

8. Summary

Quantification of *Campylobacter* spp. on the surface and in the muscle of chicken legs at retail; comparison of different sampling techniques and enumeration methods

In order to collect data about the quantitative load of *Campylobacter* in chicken and thus defining the risk for consumers, the object of the present study was to determine the prevalence and number of *Campylobacter* on the surface and in the meat of chicken legs at retail level and to investigate seasonal influence on the prevalence and number of these pathogens. In the context of quantitative investigations, two different ways of sample preparation for the isolation of *Campylobacter* combined with two different enumeration methods were compared to develop an applicable method for the isolation and enumeration of these pathogens.

From November 2003 to December 2004, 140 packages of raw chicken legs, 10 each month, were bought from different retail outlets in Berlin.

At the beginning of the quantitative investigations, the distribution of *Campylobacter*-counts within the same package was examined in ten packages containing 4 to 5 legs to determine homogeneity within the sample. Results demonstrated that there is only a small difference between *Campylobacter*-counts on the surface of chicken legs within the same package which is a condition for the comparison of the sample preparation types.

The comparison of the sample preparation types was carried out by rinsing one chicken leg (rinse sample) and homogenising the skin (skin sample) of the other leg of the same package with 90 packages. Both sample preparation types were examined by direct plating method and MPN technique in 40 packages and compared based on the colony forming units of *Campylobacter* per leg.

70% (63/90) of the skin samples and 77% (69/90) of the rinse samples were *Campylobacter*-positive. Enumeration of *Campylobacter* by direct plating method revealed a median of log 4.0 CFU/leg surface in skin samples (SD = 0.6) and a median of log 4.3

CFU/leg surface in rinse samples (SD = 0.9). 73% (37/51) of the rinse samples revealed higher numbers of *Campylobacter* than the skin samples.

Concerning the sample preparation types, the direct plating method detected higher numbers of *Campylobacter* in 80% of the compared rinse samples with a median count of log 4.2 CFU/leg surface (SD = 1) than the MPN technique where a median of log 4.0 CFU/leg surface (SD = 1.1) was obtained. The difference was not significant. Furthermore, a highly significant positive correlation was observed between both methods. Due to the results achieved in the comparative examination, the further investigations were continued with skin samples and direct plating method.

In total, results of the quantitative and qualitative investigation show that a high percentage of superficially contaminated chicken legs is sold to the consumer. 66% of the examined chicken legs were contaminated with *Campylobacter* on the surface and the numbers of *Campylobacter* with a median of log 2.4 CFU/g are remarkable. Incidence and number of *Campylobacter* detected by MPN technique in the muscle were comparatively low. Only 27% of the muscle samples were *Campylobacter* positive with a detection limit of >0,3 MPN *Campylobacter*/g. The low contamination rate of meat allocates raw meat a minor role in the epidemiology of human campylobacteriosis. Cross contamination of ready to eat food or contaminated surfaces during food preparation may pose a higher health risk than the consumption of insufficiently heated chicken meat.

Regarding the species distribution, in both, skin and muscle samples, *C. jejuni* was isolated more frequently (84% and 97%, respectively) than *C. coli* (16% and 3%, respectively). The increasing quinolone-resistance of *Campylobacter* isolates from retail is alarming and should be considered when treating *Campylobacter* infection antibiotically.

The increased prevalence and number of *Campylobacter* on chicken legs during warmer months shows a seasonal influence on *Campylobacter* contamination indicating a higher risk at certain seasons.