

IMPROVING AIR QUALITY IN BEDDED SYSTEMS

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The high concentration of airborne particles in deep-bedded animal buildings, including straw-based pig shelters (Banhazi *et al.* 2000) and horse stables, and the negative effects of high bioaerosol concentrations on human and animal health, are a concern for the intensive livestock industries (Cargill *et al.* 2000). Oil spraying has been used in straw-based shelters (Banhazi *et al.* 1999), but there are practical difficulties involved in spraying stables housing horses. The treatment of sawdust with oil prior to animals entering the buildings is an option. The effects of impregnating sawdust with canola oil on the concentration of airborne particles inside four horse stables (two control and two experimental) were studied.

Air quality parameters were recorded for 41 days in four naturally-ventilated horse boxes each housing one horse. The bedding material (sawdust) was impregnated with canola oil at the inclusion rate of approximately 5% (w/w), using a hand-held sprayer. Airborne respirable and inhalable particles were measured as previously described by Banhazi and Cargill (1997). Dust pumps were operated from 09.00 to 16.00 hours, a period corresponding with the expected highest animal activity. Carbon dioxide was monitored using Masterman Gas Monitoring Machines, to confirm that ventilation rates were similar in the boxes. The air quality data were analysed using one-way ANOVA and parameters were compared between the treatments.

The concentration of carbon dioxide did not vary significantly between treatments but there was a statistically significant reduction in the concentration of both airborne inhalable and respirable particles in the experimental facilities (Table 1).

Table 1. Concentrations of respirable and inhalable airborne particles for the control and treatment boxes

| Treatment | Respirable dust (mg/m ³) | Inhalable dust (mg/m ³) | Carbon dioxide (ppm) |
|-----------|--------------------------------------|-------------------------------------|----------------------|
| Control | 0.35 ^a | 1.13 ^a | 553 ^a |
| Treatment | 0.19 ^b | 0.47 ^b | 551 ^a |

^{ab} Values in the same column with different superscripts differ significantly (P<0.05).

The results demonstrate a reduction in the concentrations of both inhalable and respirable airborne particles in the airspace following the impregnation of sawdust bedding with canola oil. Because of the similarities of the bedding, the results will have implication for deep-bedded piggery buildings as well. However, further studies are needed to determine the duration of benefits gained, the minimum concentration of oil necessary and the effects of oily bedding material on the health of the animals.

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