Iowa Manure Matters

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## Manure Disposal Following an Outbreak of Avian Influenza on a Commercial Poultry Farm

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### What is avian influenza?

Avian influenza (AI) is a viral disease that infects almost all species of birds. It is caused by a Type A *Influenzaviru*. Type A influenza viruses are found in humans, birds, swine, horses and some other mammalian species. Influenza viruses are further classified into subtypes based upon two external glycoprotein structures: hemagglutinins (H) and neuraminidases (N). There are 16 possible hemagglutinins and nine possible neuraminidases. Influenza viruses with H5 and H7 surface structures have the potential to change from a low pathogenic virus into a highly pathogenic virus capable of causing death in most poultry infected.

### Why is avian influenza important and can it affect other animal species in addition to poultry?

Since December 2003, a highly pathogenic H5N1 avian influenza virus has spread through Asia, Europe and six countries in Africa. It has been estimated that more than 200 million poultry have been killed by the H5N1 virus or by slaughter eradication programs.

The H5N1 avian influenza virus has been transmitted from infected birds to mammals. In addition to wild birds and domestic poultry, the H5N1 virus has infected domestic cats, tigers, leopards, dogs, swine and humans. Approximately 50 percent of humans infected have died.

### How is avian influenza transmitted and how long can the avian influenza virus survive in manure?

**Fecal-oral transmission.** AIV is excreted primarily through the feces and to a lesser extent by secretions from the nose and mouth. This virus can survive in water for many days. In feces, it can survive for 30 to 35 days at 4 degrees C (39.2 degrees F) and for seven days at 20 degrees C (68 degrees F). Avian influenza viruses in liquid manure have been shown to remain viable for 105 days during the winter.

**Aerosol transmission.** Avian influenza virus can be transmitted to a lesser degree by nasal and respiratory tract excretions. Low pathogenic AI replicates especially well in the upper respiratory tract.

### How does avian influenza spread between flocks?

Humans are the primary spreaders of AIV between flocks. Feces and respiratory secretions containing potentially millions of avian influenza virus particles are carried to different locations by contaminated people (clothing, footware and hands) and contaminated equipment. Flock owners should not share equipment, such as that used for manure handling, bird catching, vaccination, loading or transport.

Equipment contaminated by feces and respiratory secretions containing AI viruses can readily transmit the disease. Potential carriers include truck, pick-up and car tires on vehicles driven by feed delivery, live-haul to processing plants, flock owners, farm workers, utility (electricity,water) workers, catching crews, vaccination crews, artificial insemination crews (turkeys), servicemen, manure applicators or veterinarians. Fecal dust containing virus particles and contaminated feathers may be disseminated by air currents. Careful disposal of manure and dead birds is critical.

### How can this virus be destroyed?

Heat, extremely low or high pH, and dryness can inactivate avian influenza viruses. Heating buildings to 90 to 100 degrees F for one week has been used to inactivate influ-

(continued on page 2)

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(AI continued)

enza viruses. In addition, infectivity of influenza viruses is destroyed by exposure to organic solvents and detergents. Virkon S is a disinfectant frequently used to disinfect premises after an outbreak of avian influenza has occurred.

### What will happen if a highly pathogenic avian influenza virus is found on a poultry farm?

The State Veterinarian will immediately quarantine the farm and establish a surveillance zone around the quarantine zone. USDA's Animal and Plant Health Inspection Service (APHIS) will be notified and the disease will be quickly eradicated. All poultry infected by or exposed to the virus will be humanely euthanized and carcass disposal will be carried out by burial or composting. After an approved cleaning and disinfection process has been completed, Iowa's Department of Agriculture and Land Stewardship will require a mandatory down time of no less than 30 days.

After the mandatory down time requirements are met, sentinel birds will be introduced to determine if viable influenza virus is still present. Sentinel birds will remain for two specific pathogen incubation periods (30 days) and be monitored for clinical signs of the disease. After the State Veterinarian has given permission to repopulate the farm, new birds on the farm will be monitored serologically.

### Can manure be removed after poultry in a house that has been infected with avian influenza?

Manure can be removed from an infected house only after permission has been granted by the State Veterinarian. Articles that cannot be disinfected and pose a risk of disease transmission, such as feed, poultry manure and litter must be disposed of by an approved method such as burial or composting. Whenever possible, disposal of these materials will be done on the affected farm so that transport of infective virus to other locations does not occur.

Determination of an appropriate on-site burial location for contaminated manure and litter should be done by Iowa's Department of Natural Resources according to their carcass disposal plan. The plan requires a plat map description and the 911 address of the premises to allow the development of maps that will help determine if an appropriate area for manure and litter disposal is on or close to the infected premises. In the event that there is no approved burial area on the premises, the procedure will be to look at other areas in the vicinity, primarily other infected premises, dangerous contact premises or adjacent crop land.

In some cases, contaminated poultry manure and litter may need to be loaded and hauled to an approved landfill. A site for poultry manure disposal would be designated away from the working face of the landfill. A track hoe would be required to dig a single trench in the waste pile where trucks would dump the poultry manure and litter, which would immediately be covered with a least two feet of solid waste.

In-house composting provides a controlled environment that reduces the need to move contaminated manure and litter and protects compost piles from inclement weather which aids in providing more satisfactory composting temperatures for pathogen inactivation. In properly constructed piles, temperatures are expected to reach 120 to 160 degrees within the first 10 days. Research has shown highly pathogenic avian influenza viruses will be inactivated after 10 days of composting.

Ag-Bag composting is a method of composting done in special composting bags that are ventilated during the composting process. Using special equipment, contaminated manure and litter can be loaded into long plastic bags, which are then ventilated as the materials are composted. Advantages of this procedure include 1) inactivation of pathogens on site, 2) composted material can be used after destruction of pathogens and 3) barns may be cleaned and disinfected as soon as poultry are removed.

### What can a commercial manure applicator do to prevent the spread of avian influenza?

**Clean and disinfect vehicles and equipment.** Clean the undercarriage and tires of vehicles with a strong detergent, then apply disinfectant to kill disease-causing micro-organisms that can linger on surfaces. Delivery trucks and other vehicles should carry a sprayer of disinfectant in the cab so that tires and wheels can be disinfected before entering and leaving a farm. Additional biosecurity can be obtained by taking vehicles through a car wash between farm visits to remove any manure or fecal dust that could potentially adhere to the exterior surfaces.

**Wear sanitized coveralls and boots.** Drivers should carry disinfectant sprays (Lysol or a similar disinfectant) in their vehicles so that shoes and floormats can be disinfected when entering an automobile, pickup or truck.

**Do not enter poultry barns that are not undergoing clean out.** Do not visit other poultry farms until you have changed clothing and your vehicle has been cleaned and disinfected.

**How can a commercial manure applicator learn more about avian influenza?**

More information is available at the following Iowa resources for avian influenza—

- Iowa Department of Public Health Pandemic Influenza: **http://www.idph.state.ia.us/pandemic/default.asp**
- Iowa Department of Natural Resources Avian Influenza Information Page: **http://www.iowadnr.com/avianflu/index.html**
- Avian Influenza Carcass Disposal: **http://www.iowadnr.com/avianflu/carcass.html**
- Iowa Department of Agriculture and Land Stewardship Avian Influenza: **http://www.agriculture.state.ia.us/avianInfluenza.htm**
- Avian Influenza Response Plans: **http://www.agriculture.state.ia.us/avianInfluenzaResponsePlan.htm**
- Iowa State University Avian Influenza: **http://www.extension.iastate.edu/livestock/animaldiseases/**
- This Iowa State University fact sheet provides information for farmers and pet owners: **http://www.ag.iastate.edu/news/generalAI.pdf**

Here is a list of national Web sites.

- USDA's Web site provides fact sheets and information about food safety and reporting suspected cases: **http://www.usda.gov/wps/portal/usdahome?navtype=SU&navid=AVIAN_INFLUENZA**
- The U. S. Department of Health and Human Services Web site monitors human outbreaks around the globe and offers planning tools for individuals and businesses: **http://www.pandemicflu.gov/**
- The Centers for Disease Control's Web site addresses specific groups such as the people working in the poultry industry, persons involved in eradication activities and persons with possible exposure: **http://www.cdc.gov/flu/avian/**
- The National Wildlife Health Center Web site deals with migratory birds and is a good source for maps and additional fact sheets: **http://www.nwhc.usgs.gov/disease_information/avian_influenza/index.jsp**
- The U. S. Department of Labor Web site offers guidance for protecting farm workers, animal handlers, food handlers and travelers against avian flu: **http://www.osha.gov/dsg/guidance/avian-flu.html**

## DNR Recommendations for Emergency Carcass Disposal

*by* Karen Grimes, Iowa Department of Natural Resources

If avian flu or another emergency event would cause the death or need to euthanize large numbers of poultry or other animals, the Iowa Department of Natural Resources (DNR) is responsible for coordinating carcass disposal. The DNR must approve emergency composting and burial when normal mortality rates are exceeded. The DNR analyzes geography and local conditions to determine the disposal method least likely to cause environmental problems.

If diseases are involved, the Iowa Department of Agriculture and Land Stewardship would determine acceptable methods of disposal, based on the specific disease and biosecurity concerns, and advise the DNR of their findings. Disposal methods for large numbers of animals must be approved by the State Veterinarian if disease is involved.

### Composting and Burial

The two most viable methods for disposal of large number of animal mortalities from a disease are on-site whole carcass composting and burial.


*Source: T. Glanville, ABE*

**(continued on page 4)**

**(Emergency Carcass Disposal continued)**

**Composting:** Iowa State University (ISU) has conducted research recently that indicates whole carcass composting is a viable option for diseased mortalities. For producers, the advantages of whole carcass composting include easy maintenance and monitoring while providing for the complete breakdown of the carcass and destruction of many diseases. The DNR's composting plan is based on ISU's research. For animal diseases, this is best done in windrows and the compost piles are not turned.

For more information, producers can check the ISU publication "Composting Dead Livestock," **http://www.abe.iastate.edu/cattlecomposting/**, **http://www.abe.iastate.edu/pigsgone/** or the IMMAG Web site: **http://extension.agron.iastate.edu/immag/pubsco.html.**

**Burial:** Carcasses can be buried at or near the production site under normal conditions. The DNR must provide prior approval for burial of catastrophic losses when the number of animals needing burial exceeds the limits allowed by state regulations. Again if the animals were diseased, the State Veterinarian should be consulted about disposal methods. More information on burial rules for normal conditions can be found on the DNR Web site at **http://www.iowadnr.com/afo/disposal.html.**

*Source: T. Glanville, ABE*

While burial at a nearby landfill may be acceptable under normal conditions, most landfills are not equipped to handle large numbers of carcasses. If disease is involved, the carcasses should not be moved outside of the quarantined area.

### Other Disposal Methods

Rendering and incineration are acceptable disposal methods on a small scale, but are limited options for diseased animals because of biosecurity concerns.

**Rendering:** Rendering can be used for carcass disposal under normal circumstances. During a disease outbreak carcasses should not be moved outside the quarantined area because of the risk of transmitting the disease. Disposal at a rendering facility must be approved by the State Veterinarian.

**Incineration:** Incineration (not open burning, burn pits or burn piles) may be an acceptable option if the facility is within the quarantined area and it is approved by the State Veterinarian. However, both fixed-facility and mobile incinerators may have limited capacity, so they would not be able to handle a large number of carcasses quickly.

The open burning of carcasses is not allowed under any circumstances. Burning can cause air pollution, has the potential to spread disease organisms and produces unsightly burn piles.

If emergency disposal is necessary, contact the DNR's emergency response unit through the state's 24-hour emergency spill line at (515) 281-8694.

## Use of the 'Air Management Practices Assessment Tool' for Decision-Making

*by* Wendy Powers, Department of Animal Science; A. Rieck-Hinz, Department of Agronomy; K. Stalder and M. Hogberg, Department of Animal Science, Iowa State University

Air quality issues continue to receive increasing attention at local, state and national levels. As a result, producers are under increasing pressure to find ways to reduce emissions. Following completion of the Environmental Protection Agency (EPA) Air Consent Agreement we will have a better idea of how much an operation needs to reduce a specific gas, if at all. At that time producers will need to know what options are available and how much of a reduction they can anticipate for the various options. It will be useful to producers as they consider options to have an idea of the relative cost of the various practices. The National Pork Board through the Pork Checkoff, and Iowa State University (ISU) have partnered to develop an electronic decision aid for producers who want more information on management practices that can assist in improving air quality.

The objective of the electronic tool is to help producers make decisions regarding mitigation practices for air quality by providing information on the relative effectiveness and cost of practices and general considerations for implementation. The purpose of the Air Management Practices Assessment Tool is to guide you through a process of determining which mitigation practices are best suited to your operation and your objectives, recognizing that this will be increasingly important to producers over the next few years. The tool is maintained by ISU and can be found at **http://www.extension.iastate.edu/airquality/practices/homepage.html** (Figure 1). Each mitigation practice has an accompanying conservative estimate of the range in effectiveness and a relative cost (one, two or three dollar signs). This tool will be updated frequently as more information becomes available.

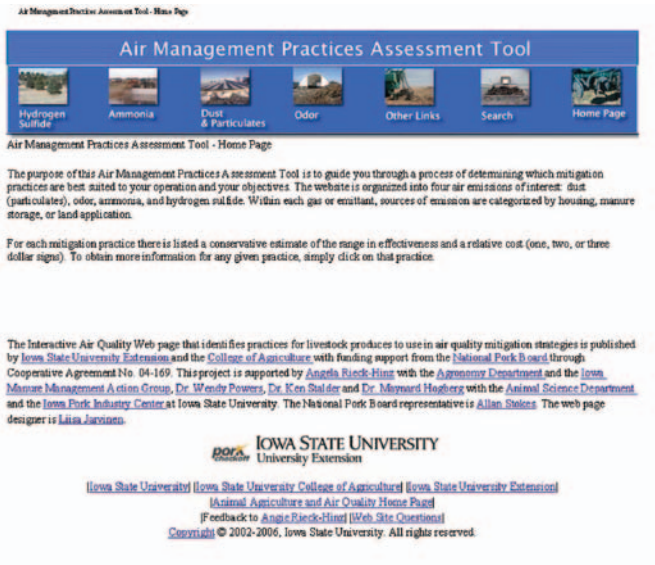


**Figure 1. The Air Quality Practices Assessment Tool**

The Web site is organized into four air emissions of interest: dust (particulates), odor, ammonia, and hydrogen sulfide. The user selects which gas they are interested in controlling and clicks on the appropriate box. For example, if the user is most interested in controlling ammonia emissions then they would click the 'Ammonia' box. This will bring the user to a page that depicts options available for ammonia control.

Within each gas or emittant, sources of emission are categorized by manure consistency, (solid or liquid) then further characterized by site or implementation (housing, manure storage or land application). On each gas-specific page, the user can decide to either view the options from this location or obtain additional information for any particular practice by clicking on that practice. The linked page provides additional information on the practice of choice, including a bulleted lists of pros and cons of implementing the practice and a list of resources for additional information.

*This paper is adapted from a presentation given at P.O.R.K. Academy 2006, Marriot Hotel, Des Moines, IA; June 7, 2006.*

## Assessing Where to Build

*by* Colin Johnson, Iowa Pork Industry Center; and Steve Hoff, Agricultural and Biosystems Engineering, Iowa State University

Over time, farms must be modified, expanded and/or replaced. Farms grow due to increased costs of living, increased demand for livestock products or bringing in another generation. Adding livestock is one way to do so. But how does one know where the appropriate location to build a new barn might be? Proper siting is critical to the long term success of an operation from an investment standpoint and for community acceptance. Growth and management of livestock farms must be conducted in an environmentally, economically and socially acceptable manner. Proper siting is critical for minimizing the impact on neighboring residences and locations of public interest.

The state of Iowa has established minimum separation distances for livestock and poultry operations dependent on animal unit capacity (AUC). However, when it comes to odor transport, it must be noted that distance is not equal in all directions. Due to orientation (barn layout and wind direction to neighboring residences) and topography, it is wise to consider multiple factors when siting a barn or expanding a current facility. A tool, which can help, is the Community Assessment Model (CAM).

CAM encompasses an evaluation of the site, including size of facility, species, average inventory and weight, and manure storage type. Community information gathered includes direction and distance to residences, churches, cemeteries and places of frequent public gathering. Other livestock at the proposed site or other locations in the community also are reported. Once this information is gathered, a computer model including local historical weather patterns with wind speed, duration and orientation is used to predict the total hours of potential odor exposure that a point of interest will receive. Hours of odor exposure are reported for three odor concentrations:

**(continued on page 6)**

**(Where to Build continued)**

2 to 1, 7 to 1, and 15 to 1. For example, an odor concentration of 2 to1 means it would take two volumes of fresh-air mixed with one volume of odorous air to make the odor "barely detectable". For example, a few states use an odor concentration of 7:1 to assess whether an operation is in compliance relative to odor.

Modeling is conducted for odor release in the eight month time-frame of March to October. This time-frame was selected to encompass the period of time when residents tend to spend a lot of time outdoors. The modeling procedure used is to assess a chosen siting location based on the percent time exposure of a residence to various levels of odor. Currently, site selections are judged based on a limit of a 1 percent time exposure to a 2 to 1 odor and a 0.5 percent time exposure to a 7 to 1 odor. These guidelines and results are given to the producer as a tool to help assess a potential site location.

CAM modeling is based on field-collected odor data and work continues to refine the accuracy and usefulness of CAM.

Modeling potential building sites with CAM provides the farmer comfort in saying 'this is a good site' or 'we need to look at an alternate location.' The impact of odor reduction methods including biofilters, environmental vegetative buffers, manure storage covers and other air quality mitigation practices can be assessed with CAM to help producers achieve the 1 percent and 0.5 percent guidelines given above. While CAM can help producers in the planning stages of siting new facilities, it is not EPA approved and it will not be recognized by law. However, CAM has been readily received by participating producers and in a few cases has given clear indications where alternate siting choices were needed.

Every community's understanding of the sites, smells and benefits of livestock farming is different. Assessing the neighboring residences and the role a proposed livestock barn has on the surrounding environment is critical to the long-term success of livestock production in Iowa. If the industry is to remain favorable, livestock production in Iowa must be done in an environmentally, economically and socially acceptable manner. Consideration of neighbors when building new or expanding a current site is important, just as determining the method and timing of manure application. Communicating the story of your family and your livelihood and future plans also goes a long ways. Always consider farm aesthetics and do not forget to involve the community in your farming business. Whether they are crop farming neighbors supplying feed inputs, consumers buying the end products or owners of the acreage next door, all have a stake in the outcome.

If a producer has a concern regarding siting options for a potential livestock barn and would like assistance with evaluating the site, Iowa State University (ISU) Extension partners with the Coalition to Support Iowa's Farmers (CSIF) to offer the Community Assessment Model. Producers may first contact the Coalition at (515) 225-5467. Rex Hoppes, CSIF Organizational Director, has had great experience over the past 20 months evaluating and trouble-shooting building locations in relation to neighbors, topography, aesthetics, and available roads and utilities. The Coalition can offer a vast amount of assistance and where necessary, ISU will conduct a Community Assessment Model with a report available to the producer.

## Results of the 2006 Manure Applicator Certification Program

*by* Rachel Klein, Department of Agronomy, Iowa State University Extension

The following is a summary of evaluations completed by manure applicators during the statewide manure applicator training workshops and video sessions held between January and June 2006. At the end of each workshop, commercial and confinement site applicators were asked to complete an evaluation of the program. The applicators were asked to rate the workshop and also were asked if they had or would adopt the practices recommended during the training. The applicators also were asked if they had adopted the recommended practices from the previous year.

The 2006 Commercial Manure Applicator program focused on: analyzing hauling and pumping charges based on distances and service, working with employees to address health issues concerning manure application and adjusting application rates based on soil infiltration capacity. The state rules for land application also were discussed.

Between January and June, Iowa State University Extension reported 598 commercial manure applicators attended a workshop or watched a video, while a total of 670 applicators returned evaluations after their training.

Of those applicators, 439 attended the satellite workshop held on January 6, 2006 and 231 applicators watched a video of the satellite uplink. The results from the Commercial program are as follows:

As a result of today's training workshop, will you:

| Topic | Adopted Prior | Plan to Adopt | Choose not to Adopt | Does no Apply | No Response |
|---|---|---|---|---|---|
| Analyze hauling and pumping charges based on distances and service? | 383 | 110 | 19 | 141 | 17 |
| | 57% | 16% | 3% | 21% | 3% |
| Work with employees to address health issues concerning manure application? | 340 | 165 | 31 | 119 | 15 |
| | 51% | 25% | 5% | 18% | 2% |
| Adjust application rates based on soil infiltration capacity? | 334 | 135 | 61 | 120 | 20 |
| | 50% | 20% | 9% | 18% | 3% |

As a result of last year's program:

| Topic | I Adopted | I did not Adopt | Did not Apply | No Response |
|---|---|---|---|---|
| Did you recognize pit gas issues and work with producers to minimize concerns? | 478 | 20 | 153 | 19 |
| | 71% | 3% | 23% | 3% |
| Did you implement equipment weight restrictions? | 396 | 48 | 204 | 22 |
| | 59% | 7% | 30% | 3% |

The 2006 Confinement Site program concentrated on the development and implementation of a manure sampling plan, feed management plans to address manure nutrient levels and air quality concerns, best management plans, such as biofilters to address air quality concerns and state rules to land applying manure. During the months of January through June, Iowa State University Extension reported 1,322 Confinement Site applicators attended training. Of those Confinement Site applicators, 1,295 returned their evaluations; 1,175 applicators attended a workshop, and 120 watched a video in an ISU Extension Office.The results for the Confinement Site program are as follows:

As a result of today's training workshop, will you:

| Topic | Adopted Prior | Plan to Adopt | Choose not to Adopt | Does not Apply | No Response |
|---|---|---|---|---|---|
| Develop and implement a manure sampling plan in the next 12 months? | 783 | 324 | 19 | 148 | 21 |
| | 60% | 25% | 1% | 11% | 2% |
| Develop and implement feed management plan to address manure nutrient levels and air quality concerns? | 522 | 294 | 85 | 353 | 41 |
| | 40% | 23% | 7% | 27% | 3% |
| Develop and implement other best management plans such as a biofilters to address air quality concerns? | 209 | 264 | 467 | 297 | 58 |
| | 16% | 20% | 36% | 23% | 4% |

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**(Certification Program Results continued)**

As a result of last year's program:

| Topic | I Adopted | I did not Adopt | Did not Apply | No Response |
|---|---|---|---|---|
| Implement a soil sampling plan to meet the P-Index manure plan requirements. | 710 | 194 | 306 | 85 |
| | 55% | 15% | 24% | 7% |
| Developed an emergency response plan to address the dangers of Hydrogen Sulfide during pumping and agitation. | 559 | 301 | 332 | 103 |
| | 43% | 23% | 26% | 8% |

Workshops for the 2006 Iowa Manure Applicator Certification program have been completed, but confinement site and commercial applicators still needing to meet their annual certification requirements can schedule appointments to watch video training through the local county extension office or can schedule an appointment with their local Iowa Department of Natural Resources field office to take the certification exam.

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