

# From the farm to the fork: fungal occupational exposure in the swine meat supply chain

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## Introduction

Feed production, swine and slaughterhouses were already reported as occupational environments with high fungal contamination [1,2]. This condition can ultimately lead to the development of several health conditions [3].

## Aim of study

This study aimed to characterize the occupational exposure to fungal burden in three different settings: swine feed unit, swine units and slaughterhouse.

## Materials and Methods

Air samples were collected through an impaction method onto malt extract agar (MEA) supplemented with chloramphenicol (0.05%), alongside with surface swabs. Outdoor samples were also performed to be used as reference. All the collected samples were incubated at 27°C for 5 to 7 days. In addition, we collected air samples using the impinger method in order to perform real-time quantitative PCR (qPCR) amplification of genes from *Aspergillus* sections *Circumdati*, *Flavi* and *Fumigati*.

## Results and Discussion

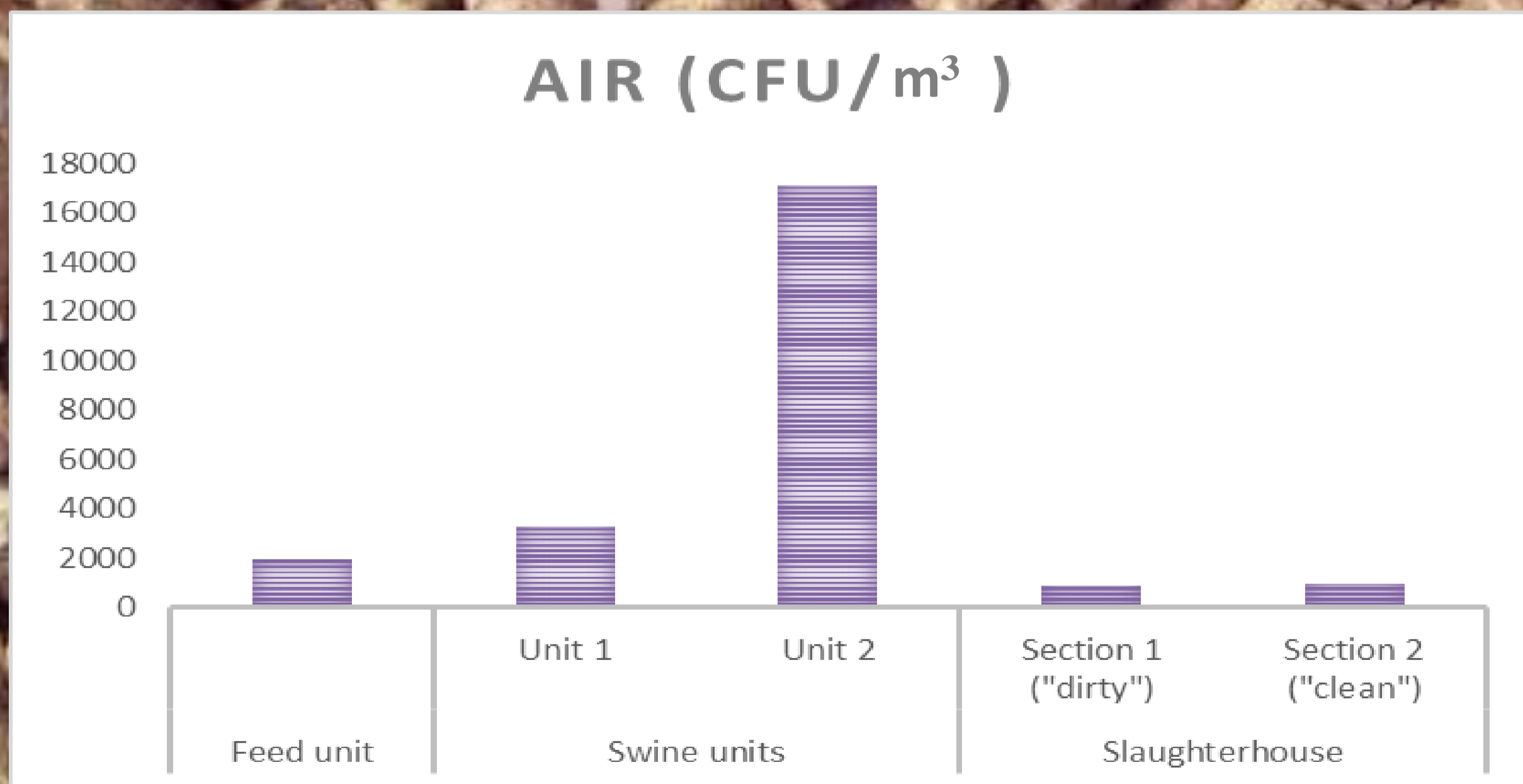


Figure 1 – Fungal load found in the different settings assessed in air samples (CFU/m<sup>3</sup>).

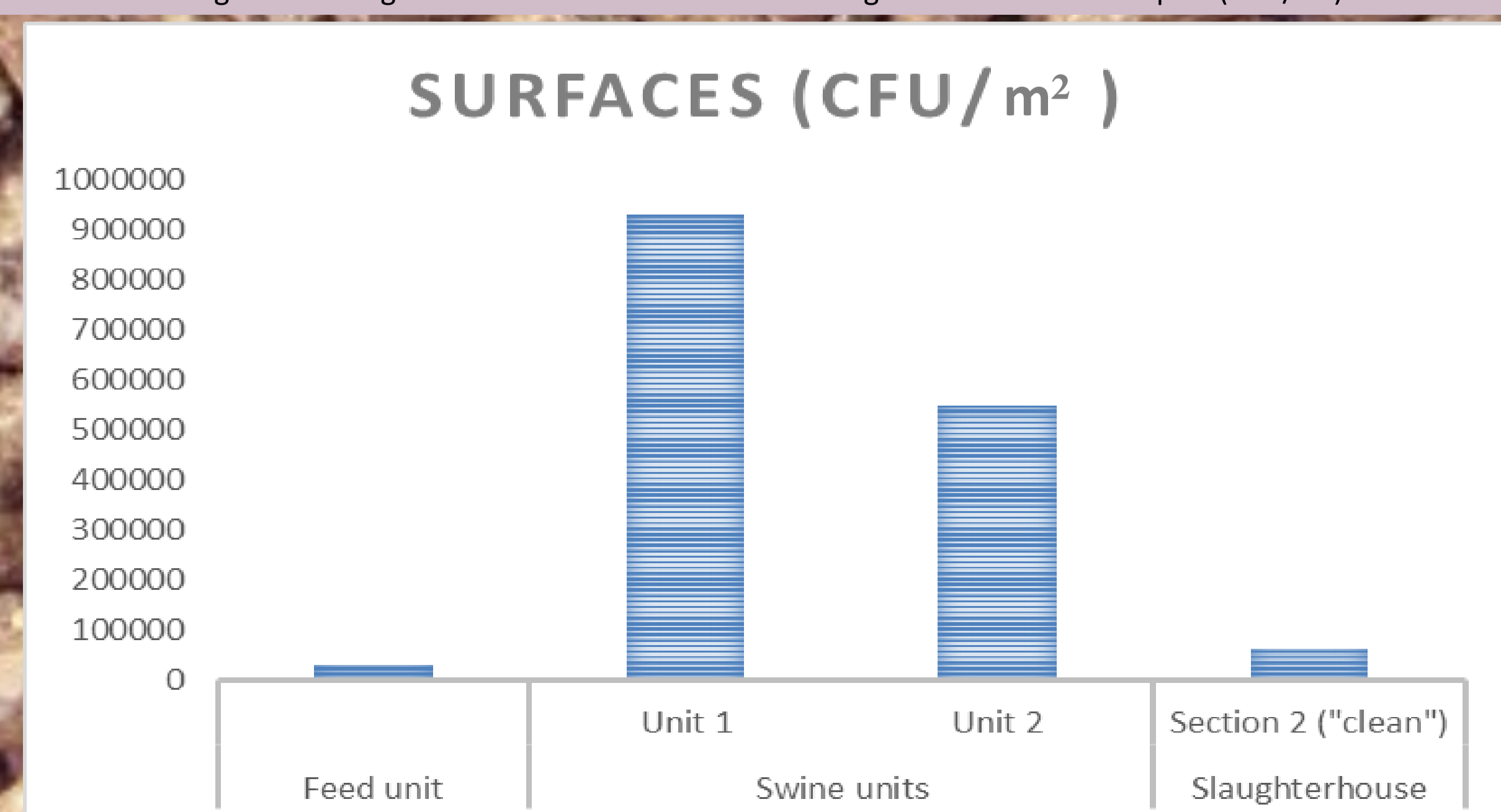


Figure 2 – Fungal load found in the different settings assessed in surface samples (CFU/m<sup>2</sup>).

## Swine feed unit

- **Air:** Most prevalent were *Cladosporium* sp. (54.6%) and *Alternaria* sp. (35.8%).
- **Surface:** *Mucor* sp., *Rhizopus* sp., *Alternaria* sp.

## Swine units

- **Unit 1:** 80.6% of the isolates in **air** belonged to *Cladosporium* sp., followed by *Aspergillus ochraceus* complex and *Fusarium graminearum* complex (each 3.7%). In the **surfaces**, countless colonies of *Mucor* sp. and *Rhizopus* sp. were detected.
- **Unit 2:** *Cladosporium* sp. (52.7%), *A. ochraceus* complex (23.7%) and *Penicillium* sp. (11.9%) were present in the **air**. *Scopulariopsis candida*, *Penicillium* sp. and *Rhizopus* sp. were detected in **surfaces**.

## Slaughterhouse

- **Air:** *Cladosporium* sp. (48.2%), *Penicillium* sp. (31.8%) and *Aureobasidium* sp. (10.6%).
- **Surface:** *Cladosporium* sp. (50%) followed by *Penicillium* sp. and *Phoma* sp.

## Molecular tools

qPCR analysis successfully amplified DNA from the *A. fumigatus* complex in 10 out of 20 sampling sites where the presence of this fungal species was not identified by culture based-methods.

## Conclusions

- Although swine units showed the highest fungal load, in all the 3 settings fungal species with toxigenic potential were present.
- Is important to consider interactions between fungi and mycotoxins in the risk assessment process.
- The molecular tools applied permitted to target selected fungal indicators, allowing a more precise characterization of the fungal burden.

## References

- [1] Viegas, S., Caetano, L., Korkalainen, M., Faria, T., Pacífico C., Carolino, E., Quintal Gomes, A., Viegas, C. (2016) Cytotoxic and inflammatory potential of air samples from occupational settings with exposure to organic dust. (Submitted)
- [2] Viegas, C., Faria, T., Carolino, E., Sabino, R., Quintal Gomes, A., Viegas, S. (2016) Occupational exposure to fungi and particles in animal feed industry. *Medycyna pracy* 67(2).
- [3] Viegas, S., Veiga, L., Almeida, A., dos Santos, M., Carolino, E., Viegas, C. (2015) Occupational Exposure to Aflatoxin B1 in a Portuguese Poultry Slaughterhouse. *Annals of Occupational Hygiene* 60(2).