

The electronic

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For livestock and poultry farmers to be able to make good decisions about reducing farm odour, they need reliable information about the odour – its sources, the factors affecting its intensity and more.

That information has been hard to come by. Efforts to remedy odours from livestock and poultry production facilities have been impeded by a lack of science-based approaches to assessing odour control technologies and the true effects of odour.

Farm smells are not simply a sum of all odorous compounds found within them, but result from interactions among complex mixtures of hundreds of compounds. In

designed specifically to support effective odour control decision-making. “Our expert system is not only able to conduct odour measurement from livestock farms,” says Yang, “but can also analyze the chemical components and generation factors to determine which component or factor contributes most to the strength of odour, all displayed on a user-friendly interface.”

Moreover, “Odour Expert” is able to provide qualitative advice on which odour control approaches to take in order to reduce odour level most efficiently. “Users can provide their specific requirements for odour control, and a list of potential control actions is shown,” says Yang.

a new tool to help manage farm

addition to the molecules themselves, odour generation is also influenced by many environmental factors such as temperature, air flow speed and relative humidity.

To date, the most commonly used instrument for measuring and managing odour has been the human nose, but trained human panels are expensive and can also be subjective.

Enter the “electronic nose,” which has the potential to provide consistent, objective readings of farm odours at a low operational cost. However, while electronic nose technology has already proved a useful tool in the food industry and the fields of both medicine and environmental monitoring, little work has been done to develop an electronic nose specifically for the agricultural sector. Moreover, most electronic noses in existence have been used only under laboratory conditions, not in the field.

The challenge to build a reliable and durable electronic nose which will analyze and help manage farm odours has been taken up in recent years by Simon X. Yang and his research team of the School of Engineering at the University of Guelph. Usable in both laboratory and field, their electronic nose consists of 14 gas sensors, a humidity sensor and a temperature sensor.

“It is capable of recognising simple or complex odours,” says Yang. “Ambient air enters the chamber from the inlet port. The sensor array located inside the chamber sends measured signals to the signal amplifier and regulation buffer. These analogue signals are then converted to digital signals and sent to a laptop computer.”

A specially developed software suite then processes the information. Known as “Odour Expert,” this tool has been

Even more impressive, however, is the ability of “Odour Expert” to forecast the effectiveness of these odour control efforts before they are applied. “Once the proposed potential control approach is selected,” says Yang, “the system then predicts the controlled odour level that will be achieved.”

Field experiments, conducted downwind from the barns on 14 livestock and poultry farms, have been very successful. The researchers have shown, for example, that their “nose” can calculate how much distance the odour source had to be set back from the farm to achieve a given reduction in odour strength.

However, while Yang and his research team consider their system a useful tool in supporting livestock and poultry farm odour management, and point out that is easier and cheaper to operate than using olfactometry or a human panel, they admit that any electronic nose is limited on the farm in that it can only detect odour events at one point. It therefore cannot provide overall odour mapping around livestock facilities, which is necessary for an overall odour management strategy.

Yang and his research team thus foresee the need for a wireless electronic nose network, combined with an air dispersion model on each farm, which would be able to monitor odour strengths on the basis of odour emission rates, topography and meteorological data.

“With this set-up, odour strength can be measured in real time, and we can achieve an effective overall odour management strategy,” says Yang. The researchers are currently working to improve a proposed wireless sensor network, more effectively model pork farm odour and improve the accuracy and precision of odour level prediction.

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nose — yard odours

This device, developed at the University of Guelph's School of Engineering, offers the promise of helping farmers analyze odours and select the most effective approach to deal with them

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