A poultry processing model for Quantitative Microbiological Risk Assessment

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Summary
A mechanistic poultry processing model for a quantitative microbiological risk assessment (QMRA) of Campylobacter is presented (Nauta et al., 2005; Nauta et al., in press; Van der Fels-Klerx et al., in press), which can also be applied to other QMRA’s involving poultry processing. The same basic model is applied in each consecutive stage of industrial processing. It describes the effects of inactivation and removal of the bacteria, and the dynamics of cross-contamination in terms of the transfer of Campylobacter from the intestines to the carcass surface or the environment, from the carcass to the environment, and from the environment to the carcass. From the model it can be derived that, in general, the effect of inactivation and removal is dominant for those carcasses with high initial bacterial loads, and cross-contamination is dominant for those with low initial levels. In other QMRA poultry processing models, the input-output relationship between the levels of contamination on the carcasses is usually assumed to be linear on a logarithmic scale. This mechanistic model shows that this may not be realistic. As non-linear behaviour may affect the predicted effects of risk mitigations, this finding is relevant for risk management. Good knowledge of the variability of bacterial loads on poultry entering the process is important. The common practice in microbiology to only present geometric means of bacterial counts is insufficient: arithmetic means are more suitable to describe the effect of cross-contamination. The effects of logistic slaughter (scheduled processing) as a risk mitigation strategy are predicted to be small. Some additional complications in applying microbiological data obtained in processing plants are discussed. The model has been applied in QMRA of Campylobacter in the Netherlands within the multi-disciplinary CARMA (CAmpylobacter Risk Management and Assessment) project (Nauta et al., 2005; Havelaar et al., 2005). For more information on the CARMA project see the CARMA website: www.rivm.nl/carma.

References