Odour Impact

Odour release, dispersion and influence on human well-being with specific focus on animal production

Sven Nimmermark

Akademisk avhandling som för vinnande av teknologie doktorsexamen kommer att offentligen försvaras i Stora Aulan, Alnarpsgården, SLU, Alnarp, fredagen den 10 december 2004, kl. 10.00. Opponent: Senior Scientist, Ph.D, Ass. Prof. Hisamitsu Takai, Danish Institute of Agricultural Sciences, Dept. of Agricultural Engineering, Research Centre Bygholm, Horsens, Denmark.

Abstract

Our sense of smell provides us with the opportunity to explore our chemical environment. Upon perceiving an odour our reactions can be approach as well as avoidance. Emissions from a number of different operations are common causes of complaints. This thesis deals primarily with odours from livestock and poultry operations, which are common causes of annoyance. The main hypothesis of the thesis was that odours and odorants may affect health and that a correlation between measurements of various parameters of odours and health exists. The main objective was to contribute to improved well-being and health and to reduce conflicts by studying factors affecting odour release, odour dispersion in the neighbourhood and factors of importance for well-being and health. Another objective was to discuss measurements of the odours in question using electronic noses. Electronic noses can be sensitive enough to measure odours related to farms and a correlation between their response and odour concentrations has been found. Studies of factors affecting odour release in a climate chamber equipped with a floor housing system for laying hens resulted in significant correlations between temperature and humidity and odour as well as ammonia concentrations and emissions. Odour observations reported by neighbourhood monitors indicated that setback distances predicted by the OFFSET (Odour from Feedlot Setback Estimation Tool) model for stable weather conditions were correlated to the exposure. Variation of emission rates and variations in concentration in an odour plume contribute to difficulties in predicting intensities in the neighbourhood. Observed increased frequencies of respiratory symptoms and symptoms like sleeping difficulties, headache, nausea, palpitations and alternations of mood in neighbours of large scale animal operations can be caused by odours mediating the symptoms through stress and annoyance, by the odorants or co-existing compounds or by combined effects. Regarding annoyance, cognition and coping are important as well as odour pleasantness. Odour pleasantness for odours from pigs, poultry and cows showed a consistent decrease by concentration. Low concentrations of these odours are likely to be rated as quite unpleasant. An important factor affecting perceived odour pleasantness is the individual odour sensitivity.

Keywords: odour measurement, olfactometry, electronic nose, emission, humidity, temperature, setback distance, stress, annoyance, health, agriculture, livestock, poultry.

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Swedish University of Agricultural Sciences
Department of Agricultural Biosystems and Technology
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