EVALUATING OIL INCLUSION RATES FOR BEDDING MATERIALS

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The high concentration of airborne particles in straw-based pig shelters (Banhazi *et al.* 2000) and horse stables, and the negative effects of these pollutants on animal health, welfare and productivity are a concern for livestock managers. The potentially harmful effects of airborne particles on human health are also well documented (Donham *et al.* 1986). It has been demonstrated in previous studies, that dust levels can be reduced in deep-bedded systems by impregnating the bedding material with canola oil (Banhazi *et al.* 1999), however finding the optimal inclusion rate under controlled conditions, has not been studied. The effects of different percentage of canola oil used for impregnating different bedding materials on the concentration of airborne particles inside specially designed "shaker-boxes" were studied.

The shaker box consisted of a sealed plastic box with a volume of 0.94m^3, fixed on top of a layered sieve shaker machine. The lid of the plastic box had two slits cut into it, which enabled dust filter heads to be inserted into the box together with a supporting structure (metal rods) holding the filter heads in place. This setup enabled the researchers to use traditional gravimetric measurements inside the shaker box, without the filter heads being effected by the shaking movement. The two different types of bedding material evaluated during the trials were sawdust and rice hulls. Each sample was dried in an 80 ^oC oven for 2 days prior to the canola oil inclusion rate of 0, 3, 6 or 9%. Inhalable and respirable particle concentrations were recorded for 6 hours inside the plastic box containing the bedding material according to previously published method (Banhazi and Cargill, 1997). The measured dust levels were compared between the 3 treatments, using one-way ANOVA procedure after the experimental data was pooled for analysis. There was a statistically significant reduction in the concentration of airborne inhalable and respirable airborne particles (Table 1).

Table 1. Concentrations of respirable (resp.) and inhalable (inh.) airborne particles in mg/m^3 at different oil inclusion rate (%).

Inclusion rate (%)	Sawdust resp.	Sawdust inh.	Rice hull resp.	Rice hull inh.
0	0.150[a]	4.275[a]	31.568[a]	224.651[a]
3	0.075[b]	0.124[b]	0.383[b]	0.611[b]
6	0.060[c]	0.085[c]	0.150[c]	0.246[c]
9	0.100[a]	0.046[d]	0.137[c]	0.228[d]

[ab] Values in the same column with different superscripts differ significantly (P<0.05).

The experiment achieved its aim of demonstrating a reduction in the concentrations of both respirable and inhalable airborne particles as a result of oil impregnation. It was concluded that there was a diminishing return on the amount of oil used for impregnation and based on the results of this study the optimum oil inclusion rate would be around 3% for sawdust. Higher oil inclusion rate would be needed for rice hulls to reduce the dust levels below maximum acceptable concentrations.

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