Water-based Foam For Mass Depopulation of Poultry

Overview

Mass Depopulation of Poultry

- Euthanasia of large numbers of birds
  - Quickly, efficiently
  - Welfare consideration
- Disease outbreaks
  - Control disease spread to other flocks
  - End suffering of dying birds
- Natural disasters

Just in Time Training — Water-based Foam for Poultry Depopulation

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 conditions and standards supported by AVMA

Just in Time Training — Water-based Foam for Poultry Depopulation

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
- Decreased labor
  - Fewer personnel required

Just in Time Training — Water-based Foam for Poultry Depopulation

Advantages

- 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

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Disadvantages of Water-based Foam

- Availability and cost
- Trained personnel
- Requires large amounts of water
- Floor-reared birds only
- Advance preparation is needed
  - Removal of slats or raised objects

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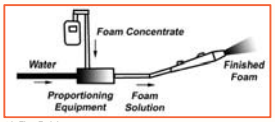
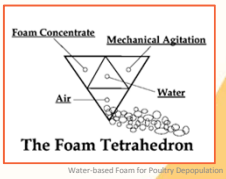
Water-based Foam

- Water
  - Flow (gpm)
  - Pressure (psi)
    - Higher psi breaks down bubble size
    - Lower psi can have too much water
- Foam concentrate
  - 0.3 to 1%
- Air, inert gas, or anesthetic gas
  - Carbon dioxide





Just in Time Training — Water-based Foam for Poultry Depopulation

Foam Depopulation

- Foam of appropriate consistency and density
- Builds blanket to occlude upper airway
  - Creates atmosphere devoid of oxygen
  - Carbon dioxide causes rapid loss of
    - Consciousness
    - Breathing
    - Heart activity

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Water-Based Foam for Depopulation

- *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
  - Foam size, expansion ratio, depth
  - Efficacy

Just in Time Training — Water-based Foam for Poultry Depopulation

USDA-APHIS Foam Standards

- 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

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Expansion Ratio

- Expansion ratio
  - Ratio of volume of foam produced from one unit of solution
- Higher ratio=drier foam
  - More foam needed
  - Foam harder to work with
- Medium expansion rate is ideal
  - USDA: 25:1 to 140:1
- Lower ratio=wetter foam
  - May not accumulate to sufficient depth

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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

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USDA-APHIS Foam Standards

- Consistency depends on
  - Temperature
  - 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

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USDA-APHIS Foam Standards

- 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

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Water

- Rate limiting step
  - Logistics important
- Capacity
  - 25,000-35,000 gallons per day
- Identify sources
- Transport
  - Water tenders
  - Farm water truck
  - Fire engines
  - Transfer to dump tank (e.g., 4,000 gallon)
- Water quality
  - Dissolved solids, salinity, pH, hardness
- Biosecurity

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Equipment Overview

- Foam Proportioning System
  - Digital system
  - Controls foam quality
  - 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 25 psi per 100 feet of 1.5 inch hose
- Nucleation screen
  - Determines bubble size

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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

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FOAM DEPOPULATION PROCESS

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Before Beginning

- Trained personnel to properly run equipment
- Water supply/sources
- Condense large areas
  - Construct walls to help obtain/maintain height
    - Plywood and 2x6s
    - Seal seams with duct tape
  - Do not overcrowd

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Foam Generator Placement

- Place generator at one end of facility
- Connect to hose/pulley at other end

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Foam Generator Operation

- Generator pumps foam and retracts hose as it travels across the house
- Experienced personnel
  - Equipment operator: Outside
  - Pump operator: Inside
- Maintain constant foam production

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Foam Degradation

- Persistence at least 30 minutes
- Then degrade quickly to prevent buildup
- Water within the foam will collect near the floor, taking longer to degrade

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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

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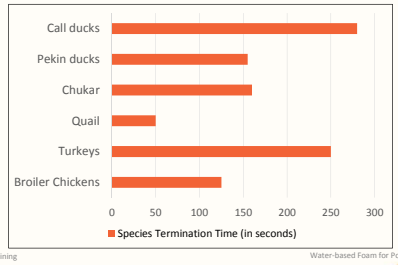
Species Termination Time

- Euthanasia times may vary with species
- University of Delaware depopulation study
  - Dr. Eric R. Benson



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Responder Safety

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

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Resources

- USDA APHIS: Use of Water-Based Foam for Depopulation of Poultry https://www.avma.org/KB/Policies/Pages/Poultry-Depopulation.aspx
- FAD PReP/NAHEMS Guidelines Mass Depopulation and Euthanasia http://www.cfsph.iastate.edu/pdf/fad-prep-nahems-guidelines-mass-depopulation-and-euthanasia
- American Veterinary Medical Association. Guidelines on Euthanasia www.avma.org/issues/animal_welfare/euthanasia.pdf
- University of Delaware, Depopulation, Dr. Eric Benson http://udel.edu/~ebenson/Depopulation.htm
- World Organisation for Animal Health. Terrestrial Animal Health Code. Chapter 7.6. Killing of Animals for Disease Control Purposes http://www.oie.int/doc/ged/D13678.PDF

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Acknowledgments

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