

# Water Based-Foam Depopulation: For Poultry During Animal Health Emergencies



During an animal health emergency, the mass depopulation of poultry may be a necessary response task. Various methods for poultry depopulation under emergency situations have been approved. One such method for use for floor-reared poultry is the use of water-based foam.

## Mass Depopulation of Poultry

Euthanasia of large numbers of birds in a quick, efficient manner with welfare consideration. The process is used to control disease spread or end suffering of dying birds during disease outbreak or natural disaster situations

## Water-Based Foam for Depopulation

- **Conditionally approved by USDA**
  - Method for mass depopulation for floor-reared poultry under emergency response conditions or potential zoonotic disease
- **USDA APHIS Performance Standards for the Use of Water-based Foam as a Method of Mass Depopulation of Domestic Poultry**
  - Conditions and criteria for use, including foam size, expansion ratio, depth and efficacy
- **USDA standards supported by American Veterinary Medical Association (AVMA)**

## Advantages of Water-based Foam

- **Rapid method for large flocks**
- **Less handling of birds**
  - Less stress on birds
  - Less risk for injury to birds/responders
  - Less exposure to zoonotic diseases
- **Fewer personnel required**
- **Foam flows into small areas/crevices**
- **Foam builds to required height**
- **Less biosecurity risk**
  - Reduces dust and airborne pathogens
  - Adds moisture for composting
  - Disinfectant may be added
- **Clean up of foam is minimal**

## Disadvantages of Water-based Foam

- **Availability and cost**
- **Trained personnel**
- **Requires large amounts of water**
- **Floor-reared birds only**
- **Advance preparation is needed**

## USDA-APHIS Foam Standards

- **Efficacy**
  - 95% within 7 minutes
  - 100% within 15 minutes
- **Bubble size**
  - Similar to shaving cream
  - Not to exceed 1/16 inch (0.625 inch)
  - Bubbles greater than 1/3 inch (0.33 inch) may not achieve 100 % mortality
  - Larger bubbles may break down when agitated
- **Flow/Fluidity**
  - Surround the birds completely, without gaps caused by bird movement
  - Completely cover entire poultry house floor and any building supports/ structures
  - Be of appropriate consistency that is readily inspired by birds
- **Expansion ratio**
  - Ratio of volume of foam produced from one unit of solution
  - Medium expansion rate is ideal
    - USDA: 25:1 to 140:1
  - Higher ratio=drier foam
    - More foam needed
    - Foam harder to work with
  - Lower ratio=wetter foam
    - May not accumulate to sufficient depth
- **Consistency depends on**
  - Temperature and air humidity
  - Water hardness
  - Wind, if present
  - Type of equipment
- **Body/Depth**
  - Varies with species/age
  - At least 6 inches above bird height
  - Does not determine efficacy

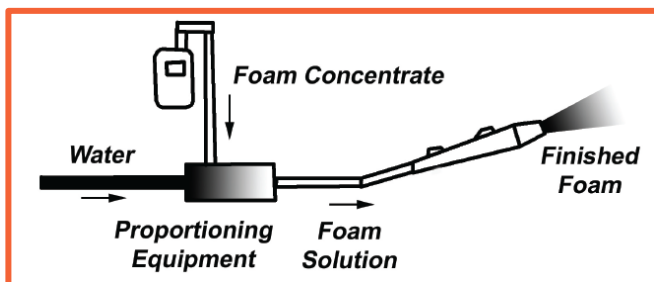
- **Observe for any species variations**
- **Persistence or drawdown time**
  - Amount of time for foam to degrade
  - USDA – must be at least 30 minutes
- **Cleanable, portable equipment**

## Water

- **Rate limiting step - Logistics important!!**
- **Capacity can be up to 35,000 gallons per day**
- **Identify water sources prior to procedures**
- **Water Transport Vehicles**
  - Water tenders, farm water truck, fire engines
  - Transfer to dump tank (e.g., 4,000 gallon)
- **Water quality can affect foam production**
  - Dissolved solids, salinity, pH, hardness
- **Biosecurity**

## Equipment Overview

- **Foam Proportioning System**
  - Digital system that controls foam quality and allows adjustment as conditions change
- **Pump**
  - Capable of 250 gpm at least 150 psi
- **Hoses**
  - Generally 1½ inch
  - Length can affect psi: Estimate loss of 26 psi per 100 feet with 1.5 inch hose
- **Nucleation screen**
  - Determines bubble size



## Types of Foamers

- **Nozzle System**
  - Hand held
  - Expansion ratio of 35:1
- **Generator System**
  - Higher expansion ratio - 120:1 to 135:1
  - Less water and personnel

## Foam Depopulation Process

- **Before Beginning**
  - Trained personnel to properly run equipment
  - Water supply/sources
  - Condense large areas - Construct walls to help obtain/maintain height; seal seams with duct tape
  - Do not overcrowd the birds
- **Foam Generator Placement**
  - Place generator at one end of facility
  - Connect to hose/pulley at other end
- **Foam Generator Operation**
  - As the generator pumps foam it retracts the hose as it travels across the house
  - Experienced personnel
    - Equipment operator: Outside
    - Pump operator: Inside
  - Maintain constant foam production i.e., no stopping to refill water tanks
- **Foam Degradation**
  - Persistence at least 30 minutes, then should degrade quickly on its own
  - Water within the foam will collect near the floor, taking longer to degrade
- **Post-Foaming Tasks**
  - Clean, disinfect depopulation equipment regardless of disease agent present
  - Clean and disinfect all off-farm equipment upon arrival, departure from the farm
- **Species Termination Time**
  - Euthanasia times may vary with species
  - University of Delaware depopulation study, Dr. Eric R. Benson

## Responder Safety

- **Qualified personnel to operate and maintain**
  - Fire department as possible resource
- **Provide appropriate safety training**
- **Wear appropriate Personal Protective Equipment**
  - Have suitable respirator equipment (SCBA, oxygen) available
- **Foam is slippery**
  - Higher carbon dioxide concentration near floor
  - **Anyone working near foam should be observed at all times**
- **Dermal irritation/eye irritation**

## Additional Resources

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- AVMA Guidelines for the Euthanasia of Animals  
<https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>
- FAD PReP/NAHEMS Guidelines Mass Depopulation and Euthanasia  
<http://www.cfsph.iastate.edu/pdf/fad-prep-nahems-guidelines-mass-depopulation-and-euthanasia>
- Procedures for Humane Euthanasia. Iowa State University College of Veterinary Medicine  
<https://vetmed.iastate.edu/vdpam/about/production-animal-medicine/dairy/dairy-extension/humane-euthanasia>
- World Organization for Animal Health (OIE) Terrestrial Animal Health Code. Chapter 7.6. Killing of Animals for Disease Control Purposes.  
[http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre\\_aw\\_killing.htm](http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_aw_killing.htm)
- University of Delaware. Depopulation. Dr. Eric R. Benson  
<http://udel.edu/~ebenson/Depopulation.htm>
- USDA APHIS. Use of Water-Based Foam for Depopulation of Poultry  
<https://www.avma.org/KB/Policies/Pages/Poultry-Depopulation.aspx>

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