli* (in cfu/g or cm²) has been realised with the AFNOR validated SDP-07/1-07/93 using the chromogenic Rapid E. coli 2 medium (Bio-Rad) with an incubation during 24h at 44°C. The enumeration of total plate counts followed the NF-V-08-051 method (PCA at 30°C during 48-72h) and the enumeration of *Enterobacteriaceae* was realised using the NF-V-08-054 method (VRBG at 30°C during 24h).

### RESULTS AND DISCUSSION

This study of *E. coli* contamination allowed the estimation of the sanitary level of Belgian companies and the follow-up of each establishment since 1998.

In poorly contaminated matrixes (cattle and pork), as a general rule, the prevalence of pathogens is directly linked to the *E. coli* level of the establishment. This not the case for poultry, which is highly contaminated with *Salmonella* and *Campylobacter*.

The proposed criteria for *E. coli*, *Enterobacteriaceae* and total plate counts are based on the percentiles 75 and 95 of the screening plans of 2000 and 2001 and are showed in Table 1.
The determination of the correlation between *E. coli*, total plate count and *Enterobacteriaceae* in beef and pork carcasses showed that there is a clear relation between *E. coli* and *Enterobacteriaceae* counts, but that there is no relation between the counts of *E. coli* or *Enterobacteriaceae* and the total plate counts.

Because of the specificity of *E. coli* as faecal indicator and of the fact that the *Enterobacteriaceae* counts are integrated in the total plate count, the *E. coli* and total plate counts have been chosen respectively as faecal and hygienic indicators for beef and pork carcasses.

For meat products (ham, pâté, salami), the *E. coli* level in 2000 was very low; the *Enterobacteriaceae* count was then chosen as hygienic indicator for these products.

**CONCLUSION**

*E. coli* and total plate counts are a good mean to evaluate hygienic measure efficacy in meat industry, especially for abattoirs. For internal quality control, companies should use the same sampling method and criteria. They will allow an evaluation of the normal contamination rate of each industry, and of preventive measure efficacy.

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