

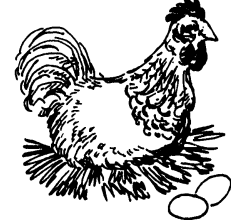


The University of Georgia

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COMMERCIAL EGG TIP . . .

DEPOPULATION METHODS FOR COMMERCIAL LAYER FLOCKS: PART 2

Part 1 of this two-part series considered cervical dislocation, water-based foam killing, poisoning with avicides, electrocution, and maceration as mass depopulation methods. All were inadequate for caged commercial layer flocks when dealing with H5N1 AI. Gas killing will be discussed here.

Gas Killing

Although poisonous gases such as carbon monoxide and cyanide gas have been tried in various nations to depopulate poultry flocks, carbon dioxide, a non-poisonous gas, has been the preponderant choice. Carbon dioxide is relatively inexpensive and normally is readily available. Given enough exposure time, 40% CO₂ in air is sufficient to kill chickens (Gerritzen et al., 2004). Concentrations above 55% will kill birds quickly (Mohan Raj and Gregory, 1990). Gas killing requires the gas mixture to be contained. This can be done using portable chambers, chambers assembled on site, or by using the interior of the building in which the flock is housed.

Portable Chambers. The MAK (modified atmosphere killing) cart, used in the U.S. egg industry for spent hen removal, is an example of a portable chamber. Live birds must be caught and placed into the chamber, which is kept filled with a stunning atmosphere of CO₂. Since the carts are rolled into the house, killing takes place immediately after the hens are caught, minimizing any distress that the birds might experience. Relatively little CO₂ is used, i.e., about 108 ft³ (13 lb) CO₂/1000 hens for the MAK cart (Webster et al. 1996). This method is probably the most feasible alternative for depopulating caged layer flocks when there is little disease danger to humans. However, numerous carts and people are needed to depopulate a house quickly, and it would be difficult to maintain the integrity of personal protection equipment (PPE) due to worker discomfort and snagging of clothing on projection in the work environment.

Chambers Assembled Onsite. The tenting method, in which flocks of floor-housed birds are enfolded in large sheets of plastic, is an example of a chamber assembled onsite. Tenting is most

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effective for floor housed broilers, which are relatively inactive and can be enfolded in place. The method can be adapted somewhat for active birds such as floor-housed commercial laying hens or breeders by setting up an enclosure in a free area of the house and driving birds into it. People are required to drive the birds, and the disturbance raises a lot of dust. Workers would have to be in the house for a lengthy time and would experience discomfort when fully suited in PPE. The tenting method is not suitable for caged layer flocks.

A chamber could be assembled outside a commercial layer house to kill hens removed from the house in pullet carts. This approach would be no improvement over the portable chamber approach, and somewhat increases the difficulty of bird handling in regard to loading and unloading of pullet carts. In Canada, a chamber has been designed which is set up outside the layer house and the hens carried out by hand and put into it.

Whole-House Gassing. This method reduces the exposure of people to live, potentially AI-infected hens since there is no need for a lot of people to enter the house before the birds are dead. Caged birds would still have to be removed individually from cages. Although the integrity of PPE would be an issue, the problem should be more manageable than when catching live birds.

Modern commercial layer houses should not be difficult to seal for gas killing, if adequate materials are available. The fans and air inlets would be the major sites of gas leakage and would have to be covered. Loose fitting doors should also be sealed. The house must not be sealed completely. Some openings in the upper part of the house are necessary to allow air to escape as CO₂ is introduced. Tests in Canada and other nations have shown that the injection of the equivalent of an entire house volume of CO₂ is necessary to achieve a final CO₂ concentration of 60% in a layer house. Rapid injection of such a large volume of CO₂ can cause gas lines to freeze up and can also produce extremely low temperatures in the house near the injection point. Special gas delivery technology is necessary to prevent lines being blocked with frozen CO₂ and avoid bird distress due to excessive cold. Such technology must be available when needed for whole-house gassing to be viable for mass depopulation.

A high-rise commercial layer house that has dimensions 500 ft L x 54 ft W x 16 ft H has an interior volume of roughly 432,000 ft³, including the living space and manure storage area. Assuming for the sake of argument that 10% of this space is occupied by birds, equipment, manure and structural materials, roughly 390,000 ft³ of CO₂ would be necessary to gas the house. This translates to about 24 tons of liquid CO₂ needed for delivery to the site. The price of CO₂ varies regionally, but using a ball-park price of \$75.00 per ton, the cost of the CO₂ alone would be \$1,800.00 for one house. A single story house with stacked cage batteries and manure removal on belts should need half the amount of CO₂ to kill the same number of birds. If multiple layer houses had to be depopulated in a quarantine zone, demand for CO₂ could outstrip the local supply and drive up prices due to logistic difficulties getting CO₂ delivered from other areas. In a worst case scenario, it may not be possible to get enough CO₂ in time.

Conclusion


There does not appear to be a good method at present for mass depopulation of commercial caged layer flocks in situations where humans could be infected by a disease carried by the birds. Existing methods either require extensive human-bird contact, which would probably be refused by the people assigned to remove the birds, or are likely to be impractical in the time frame required. Should an emergency arise that calls for mass depopulation of commercial caged layer flocks, it is difficult to think what might actually happen.

Although a mass depopulation event would be hard for any poultry company to cope with, it would be particularly devastating for an egg company with flocks concentrated in a complex of houses on one property. This and the lack of a good depopulation procedure make biosecurity a special imperative for the layer industry; even more so than for other sectors of the poultry industry. If an AI outbreak occurs in the vicinity of a commercial layer flock, vaccination of the flock may help contain the outbreak without going to the extreme of mass depopulation, provided biosecurity

procedures have kept the flock shielded from the virus. Egg companies should seriously consider upgrading their biosecurity efforts.

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****Consult with your poultry company representative before making management changes.****

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