



Field Investigation of Airborne Bacteria in Swine House of South Korea



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Abstract

Mean concentrations of airborne bacteria in terms of pig housing type were highest in growing/fattening housing room followed by nursery housing room and gestation/farrowing housing room ($p < 0.05$). The swine house showed the highest levels of airborne bacteria in summer followed by spring, winter and autumn ($p < 0.05$). Overall airborne bacteria which have particle size over $2.1\mu\text{m}$ (stage1~stage4) accounted for approximately 70% compared to total airborne bacteria regardless of pig housing type. The predominant airborne bacteria in swine house were *Staphylococcus* spp., *Micrococcus* spp. and *Brevibacillus* spp.

Keywords: Airborne bacteria, pig building, gestation/farrowing, nursery, growing/fattening

Introduction

Indoor air pollution in swine house by airborne bacteria may be a major cause of decreased pig productivity and respiratory diseases of farmer such as asthma, rhinitis, bronchitis, and bronchitis. However, it is necessary to conduct a fundamental study in South Korea because there is little domestic information for the distribution characteristics of airborne bacteria in swine house. Thus, an objective of this study is to quantify the levels of airborne bacteria in swine house according to pig housing type.

Methods

The swine house surveyed in this study was enclosed type operated with mechanical ventilation system and manure removal by slurry pit. The sampling sites in swine house were gestation/farrowing room, nursery room and growing/fattening room. It was visited every month in 2016 and the mean data obtained for three consecutive months were considered as a seasonal level: spring (Mar. to May), summer (Jun. to Aug.), autumn (Sep. to Nov.) and winter (Dec. to Feb.). Samples were collected at 1.5m above the middle floor in pig housing room. A six-stage viable particulate cascade impactor was used to collect airborne bacteria in pig building. The plate media for culturing airborne bacteria was a Trypticase Soy Agar (TSA). The statistical analysis was applied to verify the significance of concentration difference in airborne bacteria among pig housing rooms and seasons.

Results

Mean concentration of airborne bacteria in the housing room of gestation/farrowing pigs were $4,028(\pm 836)\text{cfum}^{-3}$ in spring, $9,025(\pm 2,048)\text{cfum}^{-3}$ in summer, $1,729(\pm 429)\text{cfum}^{-3}$ in autumn, and $2,108(\pm 605)\text{cfum}^{-3}$ in winter, respectively. Mean concentrations of airborne bacteria in the housing room of nursery pigs were $10,126(\pm 3,014)\text{cfum}^{-3}$ in spring, $31,248(\pm 8,351)\text{cfum}^{-3}$ in summer, $2,228(\pm 724)\text{cfum}^{-3}$ in autumn, and $3,826(\pm 1,024)\text{cfum}^{-3}$ in winter, respectively. Mean concentrations of airborne bacteria in the housing room of growing/fattening pigs were $31,214(\pm 6,256)\text{cfum}^{-3}$ in spring, $33,508(\pm 8,058)\text{cfu m}^{-3}$ in summer, $9,425(\pm 1,256)\text{cfu m}^{-3}$ in autumn, and $24,136(\pm 3,304)\text{cfum}^{-3}$ in winter, respectively. Overall airborne bacteria which have particle size over $2.1\mu\text{m}$ (stage 1~stage 4) accounted for approximately 70% compared to total airborne bacteria regardless of pig housing type. The predominant airborne bacteria in swine house were *Staphylococcus* spp., *Micrococcus* spp. and *Brevibacillus* spp.

Discussion

The concentrations of airborne bacteria in swine house obtained from this study were estimated to be 10 to 100 times higher as compared to those measured in the general residential facilities [3,4,2]. The result would be explained by that organic materials such as feed, excreta and pig skin, which can be the

main source of microorganisms, are relatively large in swine house compared to the general residential facilities [1].

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Conflict of Interest

I certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript and I am the sole contributor to this project.

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