Importance of size-selective particle sampling for assessing occupational exposures

Results from three different occupational settings

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Introduction

Sampling the total air concentration of particulate matter (PM) only provides a basic estimate of exposure that normally not allows correlating with the observed health effects. Therefore is of extreme importance to know the particles size distribution and, in more detail, the exposure to fine particles (≤ 2.5 µm). This particles dimension corresponds to the respirable fraction. This particle fraction can result, besides local effects, in systemic effects due to particle deposition and clearance from the lungs and transport within the organism.

Aim of Study

This study intended to describe occupational exposure to PM2.5 in three different units located near Lisbon and related with occupational exposure to organic dust, namely: swine and poultry feed production and waste management.

Methods

It was performed a size-selective particle sampling in three to five workplaces of each unit with an aerosol monitor (DustTrak II model 8532, TSI®). In each workplace were selected the tasks involving higher exposure to particles and for each task were done measurements of approximately 5 minutes. Statistical analysis of all data was performed using the STATISTICA® software.

Figure 1. DustTrak II model 8532, TSI®

Results

Data showed **poultry feed** unit with **higher values**, with statistical significant differences from the others units (p's <0.05) (Figure 2).

- ✓ In **swine feed** values ranged from 0.007 to 0.143 mg/m^3 (0.054 ± 0.042), being the reception room the workplace with higher values.
- ✓ In **poultry feed** the values were between 0.028 and 0.198 mg/m^3 (0.098 ± 0.061) with the bagging line as the workplace with higher values.
- ✓ In **waste management** values ranged from 0.036 to 0.059 mg/m^3 (0.046 ± 0.006) being the sorting cabinet the workplace with higher values.

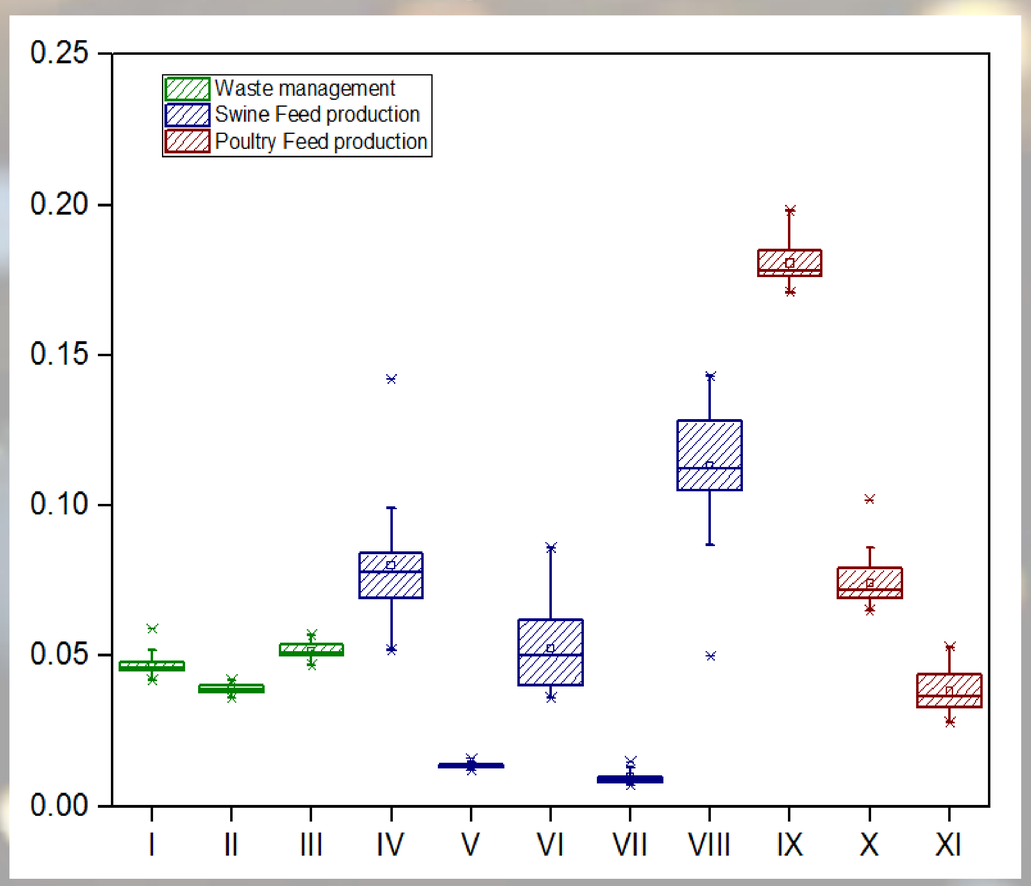

Figure 2. Box plot for each setting

Conclusion

This data allow a better estimation of particle penetration into the thoracic and respiratory regions of the respiratory tract and a better prediction of health effects.

Additionally, allows also to identify the workplaces where investment to prevent and control exposure to particles should be prioritize.

References

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