

## **Exposure to bioaerosols in poultry houses at different stages of fattening; use of real-time PCR for airborne bacterial quantification.**

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Previous studies have demonstrated that poultry-house workers are exposed to very high levels of organic dust and consequently have an increased prevalence of adverse respiratory symptoms. However, the influence of the age of broilers, on bioaerosol concentrations has not been investigated. To evaluate the evolution of bioaerosol concentration during the fattening period, bioaerosol parameters (inhalable dust, endotoxin and bacteria) were measured in 12 poultry confinement buildings in Switzerland, at 3 different stages of the birds' growth; Samples of air taken from within the breathing zones of individual poultry-house employees as they caught the chickens ready to be transported for slaughter, were also analysed. Quantitative PCR (Q-PCR) was used to assess the quantity of total airborne bacteria and total airborne *Staphylococcus* species. Bioaerosol levels increased significantly during the fattening period of the chickens. During the task of catching mature birds, the mean inhalable dust concentration for a worker was  $31 \pm 4.7 \text{ mg/m}^3$ , and endotoxin concentration was  $11'080 \pm 3436 \text{ UE/m}^3$  air, more than ten-fold higher than the Swiss occupational recommended value ( $1000 \text{ UE/m}^3$ ). The mean exposure level of bird catchers to total bacteria and *Staphylococcus* species measured by Q-PCR is also very high, respectively reaching values of  $72 (\pm 11) \times 10^7 \text{ cells/m}^3$  air and  $70 (\pm 16) \times 10^6 \text{ /m}^3$  air. It was concluded that in the absence of wearing protective breathing apparatus, chicken catchers in Switzerland risk exposure beyond recommended limits for all measured bioaerosol parameters. Moreover, the use of Q-PCR to estimate total and specific numbers of airborne bacteria is a promising tool for evaluating any modifications intended to improve the safety of current working practices.



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