Fungal contamination - Comparation between Portuguese poultries and swines

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1. INTRODUCTION

Animal confinement tends to increase the overall microbial load in the production environment caused by high amounts of feed and organic residuals (manure and wastewater) present in those environments. The number of animals and the handling and management required to work in these settings also contribute to enhance that microbial load. Animal housing typically exposes workers to substantial concentrations of bioaerosols, such as fungi and their metabolites (Clark et al., 1983; Cole et al., 2000; Douwes et al., 2003; Zejda et al., 1994). Therefore, agricultural workers, and especially pig and poultry farmers, are at increased risk of occupational respiratory diseases (Kogevinas et al. 1999; Senthilselvan et al. 1997; Novak 1994; Radon et al. 2001).

Exposure to bioaerosols in poultries and swines may vary depending upon the stage of the animals' growth, density, manure management procedures, litter type and used floor coverage, among others (HSE, 2009; Mc Donnell et al., 2008). Gathering temporal information about the quantity and the composition of fungal load is necessary to better understand the relationship between these factors and adverse health symptoms of workers.

This study aimed to characterize and compare fungal contamination between these two different settings.

2. MATERIALS AND METHODS

A descriptive study was developed in order to assess air contamination caused by fungi in seven poultry and seven swines' units. Air samples of 25 liters for poultries and 50 liters for swines were collected using a Millipore Air Tester (Millipore) by impactation method at a velocity of 140 L / minute and at one meter height, using malt extract agar supplemented with chloramphenicol (0.5%). Air sampling was also performed outside premises, since this is the place regarded as reference. All the collected samples were incubated at 27 °C for 5 to 7 days.

After laboratory processing and incubation of the collected samples, quantitative colony forming units/m^3 (cfu/m^3) and qualitative results were obtained, with identification of the isolated fungal species (Hoog *et al.* 2000).

3. RESULTS AND DISCUSSION

Regarding fungal load in the air from the seven poultry farms, the highest value obtained was 24040 (CFU/m^3) and the lowest was 320 CFU/m^3. Twenty eight species / genera of fungi were identified, being *Scopulariopsis brevicaulis* (39.0%) the most commonly isolated species and *Rhizopus* sp. (30.0%) the most commonly isolated genus. From the *Aspergillus* genus, *Aspergillus flavus* (74.5%) was the most frequently detected species. Considering the fungal load detected, a study performed in two poultry farms in Zagreb (Rimac *et al.*, 2010) presented much higher counts than the ones found in the seven poultry farms analyzed in our study (31200 CFU/m^3 – 4900 CFU/m^3 and 68400 CFU/m^3 – 7600 CFU/m^3 *versus* 240 CFU/m^3- 24040 CFU/m^3). These quantitative differences may be due to many factors such as environmental variables, ventilation rate, presence or absence of air cleaning technologies, animal stocking density, birds' species, and age, manure management methods, and others (Oppliger et al., 2008). species belonging to the genera *Scopulariopsis*, *Rhizopus*, *Aspergillus* and *Penicillium* were the most prevalent in our study, in accordance with Rimac et al. (Rimac et al., 2010).

Concerning the fungal load of the analyzed swines, the highest obtained value was 4100 CFU/m^3 and the lowest was 120 CFU/m^3. Forty six different fungal species were detected in air, being *Aspergillus versicolor* the most frequent species found (20.9%), followed by *Scopulariopsis brevicaulis* (17.0%) and *Penicillium* sp. (14.1%). Different fungal counts were obtained in a study performed by Duchaine *et al* (547 CFU/m^3 – 2862 CFU/m^3 *versus* 120 CFU/m^3- 4100 CFU/m^3), maybe be due to different procedures of building maintenance (Duchaine *et al.*, 2010). In a study published by Jo and Kang (Jo & Kang, 2005) *Aspergillus* sp. and *Penicillium* sp. were also the most frequent found in swines.

4. CONCLUSIONS

Data gathered from this study corroborate the need of monitoring the fungal contamination in both settings. Fungal quantification and species identification have important implications in the evaluation of potential health risks to the exposed workers.

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