EFFECT OF 30-DAY STORAGE AT MINUS 18ºC ON CAMPYLOBACTER CONTAMINATION OF FROZEN JAPANESE QUAILS (COTURNIX COTURNIX)

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ABSTRACT

Studies on prevalence of Campylobacter spp. in quails, partridges and pheasants, as well as the contamination of poultry products shows contradictory results. This paper shows data for the presence of Campylobacter contamination in three batches of broiler quails and the effect of 30-day storage at minus 18ºC on broilers. Sampled quails are of Faraon breed. Campylobacter was isolated from 7.8% of quails before freezing. C. jejuni was the most frequently isolated Campylobacter species (71.4%), followed by C. coli (28.6%). After 30-day storage Campylobacter was found only from 4.4% of quail samples, of which C. jejuni was isolated from 75% and C. coli from 25% of quails.

Key words: Food safety, Japanese quail, freezing, meat, skin surface, C. jejuni, C. coli.

INTRODUCTION

Campylobacter is the most common cause of bacterial gastroenteritis in humans and poultry products are considered the main sources of Campylobacter infections [1, 2, 3]. After Campylobacter appearance in poultry farm it could be found through the fattening period and isolated during the slaughter processing [4, 5]. During the latter conditions for cross-contamination arise in different phases where Campylobacter are transferred from one quail to another or from the alimentary tract to carcass surface. Subsequently Campylobacter is isolated from poultry products [6, 7] in both chilled and frozen broilers and poultry products [8, 9, 10, 11]. Because of lower consumption of game meat and meat from delicacy birds, they are conserved mostly frozen. Presence of Campylobacter in food products has attained high significance.

This paper is aimed at determining the effect of freezing and storage on Campylobacter contamination of broiler quails.

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MATERIALS AND METHODS

Samples were collected from quails from Faraon breed. Quails were randomly chosen from three batches after slaughter and processing, all intended for commercial use. Ten broilers of each batch were tested for Campylobacter, first in the day before freezing and second in 30-day of storage at minus 18ºC. Samples were collected from each broiler from skin surface, chest abdominal cavity and a part of pectoral muscles.

Samples were prepared in compliance with ISO 10272 – 1:2006 [12] that describes a horizontal method for the detection of Campylobacter spp. Samples were cultivated in enrichment broth with antibiotic selective supplement (Merck, 1.02249) and on selective Campylobacter agar, containing antibiotic supplement (Merck, 1.02249).

Samples were incubated in microaerobic conditions at 37ºC and 42ºC for 48 hours. Pure cultures of Campylobacter were tested subsequently for cytochrome oxidase, catalase and hydrolysis of hippurate and indoxylacetate. Bacteria with cell, colonial and biochemical characteristics of Campylobacter spp. were differentiated by API Campy® system (Bio Mérieux, 20800).
RESULTS AND DISCUSSION

Campylobacter was isolated from 7.8% (7 of 90) of the samples of broiler quails on the day before freezing. Most frequently isolated was C. jejuni, followed by C. coli. C. jejuni was detected in 71.4% (5 of 7) and C. coli in 28.6% (2 of 7) of Campylobacter positive samples. The biggest number of Campylobacter positive samples was found in chest-abdominal cavity (13.3%), and lowest positive detection of Campylobacter was found in pectoral muscles (Table 1).

Table 1. Prevalence of Campylobacter spp. in broiler quail carcasses on the day before freezing

<table>
<thead>
<tr>
<th>Samples</th>
<th>n</th>
<th>Campylobacter positive n (%)</th>
<th>Batches</th>
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<tbody>
<tr>
<td></td>
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<td>n (%)</td>
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<td>III (%)</td>
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<td>Skin surfaces</td>
<td>30</td>
<td>2 (6.7%)</td>
<td>1 (10%)</td>
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<tr>
<td>Chest-abdominal cavity</td>
<td>30</td>
<td>4 (13.3%)</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Breast muscle</td>
<td>30</td>
<td>1 (3.3%)</td>
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In the second batch Campylobacter was isolated in samples from the broiler skin surface as well as in chest-abdominal cavity and muscles. In the third batch only one Campylobacter positive sample was detected.

Jeffrey et al., reported (2002) 30% prevalence of Campylobacter in cloaks of pigeons raised for meat. After evisceration of the pigeons, Campylobacter positive were only 13% of all samples on skin surface.

Musgrove et al. (2003) isolated Campylobacter in 1.0 CFU/ml from 58.3% of samples from carcass rinse samples.

Giacoboni et al. (1999) also showed that the consumer should take measures accordingly when preparing food at home. They studied 120 frozen chicken broilers from stores in Argentina and detected 35.8% (43 of 120) Campylobacter positive samples.

On the 30th day after freezing only 4.4 % (4 of 90) of the samples were Campylobacter positive. Compared to the day before freezing we found a decrease in the number of Campylobacter positive samples. Biochemical differentiation showed the almost same proportion between C. jejuni and C. coli. C. jejuni were the more common isolates (75%), followed by C. coli (25%). The biggest number of Campylobacter positive samples was found on broiler skin surface (Table 2). The study showed only one Campylobacter positive result of all samples from chest-abdominal cavity and breast muscles.

Table 2. Prevalence of Campylobacter spp. in broiler quail carcasses on the 30th day of freezing

<table>
<thead>
<tr>
<th>Samples</th>
<th>n</th>
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<td>30</td>
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<td>0</td>
</tr>
</tbody>
</table>

In the second batch Campylobacter was isolated for only one broiler in samples from skin surface, chest abdominal cavity and muscles. In the third batch all samples were Campylobacter negative.

Results from the survey showed a decrease in the number of Campylobacter positive samples in the process of storage below zero degree temperature. The reduction process is less strong in the second batch, as most probably the level of contamination in there was higher compared to the other batches.

Various studies [14, 15, 9] presented evidence for the reduction effect of freezing on poultry bacterial contamination.

Dufrenne et al. (2001) found a level of Campylobacter contamination on chilled poultry of 10 to 50x10^3 CFU. In 34% of all chilled broilers there was contamination of over 1x10^3 Campylobacter cells whilst on the frozen meat only 9% of all showed contamination at the same level.

NACMCF paper (1994) reported that the values of Campylobacter isolation in frozen poultry meat are five times lower compared to the isolation values in chilled poultry meat.

Lee et al. (1998) tested the capability of C.jejuni to survive on skin surface at different temperatures and atmosphere in packing. Reduction effect of temperature conservation
at minus 70ºC was significantly less strong compared to the effect of conservation at minus 20ºC. Reduction of the number of C. jejuni at minus 70ºC was log10 2 and after 5 days it remains almost constant till the end of the study (56 days). At minus 20ºC it could be seen strong reduction (log 100.8) till the end of the experiment. C. jejuni survives freezing better in atmosphere of carbon dioxide, and stronger reduction was reported in nitrogen atmosphere and vacuum.

CONCLUSION
Presence of Campylobacter in frozen quail carcasses even at minus 18ºC indicate that Campylobacter survives freezing and defrosting successfully and remains to be a risk factor for the consumers. That underscores the need for hygiene measures to decrease the risk in following stages of processing as kitchen and heat processing of quails.

REFERENCES