

## Poultry production chain: Where is the highest occupational threat?

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**Introduction:** Poultry farmers are occupationally exposed to many respiratory hazards, being the two most reported the fungal burden and particles. Besides poultries we also must consider poultry slaughterhouses, since it may confine the same exposure risks.

**Objective:** In this study we aimed to assess fungal and particles' exposure in seven poultries with floor-housed operations and in one poultry slaughterhouse to assess and compare occupational exposure to both risk factors in the two occupational settings.

**Materials and methods:** Seven poultries and one slaughterhouse were assessed by air samples through impaction method. Surface samples were also collected by swabbing the surfaces of the same indoor places. Besides air and surface samples, 7 new and 14 used litter samples were also collected in sterilized bags from the seven poultries. All samples were incubated at 27.5°C during 5 to 7 days. Aiming to apply molecular methods, samples of 300 liters of air were collected through the impinger method. Molecular detection of *Aspergillus flavus* and *Aspergillus fumigatus* complexes was obtained by real time PCR (PCR RT). Besides fungal contamination, we also assessed the exposure to particles. Two metrics were considered: particle mass concentration (PMC) - measured in 5 different sizes (PM0.5; PM1; PM2.5; PM5; PM10) - and particle number concentration (PNC) based on results given in six different diameters sizes, namely; 0.3 µm, 0.5 µm, 1 µm, 2.5 µm, 5 µm and 10 µm.

**Results:** Air fungal load in the poultries analyzed ranged from 320 to 8120 CFU/m<sup>3</sup>. Twenty eight different fungal genera were detected from the analyzed poultries. *Aspergillus versicolor* complex was the most frequently found in the air (20.9%). *Aspergillus flavus* complex, among all detected *Aspergillus*, presented the highest level of airborne spores (>2000 cfu/m<sup>3</sup>). From the analyzed surfaces, *A. versicolor* complex was detected in higher number (>3x10<sup>-2</sup> cfu/m<sup>2</sup>). *Penicillium* was the genera most found (59.9%-42.3%) both in new and used litter. Regarding the poultry slaughterhouse, the fungal load ranged from 10 to 970 CFU/m<sup>3</sup>. Eight species/genera were detected in the air, being the most frequently found *Scopulariopsis candida* (59.5%) and *Penicillium* sp. (32.8%). Only *Mucor* was isolated in surfaces. Isolates belonging to *A. fumigatus* complex (83.3%) and *A. niger* complex (16.7%), among the *Aspergillus* genus, were the only ones isolated in this setting. Poultries showed higher contamination of particles (for both metrics) than the slaughterhouse and with significant differences (p<0.001).

Through molecular methods, we were able to detect the presence of DNA from toxigenic strains of *A. flavus* complex and DNA from *A. fumigatus*. Interestingly, the sampling sites (poultries) where the detection was positive gave negative cultural results for those species-complexes. None of the targeted species were found in the slaughterhouse.

**Conclusions:** Occupational exposure to fungal burden and particles was higher in poultries than in the analyzed slaughterhouse. However, in both occupational settings, we must consider the potential co-exposure to several mycotoxins, since more than one fungal species, recognized as mycotoxin producers were found simultaneously.