

PREDICTING COMMUNITY RESPONSE AND POTENTIAL HEALTH ISSUES IN THE AUSTRALIAN CONTEXT FOR MAJOR PIGGERIES AND OTHER SIMILAR CONCENTRATED ANIMAL-FEEDING OPERATIONS

Peter Best, Christine Killip and Mark Kanowski
Katestone Environmental, PO Box 2184, Toowong, Queensland, Australia 4066

Abstract

Intensive agricultural developments such as major piggeries are significant emitters of air pollutants that can affect the amenity and health of nearby communities (thereby increasing odour emission rates). In the Australian rural environment, adverse air quality conditions are those promoting high emissions (e.g. hot and humid conditions that cause high heat stress in livestock, or wet conditions that promote waste degradation) and poor dispersion conditions (typically light-wind stable conditions or persistent winds in a narrow direction sector). A review of recent Australian and international research suggests major uncertainties in the estimation of hourly normal or upset odour emissions from ponds, sheds, composting and irrigation, dispersion under light-wind conditions (even with supposedly "advanced" numerical models) and odour/health dose-response relationships for various types of communities nearby to major piggeries. With each of these important factors typically having an error of 100%, risk assessment approaches and sensitivity analyses are likely to be necessary for any marginal situation. A range of investigations is suggested that may value-add to previous work and give more confidence in both screening procedures, detailed assessments of odour and health impacts of single piggeries (in various social environments) and evaluation of the increasingly likely development of multiple piggeries within a given region (such as the Darling Downs in Queensland). Proactive control methods can now include the short-term forecasting of adverse site meteorological conditions and the use of community annoyance measures rather than the registration of odour complaints as a performance measure.

Keywords: Piggery odour assessment, dose-response, pollution forecasting

1. Introduction

The papers presented to this conference (e.g. Jiang 2002, McGahan 2002, Ormerod 2002a) and recent international reviews (e.g. Irish EPA 2001, YCELP 2001, Iowa State University 2002) attest to the considerable interest in intensive piggeries causing odour annoyance and low-level health impacts to neighbouring communities of various characteristics (e.g. rural residential or near-urban populations of different sizes and sensitivities, with various degrees of exposure to or understanding of piggery activities).

Regular exposures to pollutants that cause odour can produce significant health symptoms, with increasing consideration now being given to the "coping ability" of a community and the interaction of stress and immune system responses for more odour-sensitive people (Sucker et al 2001). Indeed, the World Health Organisation definition (WHO 1998) that "health is a state of complete physical, social and mental, and social

well-being and not merely the absence of disease or infirmity" would suggest that dismissal of health impacts in an odour annoyance situation is becoming increasingly untenable. The Iowa University report considers that emissions from concentrated animal feeding operations (CAFO) can "constitute a public health hazard, deserving of public health precautions as well as larger well-controlled, population based studies to more fully ascertain adverse health outcomes and the impact on community health services"

Odour concentration thresholds for avoiding odour annoyance and/or odour complaints due to piggery operations vary by at least a factor of 2 between various jurisdictions, once allowances have been made for different olfactometric standards and exposure ratings (see Table 1 for a compilation of recent "guidelines"). Recent European guidelines present a more holistic approach to odour assessment (see, for example, Figure 1, Irish Environmental Protection Agency, 2001) that call into question the prevalent assumption of many