

A CASE STUDY “FROM FIELD TO FORK”

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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 great importance to recognize the particles size distribution and, particularly, the exposure to fine particles ($\leq 2.5 \mu\text{m}$). This particles dimension corresponds to the respirable fraction, the one that can implicate local and systemic effects due to particle deposition and clearance from the lungs and transport within the organism (Brown et al., 2013). Swine production was already linked with occupational exposure to particles (Viegas et al., 2013a).

Aim of study

This study intended to describe occupational exposure to PM_{2.5} in three units related with swine production and consumption, namely: feed production, swine production and swine slaughterhouse.

Materials and Methods

A size-selective particle measuring in five to six workplaces of each unit was performed. Measurements of PM were done using a portable direct-reading hand-held equipment (Lighthouse, model 3016 IAQ).



Figure 1. Lighthouse, model 3016 IAQ

Results and discussion

Data showed slaughterhouse unit with higher values, with values ranging from 0.030 to 0.142 mg/m³ (0.073+ 0.043), being the cutting room the workplace with higher values. In feed production unit, values were between 0.026 and 0.033 mg/m³ (0.028 + 0.003) with the warehouse of pharmacy products as the workplace with higher values. Finally, in swine unit values ranged from 0.006 to 0.048 mg/m³ (0.023+ 0.017) with the batteries area presenting the higher values.

Table 1. Assessed tasks in each occupational setting.

	Workplace	Mass Average (mg/m ³)	mg/m ³
I - Swine Production	A - Parks Gestation	0.013	Mass Average 0.023 (min.– max.) [0.006 – 0.048]
	B - Cells Gestation	0.006	
	C - Batteries	0.048	
	D - Maternities	0.016	
	E - Quarantine	0.030	Standard Deviation 0.017
II - Swine slaughterhouse	F - Gut room swine	0.104	Mass Average 0.073
	G - Gut room bovine	0.072	
	H - Bleeding swine	0.044	(min.– max.) [0.030 – 0.142]
	I - Cutting swine	0.142	
	J - Bleeding bovine	0.030	
K - Cutting swine bovine	0.045	Standard Deviation 0.043	
III - Feed Production	L - Reception Romm	0.030	Mass Average 0.028 (min.– max.) [0.026 – 0.033]
	M - Bagging line	0.027	
	N - Control Room	0.027	
	O - Warehouse Pharmacy	0.033	
	P - Loading truck area	0.026	
	Q - Finished product Warehouse	0.029	Standard Deviation 0.003

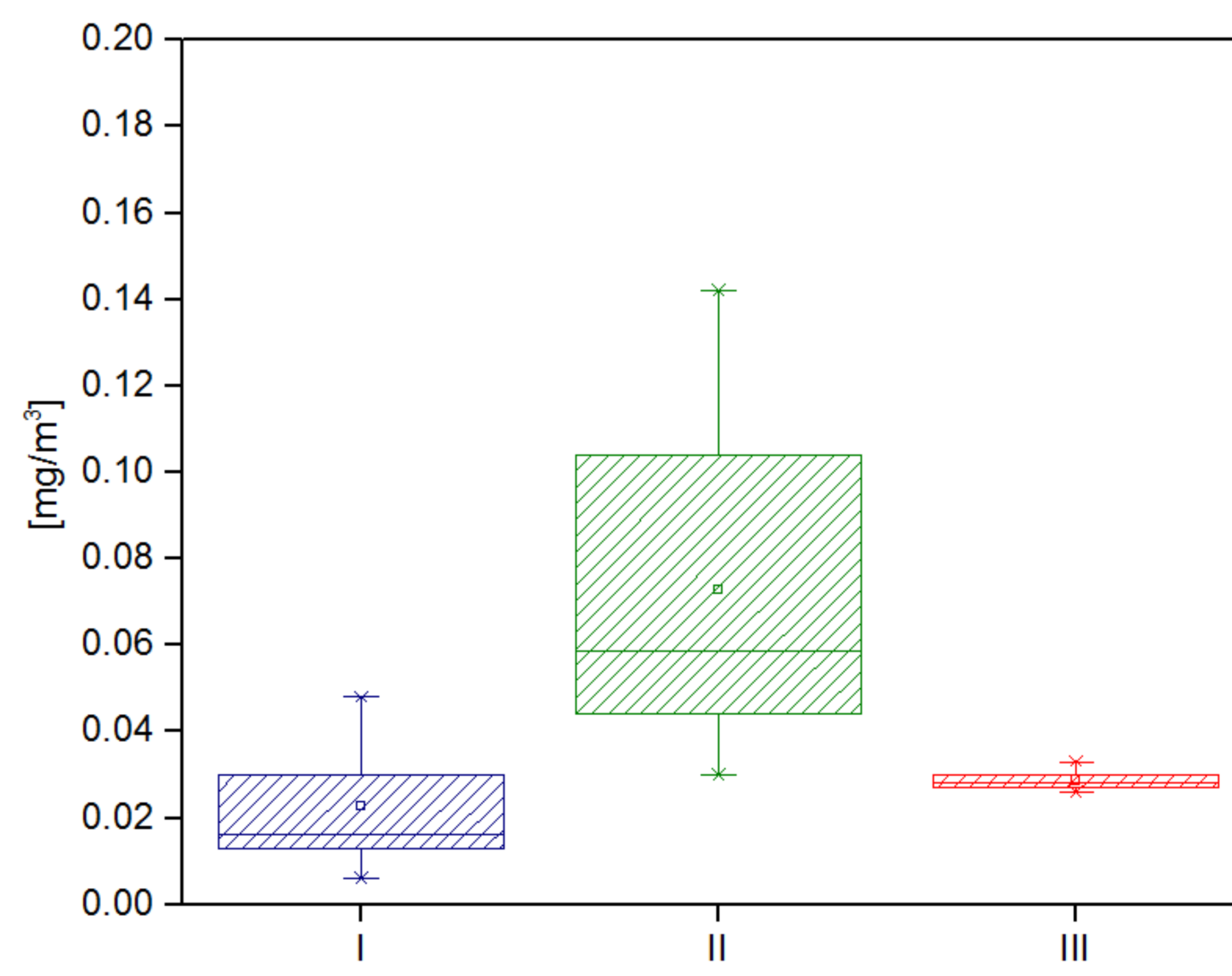


Figure 2. PM_{2.5} values in each setting

PM can be rich in fungi and bacteria and their metabolites, such as endotoxins and mycotoxins. Previous publications already showed high contamination in these occupational settings and particles can have an important role in exposure since can easily act as carrier of these agents (Viegas et al., 2013b).

Conclusions

Data obtained allow to identify the settings and workplaces where investment should be made first to prevent and reduce exposure to PM.

Additionally, data acquired permit not only a better prediction of particle penetration into respiratory regions of the respiratory tract, but also a better estimation of PM health effects.

References

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