Introduction

Swine production has been associated with health risks and workers' symptoms with an increased prevalence of several respiratory symptoms and diseases, such as chronic bronchitis, chronic obstructive pulmonary disease and organic dust toxic syndrome. In Portugal, as in other countries, large-scale swine production involves several activities in the swine environment that require direct intervention, increasing workers’ exposure to organic dust.

This study describes an updated protocol for the assessment of occupational exposure to organic dust, to unveil an accurate scenario regarding occupational and environmental risks for workers' health.

Materials and methods

- Active (air samples) and passive sampling methods (surfaces, floor covering and feed samples) were performed (Table 1).
- At each working site, 4 air samples were taken for each media (malt extract agar (MEA), dichloran glycerol (DG18), tryptic soy agar (TSA), Violet Red bile agar (VRBA)).
- The molecular detection of the Aspergillus sections Circumdati, Fumigati and Flavi (only the toxigenic strains) was performed by Real Time PCR (RT-PCR).

Active methods (Air samples):

Bacteria load: The limit values suggested for total were surpassed in 35.7% (10 out of 28). None of the sampled sites exceeded the limit values suggested for Gram-negative bacteria.

Fungal load: In 65.5% (19 out of 29) of MEA samples surpassed the guideline suggested by World Health Organization (150 CFU·m⁻³), whereas DG18 revealed an increased amount of sampling sites (82.8%; 24 out of 29) (Figure 1).

Among Aspergillus genus found on air samples, section Circumdati was the most prevalent (55%) on MEA and Versiculares the most identified (50%) on DG18.

Results

Passive methods (feed, floor coverage and surface swabs)

Results suggest a higher contribution of Gram-positive than Gram-negative bacteria in the bacteriota load.

Different fungal species were found in the different environmental matrices assessed and in the different media (Table 2).

No Aspergillus section Fumigati nor Aspergillus section Versiculares were detected by qPCR.

Discussion and conclusion

The complementarity of the results allows us to infer the importance of using different sampling methods and different culture media to achieve a more accurate exposure assessment. As in other studies developed in settings with high fungal contamination, it was possible to identify one fungal species on surfaces that was not found in air samples.

The sampling (active and passive) and analysis (culture-based and molecular) methods employed should be adopted as a protocol to be followed in future exposure assessments.

References


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