

## *Agricultural and Biosystems Engineering*

# **USING INCINERATORS FOR POULTRY MORTALITY MANAGEMENT**

Robert T. Burns  
Associate Professor  
Agricultural and Biosystems Engineering Department

### **Mortality Management Options**

Commercial poultry producers are faced with mortality management on a daily basis. There are several options available for handling poultry mortalities. In Tennessee composting, rendering, incineration, disposal in a Class I landfill and on-site burial are accepted by the Tennessee Department of Environment and Conservation as dead animal disposal methods. The mortality management method that best suits a given broiler farm will depend on the available labor, land area, farm location and management level available on the farm.

The majority of broiler mortalities in Tennessee are managed using dead-bird composters or burial. While on-site burial is currently legal in Tennessee, it is the least desirable mortality management option due to the increased potential for ground-water contamination compared to the other available options. On-site composting of poultry mortalities has become a very successful option for producers and is highly encouraged. Incineration is also a viable option, and has several advantages over other disposal methods.



## INCINERATION

Incineration was commonly used on many poultry farms until the energy shortage of the 1970's. When energy costs increased many producers stopped incinerating mortalities. Currently manufactured livestock incinerators are more fuel efficient than many of those offered several years ago. The increased fuel efficiency of many newer incinerators makes them an economically viable alternative to composting systems.

Incineration has both advantages and disadvantages when compared to other mortality management methods. The primary advantage of incineration is producer convenience. A properly sized incinerator can reduce daily mortalities to a comparatively small amount of ash in a few hours. Incineration provides a higher level of bio-security than other mortality management options. Carcasses that could potentially spread disease or attract insect pests or vermin are quickly reduced to ash during the incineration process. Improperly designed or operated incinerators can cause odor and particulate air pollution problems.

## INCINERATOR SELECTION

Commercially constructed incinerators should be used for the incineration of poultry carcasses for mortality management. While home-made units may prove serviceable, they usually lack the design needed to ensure a clean burn. The following items should be considered when selecting an incinerator for poultry mortality management;

capacity, burner size, fuel type, controls, door size, and overall sturdiness. A typical commercial livestock incinerator with automatic controls and a counter-weighted door is shown in figure 1. When considering needed incinerator capacity, remember that required incinerator capacity will increase during a broiler grow-out cycle. Figure 2 indicates a typical mass of mortalities in pounds that would be generated on a week-by week basis during a seven-week broiler grow-out



Figure 1. Commercial Livestock Incinerator

cycle. As the bird size increases during the grow-out, so does the weekly mass of mortality carcasses to be handled. Note that while the mortalities run around 100 pounds per week in the beginning of the grow-out, they reach 1200 pounds per week during the last week. Poultry producers should have an alternative plan for handling a catastrophic loss of birds in the event of a power or ventilation failure or during periods of excessive heat. It is not practical to size an incinerator to handle a large and sudden loss of birds.

Incinerators are available with single or dual burner systems. The dual burner systems usually use the first burner for the primary carcass incineration and use the second burner in the incinerator stack in an afterburner mode to provide a cleaner burn. Incinerators with over 400,000 Btu / hour total burner capacity require permitting in Tennessee. To calculate total burner capacity, the Btu / hour rate of both burners must be added together. Incinerators are available that operate on propane and diesel. A well designed

unit using either fuel type can do a good job. As such fuel selection is primarily determined by the operators preference and fuel availability. Incinerators are available with or without automatic

controls. Most operators highly favor units with automatic ignition and timer mechanisms. This allows the operator to load the incinerator and set a timer that will ignite the unit and provide a timed burn. Automatic controls reduce the amount of time required to manage the incineration process and as such are very desirable. Make sure that the loading doors are of ample size to allow easy loading of large carcasses and removal of ash. Also look for doors that are counter-weighted or spring assisted to make opening and closing easy.

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**Broiler Mortality Over a 7 Week Grow-Out**  
Data from two North Carolina farms over five flocks

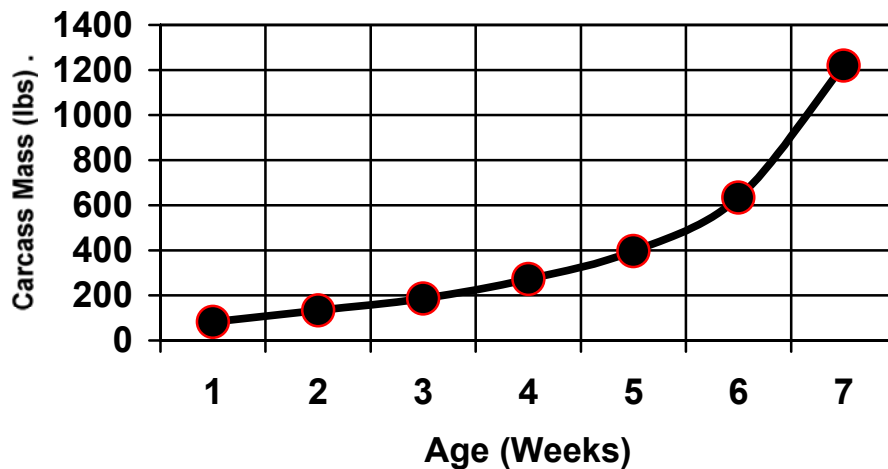


Figure 2. Broiler Mortalities over Grow-Out

### PERMIT REQUIREMENTS

Tennessee regulations exempt incinerators used to burn livestock and poultry operation mortalities from air pollution control permitting unless they meet one of the following conditions;

- 1) The incinerator has a manufacturer's rated capacity greater than 500 pounds per hour.
- 2) The incinerator has a total burner rating greater than 400,000 Btu per hour.
- 3) The incinerator is charged with materials other than livestock or poultry carcasses.
- 4) The unit is used commercially.

Incinerators used to burn poultry mortalities that do not meet the conditions listed above are exempt from air pollution permitting in Tennessee.

## **OPERATING COST**

The cost to operate an incinerator will fluctuate with fuel prices. Assuming a propane cost of \$0.75 per gallon, the cost to burn 100 pounds of poultry broiler carcasses will range from \$3 to \$5 in fuel, averaging \$4 per 100 pounds. Smaller birds require more propane to incinerate than larger birds, due to the increasing amounts of carcass fat in the larger birds. Table 1 shows the pounds of carcass burned per gallon of propane as determined from a study conducted by the North Carolina State University.

<b>Table 1. Incinerator Efficiency*</b>		
<b>Species</b>	<b>Lbs of Carcass / Gallon of Propane</b>	<b>Cost per 100 lbs carcass @ \$ 0.75 / gallon propane</b>
<b>3 week old broiler</b>	<b>15.4</b>	<b>\$ 4.87</b>
<b>7 week old broiler</b>	<b>25.1</b>	<b>\$ 2.98</b>
<b>Broiler breeder</b>	<b>28.0</b>	<b>\$ 2.67</b>
<b>Commercial layer</b>	<b>31.1</b>	<b>\$ 2.41</b>
<b>Turkey</b>	<b>27.7</b>	<b>\$ 2.71</b>

\*Shenandoah A-10 Incinerator used for test by NCSU.

Table 2 provides an estimate of fuel cost to operate an incinerator at propane costs varying from \$0.65 to \$0.95 per gallon for a single 24,500 bird broiler house over one flock. These cost estimates are based on an average of 20 pounds of carcass incinerated per gallon of propane.

<b>Table 2. Estimated Fuel Cost per House per Flock</b> (Assuming 3000 pounds mortalities / 24,500 bird house / flock)		
<b>Propane cost / gallon</b>	<b>Cost / 100 lbs Carcass</b>	<b>Fuel Cost (house / flock)</b>
<b>\$ 0.65</b>	<b>\$ 3.2</b>	<b>\$ 96</b>
<b>\$ 0.75</b>	<b>\$ 3.7</b>	<b>\$ 111</b>
<b>\$ 0.85</b>	<b>\$ 4.2</b>	<b>\$ 126</b>
<b>\$ 0.95</b>	<b>\$ 4.7</b>	<b>\$ 141</b>

## **ASH DISPOSAL**

Ash from the incineration of poultry mortalities is a concentrated source of phosphorus and potassium. Table 3 shows the typical nutrient content in ash generated from poultry broiler mortalities. It is important to recognize that if mismanaged, this

phosphorous rich ash could cause surface water degradation. Ash should be land applied in areas where run-off potential is very low.

Table 3. Typical Nutrient Content of Poultry Carcass Ash	
Nitrogen	20 lbs / ton
Phosphorus (P <sub>2</sub> O <sub>5</sub> )	650 lbs / ton
Potassium (K <sub>2</sub> O)	175 lbs / ton

## SUMMARY

- ❖ When selecting an incinerator, look for a sturdy unit of adequate capacity to handle the mortalities generated at the end of a grow-out cycle.
- ❖ Look for a unit with automatic ignition and a timer mechanism to reduce your management time.
- ❖ Choose a location for the incinerator that is typically downwind from any nearby residences and your buildings.
- ❖ Remember that ash contains nutrients and must be handled in an appropriate manner.
- ❖ Permits from the Tennessee Division of Air Pollution Control are required for incinerators under some conditions.
- ❖ Have a separate mortality management plan in place to handle a catastrophic loss.

**More information on livestock incinerators may be obtained from the following vendors:**

Burn-Easy Animal Carcass Incinerators  
R&K Incinerator Co.  
Rt. 4 6125 West 100 South  
Decatur, IN 46733  
1-800-233-1163 (219)-565-3214 Fax (219)-565-3149

Larry Lewis Livestock Incinerator  
P.O. Box 112  
Cedar, Iowa 52543  
Sales (515)-933-4762 Service 1-800-933-4761

National Incinerator Incorporated  
P.O. Box 266  
Boaz, AL 35957  
(205)-589-6720 Fax (205)-589-2326

References:

A Cost Comparison of Composting and Incineration Methods for Mortality Disposal.  
Poultry Science Facts #25. North Carolina State University

Installation and Use of Incinerators. Alabama Cooperative Extension System Bulletin  
ANR-981. Auburn University.

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