OCCURRENCE OF *CAMPYLOBACTER* SPP. ON FRESH BROILER CHICKEN CARCASSES AT RETAIL LEVEL IN LATVIA

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Abstract

Campylobacter jejuni and *Campylobacter coli* are the most commonly registered cause of human campylobacteriosis. Mainly the source of these bacteria is from the contaminated foods of animal origin and especially broiler chicken (*Gallus gallus domesticus)* meat.

The aim of the present study was to determine the occurrence of *Campylobacter* spp. in fresh broiler chicken carcasses at the retail level in Latvia. Sampled broiler chicken carcasses originated from two biggest Latvian chicken companies/slaughterhouses and samples were taken during the year 2010. A total of 56.7% of the fresh broiler chicken carcass samples were positive for *Campylobacter*. There was no distinct seasonal variation in *Campylobacter* contamination in Latvia. Additionally, only slight differences between the proportions of *Campylobacter*-positive broiler chicken meat samples of the studied companies were determined.
Key words: *Campylobacter* occurrence, fresh broiler chicken carcasses, slaughterhouses.

Introduction

Campylobacter coli and *Campylobacter jejuni* are mostly slender, spirally curved, gram-negative rods with a characteristic corkscrew-like darting motility. Compared to other food-borne bacterial pathogens, *Campylobacter* are more fragile and require microaerobic conditions for multiplication (Park, 2002). Nowadays, *Campylobacter jejuni* and *C. coli* are the most common registered bacterial causes of human intestinal infections in European Union (EFSA, 2010). The most important sources of this bacterium are the foods of animal origin, especially poultry meat. Therefore, control of *Campylobacter* in poultry meat is a major public health strategy for the prevention of human campylobacteriosis (Friedman et al., 2004) In 2008, the proportions of *Campylobacter*-positive broiler meat samples varied widely between European Union member states (EU), from 3.0% to 86.2% (EFSA, 2009 and 2010). For fresh broiler chicken carcasses the average *Campylobacter* prevalence rate in EU was 75.8% (Rantsiou et al., 2010; EFSA, 2010).

First poultry exposure to the *Campylobacter* usually is at farm level and directly related with insufficient biosecurity measures in and around poultry farm (Newell et al., 2003; Ellis-Iversen et al., 2009). In a flock with 20,000 broilers prevalence of *Campylobacter* can increase from 5% to 95% within 6 days after initial *Campylobacter* introduction (Van Gerwe et al., 2005). The cross-contamination of the chicken meat has been observed at scalding, evisceration and water chilling stages following by the transmission of the *Campylobacter* contamination to the retail level (Hue et al., 2010; Jacobs-Reitsma, 2000). Studies in neighboring Baltic countries Estonia and Lithuania showed seasonal peak of *Campylobacter* occurrence to be in winter and spring season in Lithuania and summer and early autumn in Estonia (Pieskus et al., 2008; Meremae et al., 2010).

The aim of present study was to determine *Campylobacter* spp. occurrence in broiler chicken (*Gallus gallus domesticus)* carcasses at retail level in Latvia.

Materials and Methods

Collection of samples

Totally 240 fresh broiler chicken carcasses were collected during the year 2010. Sampling was performed on a monthly basis, and 10 samples from each of two biggest broiler chicken meat producer in Latvia were collected randomly at retail level in each month. Broiler chicken carcasses from slaughterhouse 'A' were sold in tight, sealed plastic bags opposite to the slaughterhouse 'B' where production of broiler chicken carcasses was sold in loose, unsealed plastic bags.

Campylobacter spp. *isolation*

One to two hours after sampling, 10 grams of skin material from the backs of the broiler chicken carcasses were aseptically taken and placed into sterile plastic bags for enrichment. Plastic bags were prefilled with 90 mL of sterile Bolton broth (Oxoid; Basingstoke, Hampshire, UK), and the samples were processed for one minute in a stomacher and then incubated in microaerobic atmosphere at 37 °C for 4 h to 6 h, followed by 41.5 °C for 44 ± 4 h. After enrichment, detection method of *Campylobacter* spp. described by ISO 10272-1:2006 was followed. Briefly, 10 µL of the enrichment broth were plated on modified charcoal cefoperazonedeoxycholate agar (Oxoid; Basingstoke, Hampshire, UK) and incubated for 48 h at 42 ± 0.5 °C under microaerobic conditions. Typical *Campylobacter* colonies on mCCDA plates were streaked on Columbia blood agar (Oxoid) plates, which were incubated for 24 h at 41.5 °C in microaerobic conditions. Isolation of *Campylobacter* spp. from broiler chicken carcass samples was carried out at the Latvia University of Agriculture, Faculty of Veterinary medicine, in laboratory of Food Hygiene of the Institute of Food and Environmental Hygiene (Jelgava, Latvia).

Campylobacter identification

Gram staining, motility analysis, oxidase and catalase tests were performed for the identification of *Campylobacter* species according to the instructions of the international standard ISO 10272-1:2006.

Statistical methods

The *Campylobacter* spp. occurrence data was analyzed by Microsoft Excel 2010 in order to determine confidence interval.

Results and Discussion

The bacteria isolated from broiler chicken carcasses that showed typical growth on mCCDA, were gram negative, had corkscrew-like darting motility and were catalase and oxidase positive were considered as *Campylobacter* spp. The occurrence of *Campylobacter* spp. on broiler chicken carcasses sampled at retail level during the year 2010 is shown in Table 1.

Table 1

Campylobacter spp. positive samples on raw broiler chicken carcasses at the retail level in Latviain 2010

Month	Slaughterhouse 'A'[1]	Slaughterhouse 'B'[1]
January	8/10	0/10
February	9/10	6/10
March	10/10	2/10
April	8/10	6/10
May	7/10	8/10
June	9/10	8/10
July	10/10	6/10
August	6/10	4/10
September	10/10	10/10
October	5/10	5/10
November	0/10	0/10
December	4/10	1/10
Total	**86/120 (66.7%)**	**56/120 (46.7%)**

[1] – number of positive samples/total samples taken

The average proportion of *Campylobacter* positive broiler chicken carcasses at retail level was 59.2% (95% confidence interval: 52.9 to 65.4%) which is 17% lower compared with average European union member state level where broiler chicken carcasses at slaughterhouse level were investigated (EFSA, 2010). However, the contamination in Latvia was higher than in neighboring country Estonia where the occurrence of broiler chicken carcasses at retail level was 12.3% (Meremae et al., 2010). There is no up-to-date research data available about *Campylobacter* spp. on broiler chicken carcasses at retail level in Lithuania. Previous *Campylobacter* occurrence studies in Lithuania showed that chicken wings and drumsticks at the retail level were contaminated up to 46.5%, and broiler chicken carcasses at slaughterhouse level – up to 45.8%, respectively (Bunevičienė et al., 2010; EFSA, 2010). In the present study the higher occurrence of *Campylobacter* spp. was determined in the products originated from slaughterhouse 'A' compared with products of slaughterhouse 'B'. Small differences in *Campylobacter* occurrence on broiler chicken carcasses of two biggest Latvian broiler chicken meat producers could be associated with the differences in chicken carcass packaging methods (Kovaļenko et al., 2010).

In 2010 only slight seasonal variation in *Campylobacter* contamination levels was observed in Latvia (Table 1). The only months with no *Campylobacter* contamination was November for slaughterhouse 'A' broiler chicken carcasses and November and January for slaughterhouse 'B' broiler chicken carcasses.

We may conclude that *Campylobacter* occurrence in broiler chicken carcasses of both slaughterhouses was relatively high in the year 2010. There is need for further investigation to determine the reason of differences in *Campylobacter* contamination levels compared to Estonia where distinct seasonal variation was observed and very low *Campylobacter* contamination of broiler chicken meat in 2010 was determined (Meremae et al., 2010). Estonia, Latvia and Lithuania are considered to be in the same geographic region where there are still considerable differences in occurrence of *Campylobacter* spp. contamination in broiler chicken production chain. Biosecurity measures of both Latvian broiler chicken meat companies at farm level should be strengthened and proper epidemiological investigation applied to determine *Campylobacter* source attribution and possible contamination routes.

Conclusions

1. According to the study it can be concluded that at Latvian retail level on average 59.2% of broiler chicken carcasses were contaminated with *Campylobacter* spp.
2. There is only slight seasonal variation in *Campylobacter* spp. occurrence on broiler chicken carcasses at retail level in Latvia.

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