OZONE TREATMENT OF AIR IN WEANER ACCOMODATION

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It is important to identify new and practical ways of improving air quality in pig sheds to reduce the incidence and severity of respiratory diseases, improve production efficiency and animal welfare, and reduce the potential Occupational Health and Safety (OH&S) problem arising from long-term human exposure to airborne pollutants in piggery buildings (Donham *et al*. 1989). Although several strategies are already available to improve air quality in piggery buildings (Cargill and Skirrow 1997), the use of ozone has not been extensively investigated in pig production in Australia. Ozone is widely used to extend the storage life of various agricultural products, by reducing the bacteria load in food storage facilities (Ricel *et al.* 1982).

The aim of the study was to investigate the benefits of adding ozone to incoming air in piggery buildings and its effect on the parameters affecting air quality. Air quality parameters were recorded in a weaner room for two days (control period) and then the same room was treated with ozone for six days (experimental period). The change in air quality parameters was then compared between the two periods.

Cyclone and IOM (Institute of Occupational Medicine) attachments connected to Gilair-5 pumps, operated from 08.00 to 16.00 hours at 1.9 and 2.0 L/min respectively, were used to measure particles of less than 5 microns and inhalable airborne particles. An Anderson bacterial sampler, attached to a GilAir-5 pump and filled with Columbia horse blood agar plates, was used to measure airborne bacteria for five minutes three times a day. Ammonia and carbon dioxide were monitored using a MGM Machine.

The concentration of airborne dust and gases was not affected by ozone, however there was a statistically significant reduction in total airborne bacteria concentration (Table 1). Although ammonia reduction was also expected as a result of ozone treatment, the low concentration of ammonia recorded during the control period, did not fall.

Table 1. Concentrations of respirable and total particles, viable bacteria, ammonia and carbon dioxide for the control and experimental periods.

Treatment	Respirable dust (mg/m^3)	Inhalable dust (mg/m^3)	Viable bacteria (CFU/m^3)	Ammonia (ppm)	Carbon dioxide (ppm)
Control	0.272^a	1.69^a	$98,000^a$	3.4^a	960^a
Ozone	0.262^a	1.70^a	$73,000^b$	3.5^a	974^a
Reduction %	3.7	-0.59	25	-2.94	-1.46

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

Although adding ozone to the incoming air in a weaner room significantly reduced the concentration of airborne viable bacteria, other air quality parameters were not affected. However, the concentration of ozone used in these experiments was only 0.05 ppm, which is approximately 50 % less than the maximum concentration allowed under OH&S regulations. Further studies are needed to determine the required dose which will result in improvement in air quality, without exceeding the maximum safety levels.

Supported in part by the Australian Pork Limited.

CARGILL, C. AND SKIRROW, S. (1997). *In* 'Pig Production', Proceedings No 285, pp 85-104 The Post-graduate Committee in Veterinary Science, University of Sydney, Sydney, Australia.

DONHAM, K. J., HAGLIND, P., PETERSON, Y., RYLANDER, R. and BELIN, L. (1989) *Br. J. Ind. Med.* **46,** 31-7.

RICEL, R. G., FARQUAR, J. W. and BOLLYKY, L. J. (1982) *Ozone Sc. Eng.* **4,** 147-63.

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