Table 3 summarizes the expenses, number of registered case and estimated “real” cases, when 5% to 20% of the cases are registered.

**Table 3.** The Danish society costs in 2002, human medicine and lost days of work, for pork related salmonellosis and yersiniosis assuming 5-20% of the real cases are registered.

<table>
<thead>
<tr>
<th>Infection</th>
<th>Reg. cases</th>
<th>Estimated no. of “real” cases</th>
<th>Estimated society expenses for “real” cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonellosis</td>
<td>77</td>
<td>385 – 1,540</td>
<td>165,300 – 601.100</td>
</tr>
<tr>
<td>Yersiniosis</td>
<td>192</td>
<td>960 – 3,840</td>
<td>324,300 – 1,392.000</td>
</tr>
</tbody>
</table>

**Discussion:** The veterinary *Salmonella* control program for swine have reduced the pork related number of human salmonellosis cases from 1,144 cases registered in 1993 to 77 cases in 2002. The annual expenses to the program were 6.9 million Euro in 2002. In total, the expenses to the veterinary program have been close to 90 million Euro since its initiation in 1995. Assuming that the number of human cases had remained at the pre-control level if the salmonella-program have not been implemented, the program have reduced the occurrence of human salmonellosis in Denmark by approximately 1,000 registered cases in 2002. The majority of human salmonellosis cases are not registered, as only the more severely affected patients are examined by culture, so the “real” number of salmonellosis cases avoided in 2002 was probably 5,000-20,000, equivalent to a saved society cost of at least 3.5-8.2 million Euro. Between 70–90% of the society cost to human salmonellosis and yersiniosis is due to lost working days. From a society point of view, the salmonella-program and the improved hygiene on slaughterhouses have significantly reduced the *Salmonella* and *Yersinia* related expenses to hospitalisation, consultation to physicians and lost days of work.

**References:**

**O 36**  
**Comparison of Campylobacter coli strains isolated from pigs and humans - porcine strains a possible source of human infection?**  

M. Gürtler*, T. Alter, S. Kasimir and K. Fehlhaber

Institute of Food Hygiene, Faculty of Veterinary Medicine, University of Leipzig, An den Tierkliniken 1, D-04103 Leipzig, Germany. * corresponding author: Phone: ++49-341-9738233 ; Fax: ++49-341-9738249;  
E-mail: mguertle@rz.uni-leipzig.de

**Summary:** The primary aim of this study was to detect and genotype *Campylobacter* strains from pigs and humans. AFLP (amplified fragment length polymorphism) analysis was used to compare...
different genotypes to identify the genetic diversity of Campylobacter coli (C. coli) strains. Heterogeneous patterns were detectable among the porcine and human C. coli pool. By using an optimized extraction method combined with a PCR it was possible to detect C. coli DNA in some samples of the investigated minced meat but it could not be distinguished between dead bacterial cells and viable but nonculturable cell (VBNC)-forms of C. coli strains.

Keywords: AFLP; minced meat; paramagnetic beads; PCR; VBNC

Introduction: Campylobacter spp. are one of the very common causes of infectious gastroenteritis in humans. In this respect C. jejuni is the most important species. But there is no sufficient information about the relevance and the source of human C. coli infection. C. coli is a commensal of the gut of pigs and is excreted in faeces.

1. In order to assess the importance of pork as a source of C. coli-induced campylobacteriosis in humans it was necessary to detect and evaluate the prevalences of C. coli in pigs and in humans.
2. To characterize the genetic relationship of human and porcine C. coli strains, the genotypes of these were compared.
3. The consumption of minced meat may be a possible source for human infection with C. coli. Therefore we investigated different minced meat products bacteriologically and also by two different molecular biological methods.

Materials and Methods: For isolation of C. coli in fattening pigs (n=1150) a rectal swab was placed directly into Bolton-Broth and then cultured on mCCDA. The enrichment broth and the plates were incubated microaerobically for 48 hrs at 42 °C. After the bacteriological isolation of C. coli strains, the DNA was extracted using a DNA extraction kit and identified using the PCR-technique (Linton, Lawson, et al. 1997 125 /id)). Specific primers for the genus Campylobacter and the species C. coli were used.

For investigation of human C. coli isolates were submitted to use from two regional laboratories as “thermophilic campylobacters” (n=456). Up to three single colonies from each agar plate were further processed by DNA extraction and PCR-technique described above.

In this study, AFLP was used for genetic typing of C. coli strains from pigs and humans as described previously (Duim et al., 1999).

To detect C. coli in pork products, minced meat was investigated bacteriologically and by PCR analysis. In addition an optimized PCR-technique was developed for a more sensitive detection of C. coli in minced meat. Boiled meat samples were mixed with a C. coli specific DNA-probe. After hybridisation paramagnetic beads were added to the mixture and incubated for 30 min at room temperature. C. coli specific PCR followed the extraction procedure.

Results: C. coli were detected in approximately 90 % of the fattening pigs in faeces (n=1150) and 21.5 % of human campylobacter cases bacteriologically examined (n=456). In the slaughter house we isolated C. coli at 85 % in faeces, 20 % on skin surfaces before chilling. After the chilling process no C. coli could detected on the skin surfaces bacteriologically. Human C. coli strains showed like porcine C. coli strains heterogeneous AFLP patterns. Nonetheless single similarities between human and porcine strains (isolated in the same region at similar times) could be established.

Culturable thermophilic Campylobacter spp. could not be detected in minced meat (n=125) bacteriologically. By direct PCR, the detection rate of C. coli increased slightly to 0.8 %.

When using an optimized extraction method combined with a PCR it was possible to detect C. coli DNA in higher numbers of the investigated minced meat samples.

Discussion: C. coli infection in humans is underestimated. At least 20 % of human campylobacteriosis are caused by C. coli. But the sources of C. coli infection in humans are not known.
The chilling process of pig carcasses in slaughter houses reduced the rate of culturable campylobacters on the carcass surface significantly.

Genotyping of C. coli revealed heterogeneous patterns among the human and porcine C. coli pool. It shows that different sources of infection in humans are most probable.

In minced meat we did not detect C. coli bacteriologically, but by the use of paramagnetic beads combined with PCR-technique we detected C. coli positive samples. This shows, that the meat was contaminated with C. coli. It is not clear what importance the presence of C. coli DNA in minced meat has for human infection, even though the presence of viable and culturable C. coli cells could be ruled out by bacteriological investigation. We could not distinguish between dead cells and VBNC forms of C. coli cells. The role of VBNC form of C. coli, a specific phenomenon of campylobacters (Lazaro et al., 1999) and certain other bacteria, has to be investigated further.

**Conclusion:** Porcine strains as sources of human C. coli infection can not be ruled out. Further research is needed to evaluate the C. coli findings in minced meat and the role of VBNC for human infection.

**References:**
