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Original Contribution

PRESENCE OF *CAMPYLOBACTER* SPP. IN MEAT AND INTERNAL ORGANS OF JAPANESE QUAIL (*COTURNIX COTURNIX*)

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ABSTRACT

A number of avian species, such as quails, partridges and pheasants form choice foods in gastronomy but quite often their thermal treatment is fast and insufficient. The role of these species as vector in the spread of *Campylobacter* spp., as well as the contamination of commercial meat products is not clear.

In the current study, the existing campylobacter contamination of broiler quails from 3 different flocks was investigated. The quails of the Pharaoh meat type were taken for examination on reaching 180 g of body weight. After bleeding, rinse samples from the skin surface, breast muscles, liver, heart, spleen, and content from the caecum of the birds were taken. *Campylobacter* micro-organisms were found in 16.1% of the examined samples. The most frequently found *Campylobacter* species was *C. jejuni* (89.7%), followed by *C. coli* (10.3%). The presence of campylobacteria in the digestive tract (the caecum) was confirmed in 80% of the studied specimens. In liver samples, 16.7% were *Campylobacter* positive. Campylobacteria were not found in skin washings, as well as in the samples of breast muscles, heart, and spleen.

Key words: Japanese quail (*Coturnix coturnix*), meat, intestine, internal organs, *C. jejuni*, *C. coli*

INTRODUCTION

During the last few years, the micro-organisms of the *Campylobacter* genus have been an object of strong scientific interest. *Campylobacter* infections in humans are food-borne diseases for which poultry and poultry meat products are considered as an important sources (1, 2, 3) Recently, cases of human *Campylobacter* gastroenteritis in some European countries have been more frequent than those caused by *Salmonella* bacteria (4, 5). At normal (commercial) conditions *Campylobacter* infection develops in broiler flocks within the 2nd or 3rd week (6), with a quick spread up to 100% of the birds (7). The infective agent is preserved until the end of the fattening period, and can be proved during slaughtering process of the birds (8, 9) as well as in the products ready for sales (10, 11, 12). The problem grows in significance, in light of the observation of modern food safety requirements.

In the current study, we aimed to determine the presence and species variation of *Campylobacter spp* in broiler quails, as well as to determine the tissue and organ contamination in this avian species.

MATERIALS AND METHODS

In the current study of *Campylobacter* occurrence, a total of 180 samples from 3 flocks of quails were investigated. From each flock, 10 birds of Pharaoh meat type breed were taken for examination after reaching body weight of 180 g. After bleeding, the following samples were taken from each bird: skin surface rinse samples, breast muscles, liver, heart, spleen, and the digestive content of the caecum.

The culturing of the samples was carried out in enrichment thioglycolate broth (Merck, 1.08190) with antibiotic selective supplement (Merck, 1.02249) as well as on selective *Campylobacter agar* (Merck, 1.02248), containing selective supplement (Merck, 1.02249).

The samples were incubated in microaerobic atmosphere at 37°C and 42°C for total 48 hours. The suspected

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Campylobacter colony was further studied for cytochrome oxidase production, catalase, hippurate hydrolysis and indoxylacetate hydrolysis. Bacteria with cell, colony, and biochemical characteristics identical with *Campylobacter* were differentiated by API Campy® (Bio Mérieux, 20800).

RESULTS

From 180 examined samples, 29 (16.1%) were found positive for *Campylobacter spp.* (**Table 1**). Biochemical differentiation of the produced campylobacteria isolates showed that the *C. jejuni* strain was the most frequently found, followed by *C. coli*.. Of all 29 Campylobacter isolates, 26 were identified as *C. jejuni (89,7%)* and only 3 as *C. coli* (10,3%) (**Table 1**).

Table 1: Campylobacter positive samples obtained from broiler quails

Number of samples	*Campylobacter positive*	*%*	*C. jejuni*	*%*	*C. coli*	*%*
180	29	16.1	26	89.7	3	10.3

Table 2: *Presence of Campylobacter spp. in three broiler quails flocks*

Sample	*Number of samples*	*Campylobacter positive*	*Flock*		
			I	*II*	*III*
			n (%)	*n (%)*	*n (%)*
Skin surface	30	0	-	-	-
Breast muscle	30	0	-	-	-
Liver	30	5 (16.7%)	1 (10%)	2 (20%)	2 (20%)
Heart	30	0	-	-	-
Spleen	30	0	-	-	-
Caecum	30	24 (80%)	9 (90%)	7 (70%)	8 (80%)
Total	***180***	***29 (16.1%)***	***16.7%***	***15.0%***	***16.7%***

The greatest number of *Campylobacter* positive samples (16.7%) was found in batches I and III. In the second batch, 15.0% of the samples were positive for *Campylobacter* (**Table 2**).

The presence of *campylobacteria* in the digestive tract (caecum) occurred in 80% of the birds, with values for the different flocks, 90%, 70%, and 80% respectively.

The examination of organ samples showed that 16.7% of the liver samples were positive for *Campylobacter* spp. In the breast muscles, heart, and spleen *Campylobacter* were not detected (**Table 2**).

DISCUSSION

The existence of *campylobacteria* in the digestive tract (*caecum*) of quails was confirmed in 80% of the birds, the strain *C. jejuni* (89.7%) dominating over the *C. coli* (10.3%) strain. Wedderkopp et al. (5) showed the presence of *Campylobacter* in 46% of the birds (broiler chickens) entering slaughterhouses, with a dominance of *C. jejuni* (86%), followed by *C. coli* (11%), and *C. lari* (1%). According to other authors, the carrier status of campylobacteria ranges from 0 up to 100% for the intestinal content, and between 17 and 100% for presence on the skin surface of the same birds.

In our study, the samples from breast muscles, heart, and spleen, taken from quails under sterile conditions were not positive for *campylobacteria*. This shows that in natural conditions, despite their presence in the digestive tract, *campylobacteria* do not penetrate and colonize the tissue of those organs. The existence of *Campylobacte*r micro-organisms in quails' digestive tracts should be noted as an indication for risk of its spread during slaughtering, and consequently, contamination of the processed carcasses. In real production conditions in the poultry slaughterhouse, it often happens following rupture of the digestive system; subsequently, the exposed faecal matters bring about contamination or cross contamination of the carcasses. The spread of *Salmonella* types during slaughtering process of quails was shown by Sander et al. (14). In 38% of the strains of *Salmonella typhimurium var*. Copenhagen isolated from skin surface of the carcass in the slaughterhouse and from the poultry farms; DNA similarity was established.

The *Campylobacter* presence in the liver samples confirmed by us (16.7%) had relatively low values in comparison with the

results of other authors in examinations of other avian species. Oosterom et al. (15) and Denis et al. (11) established contamination of the liver in broiler chickens within the range from 28.6% to 73.0%. The significance of the liver for food hygiene is great because from one side, there is a risk for the consumer to be infected with *campylobacteria* by the consumption of liver without proper thermal treatment, while on the other side, the liver can also serve as a source and vector for the transmission of those micro-organisms by slaughter processing of the birds. Misawa et al. (16) describe necrotic damages on the liver of quails after experimental infection with *C. jejuni*. Such damage appeared within the period between the 1st and the 7th day after inoculation of the causative agent in the pancreatoduodenal veins, but do not appear when the micro-organism was introduced in the digestive tract of the birds. In our studies, no pathoanatomical changes in the birds' livers were found.

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