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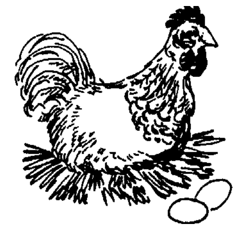

COMMERCIAL EGG TIP...

AMMONIA IN COMMERCIAL LAYER HOUSES

Poultry manure is high in nitrogen, some of which is released as ammonia, NH_3, when manure moisture and temperature are high enough to support NH_3 production. High concentrations of NH_3 can have an adverse impact on hens. For this reason, the 2003 United Egg Producers Animal Husbandry Guidelines specify that commercial flocks should be exposed to less than 25 parts per million (ppm) NH_3 and not more than 50 ppm. It is also possible that large layer houses emit significant quantities of NH_3 into the atmosphere, creating the risk that commercial egg farms will be identified as point sources for emission of NH_3 as an air pollutant. If this were to happen, large egg production facilities could become subject to regulation of NH_3 emission under the Clean Air Act.

Egg producers have had difficulty coming to grips with NH_3 because there is no reliable technology available to continuously measure NH_3 levels in commercial housing environments. Without this technology, it is not possible to establish how serious a problem NH_3 is inside a layer house, nor to accurately estimate how much NH_3 a house actually emits.

Researchers have used portable monitoring units to try to learn the NH_3 production rates typical of different types of commercial layer houses. Some results have recently been published for houses located in Iowa (Liang, et al. 2003. Ammonia emissions from layer houses in Iowa. Pages 1-9 in: Proceedings of the International Symposium on Gaseous and Odour Emissions from Animal Production Facilities. Horsens, Jutland, Denmark, June 1-4). Two types of houses were studied. The manure belt house had exhaust fans located on each end of the house and two continuous slot air inlets in the ceiling running the length of the house. Manure was removed daily. The high-rise house had all exhaust fans installed in the side walls of the bottom level, where the manure was stored. Continuous slot ceiling inlets were located over each cage row. Several months accumulation of manure was in place at the start and no manure was removed during the study. Flock size was more than 100,000 hens in each house. The ventilation rate was based on house temperature. NH_3 levels were recorded in the living space of the hens and at the exhaust fans at intervals of about 2 weeks from February to October. During each sampling period, recordings of NH_3 were taken every 30 minutes for at least 48 hours.

In the manure belt house, daily average NH_3 concentrations were low in all seasons, ranging from 1 to 7 ppm.

This reflects the fact that there was little manure in the house to produce NH_3. The high-rise house had daily average concentrations of NH_3 in the living space of the birds ranging from 3 to 61 ppm. In this house, NH_3 levels were highest in the winter, exceeding a daily average of 50 ppm on one of the five days monitored in February and March. From April to late October, daily average NH_3 levels were below 20 ppm.

Calculated NH_3 emission rates were lowest in winter (February-March) and highest in summer (June-August) from both types of house. The amount of NH_3 released from each house, however, differed considerably. For the manure belt and high-rise house, respectively, average NH_3 emission rates in winter were 0.09 lbs/1000 hens/day and 1.64 lbs/1000 hens/day, and in summer were 0.82 lbs/1000 hens/day and 2.90 lbs/1000 hens/day. When projected to an annual basis, the average daily NH_3 emission rate was calculated to be 0.38 lb/1000 hens/day for the manure belt house, and 2.27 lb/1000 hens/day for the high-rise house.

The data clearly favor the manure belt house with daily manure removal for control of NH_3. There is no reason to believe that NH_3 levels would differ greatly from those seen in this study in any similar house with the same manure management. Hens in the manure belt house were never observed to be exposed to stressful concentrations of NH_3. NH_3 emissions from the house were low, making it possible to argue that any size of house of this type should not be classified as a point source for air pollution. Of course, the manure removed from such a the house would have the potential to produce as much NH_3 as that produced in a high-rise house, unless managed in a way that curtails NH_3 release.

The high-rise type of house can have problems with NH_3. In winter, when ventilation rates were low, it was not unusual for hens in the high-rise house to be exposed to aversive levels of NH_3, i.e., more than 25 ppm and evidently on occasion, even more than 50 ppm. Moreover, if the EPA non-agricultural industry standard for point source pollution of 100 lb NH_3/day were to be applied, almost all high-rise layer houses would be classified as point sources for NH_3 emission, if the emission rates observed in this study are typical.

High-rise houses in southern regions of the U.S. are usually bi-directionally tunnel ventilated, as opposed to the drop-down ventilation design evaluated in the study. Since most of the fans in tunnel-ventilated layer houses are mounted on the upper (living space) level, air drawn from the lower level to be exhausted from the house may expose hens at the ends of the cage rows to higher concentrations of NH_3. Although tunnel houses generally keep manure quite dry, it seems unlikely that NH_3 production from a tunnel house would be much less than that seen in the high-rise house studied, based on differences in manure dryness. The manure moisture in this house was reported to be only 15% in June, a time when NH_3 emission rates from the house were highest. These conjectures, of course, would need to be verified.

For animal welfare and environmental reasons, NH_3 control in layer houses may become a critical issue for the egg industry. It appears that if the high-rise house is to remain a viable design for the commercial layer husbandry, manure management strategies will need to be employed at critical times of the year to reduce interior NH_3 concentrations or NH_3 emission rates. This will require research and development because at present such strategies have not been well defined.

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“Your local County Extension Agent is a source of more information on this subject.”