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Comparison of Campylobacter jejuni/coli detection rates in fresh broiler meat by cultural enumeration and quantitative real-time PCR

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Key words
chicken, process hygiene criteria, neck skin, slaughterhouse

Aim of the study
In May 2017 quantitative process hygiene criteria (PHC) for Campylobacter on broiler skin sample at slaughter-house were introduced in Switzerland (Swiss ordinance of hygiene, 817.024.1). With implementation of these criteria improvement of slaughterhouse hygiene is intended, leading subsequently to a reduction of Campylobacter on fresh poultry meat. For competent authorities data of the Campylobacter load on skin samples before introduction of the hygiene criteria are needed for the evaluation of successful implementation and/or effective measures at slaughterhouse. Unfortunately no representative samples have been taken at slaughter-house in 2015 or 2016. Hence, random sampled fresh poultry meat without skin, taken in the framework of the Swiss antimicrobial resistance monitoring, were analyzed for determination of the quantitative Campylobacter jejuni/coli rate in retail meat before implementation of the PHC. In parallel, the recently developed qPCR (Haas et al., 2017) was tested as an alternative quantitative approach.

Material and methods
The cultural quantitative analysis followed the method according to ISO 10272: Microbiology of the food chain – horizontal method for the detection and enumeration of Campylobacter spp., Part 2: colony count technique. This method is the prescribed method for assessing the Campylobacter PHC at slaughterhouse. In addition, qualitative enrichment according to the ISO 10272-Part 1: detection method was performed. A quantitative real-time PCR (qPCR), that allows quantification of Campylobacter (C.). jejuni and C. coli in boot socks was recently developed at our institute (Haas et al., 2017). This protocol was adapted to meat samples.

Results and significance
From 01.04.2016 to 30.04.2017 a total of 301 fresh broiler meat samples were taken at retail level. Only two samples (1 % (95%CI 0.2-2.0) showed a Campylobacter jejuni/coli contamination >10 cfu/g meat by cultural enumeration according to ISO 10272-2. By analyzing the samples with the recently developed qPCR 22 samples showed a positive result (7% (95%CI 5-12)), with Ct-value of 35-40, indicating a low level contamination. In 14 samples the qPCR was inhibited, and 265 were negative (Ct values > 40). In contrast, when analyzed by enrichment according to ISO 10272-1, from 302 fresh broiler meat samples taken between 01.01.2016 and 31.12.2016 159 samples (53% (95%CI 47-58)) turned out to be positive for Campylobacter jejuni/coli.
The results show, that already before implementing the new PHC, only a few fresh broiler meat samples at retail level (1%) exhibit enumerable amounts of Campylobacter jejuni/coli. Even by qPCR only 7% of the samples were positive at a low contamination level. In contrast, a remarkable percentage (53%) of meat samples was positive for Campylobacter jejuni/coli when enrichment was used. When interpreting these results, one has to take into account that predominantly sliced breast meat without skin was tested, which is known to be less contaminated than meat with skin. However, application of the PHC established for broiler carcasses at slaughterhouse after chilling seems not to be appropriate for fresh broiler meat at retail level.
In 2016 more than 7800 cases of human campylobacteriosis were notified in Switzerland. As the infection dose for Campylobacter is very low (approx. 550 cfu), it is likely that, although only a few meat samples were positive

by enumeration, the high percentage (53%) of qualitatively Campylobacter positive meat samples are main-ly responsible for the human cases.

Publications, posters and presentations
A publication in a peer-reviewed journal is in preparation.

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