Mortality Management Planning and Response Considerations - Addressing Natural Resources in Emergencies

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Goals of Presentation

- Nature of animal mortalities in disaster (as differentiated from naturally occurring or daily)
  - Causes
  - Issues of Concern
  - Scale
- Methodologies of disposal
  - Environmental considerations
- Roles and responsibilities
- Considerations
Daily Mortality

- Before its final intended use
  - Harvest (food animals)
- At its predetermined conclusion
- Old age, natural death
- No-value food animals (spent hens)
- Biomedical animals
- Producers must have a plan for this (under BODA, MAEAP, NPDES Permits)
Cause of Death During Emergencies

- Physical disaster
  - Fire, toxin, weather, building collapse
- Transboundary Disease
  - FMDs, CSF
- Direct euthanasia
  - Due to injuries or disease or proximity to disease
- Collateral euthanasia
  - Mortalities created by disruptions of marketing and transport systems caused by the disaster
Management Methods

- Burial
- Land-fill
- Composting
- Incineration
- Rendering
- Feeding to other animals
  - Fur-bearing, alligators

- Treat (vaccination-hold)
  - Anaerobic digestion
  - Gasification
  - Alkaline hydrolysis or digestion
  - Harvest
Burial

- All body parts at least 2 feet beneath the natural surface
- No contact with bodies of water
- 200 feet from wells
Common Graves

- Maximum 2.5 tons/acre
- Separated by minimum of 100 feet; 4 graves per A
- Covered with minimum of 1 feet of soil within 24 hr
- Entire grave not open longer than 30 d
- At least 2 feet of soil as final cover

Illustration from Texas Animal Manure Management Issues (TAMMI) Website
Incineration

Cremation is a controlled and rapid oxidation of organic matter:

- Complete reduction of volume
- Destroys pathogens
- Expensive - initial cost and energy cost
  - Natural gas or diesel fuel
  - This is not coal-oil, old tires and a lit cigarette
  - Greatest utility is for small animals
- Oxidizes volatile gases (odors)
- Air quality permit may be required
Incineration – Institutional/Commercial
Curtain Incineration
Rendering – pros and cons

- Recycles the nutrients in the dead animal
- Bio-security measures must be observed
- Low maintenance
- Flexible to handle single carcass or 1000 tons or more
- Storage of animals is required until pickup
- Fees charged for pickup
- Rendering services may not be available
Landfill

- Availability must be determined
- Flexible to handle small and large amounts of mortality
- Generally no pick-up by waste management companies unless large consistent quantity
  - If farmer must deliver normal mortality
    - Must avoid complaints in transport
    - However, license is not required as farm is not a “dead animal dealer”
Composting

- The controlled biological decomposition of organic material under (aerobic and anaerobic) conditions
Composting

- So that storage, handling and land application of compost can be done without adversely affecting the environment or people
  - Not recognizable
  - Aesthetically acceptable
  - Not a nuisance
- Recycling nutrients
Terminology

- **Active composting**
  - Rapid decomposition into $\text{CO}_2$, water, heat, minerals, and compost (humus)
  - Temperature of 120 to 150º F
  - Several weeks – “primary”
  - May or may not aerate
    - Do not if disease agent involved
  - Continue 2-3 months, until soft tissues are totally decomposed and $\text{H}_2\text{O}$ vaporized
    - Complete composting process
    - Landfill
    - Combustion – preferably gasification
  - Landfill
  - Combustion – preferably gasification
Windrow
Density

- Dead animal density (lbs./ft$^3$) in compost
  - Range 3 to 15; but 5 is effective and safer
  - Optimum depends on desired speed of composting process
- About 80 ft$^2$ active area per 1500 lbs. of mortality
  - 240 ft$^2$ with apron working area
  - 1.1 A for 200 cows
- Rule of thumb: 2 to 2.5 parts amendment to 1 part animal
Best Conditions for Active Composting

- Moisture content, range of 40 to 60 %
- Carbon-to-nitrogen ratio, range of 15:1 to 35:1
- Amendment particle size, range of 0.1 to 2 inches
- Temperature range of 100 to 150°F
- pH range of 5.5 to 9.0
Composting Amendment

- Blend
  - Dairy manure compost
  - Horse stall bedding
  - Finished swine mortality compost
  - Dry wood shavings

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Anaerobic digestion
Other Methods

- May be approved by the Director
  - Alkaline hydrolysis or digestion
  - Gasification
  - Feeding to other animals
    - Fur-bearing, alligators
Alkaline hydrolysis
Gasification
Considerations

- Cause or agent
- Resources
  - Available workers & equipment
  - Local, state and federal funds
  - Live animal management pre-euthanasia
  - Transportation
  - Fuels, composting feedstocks, alkaline substrate
Considerations

- Biosecurity and disinfection
  - Contain disease or other contaminants to a confined area and prevent spread to other locations
  - Operate disinfection station with limited impact on environment
    - Location should provide easy access for residents and responders.
Considerations

- **Human safety**
  - Personal Protective Equipment (PPE) to prevent occupational injuries and disease
  - Plan to minimize any negative environmental effects associated with the disposal or reduction/recycling of contaminated PPE

- **Social**
  - Publicity about farm
  - Public information officer (PIO)
  - Mental health offices and professional counseling services
Considerations

- Natural resources
  - Waters of the state
  - Distance to any septic drain field or fields
  - Location relative to tiled fields
  - Geology
    - Ensure containment of leachate in the long term
- Topography
  - Water (slope), but also odor, noise and visual effects
- Compatibility with surrounding land use
Web Soil Survey
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<td>Heating / Cooling Stations and Congregate Care Shelters with Companion Animal Provisions</td>
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<td>Supplemental Animal Care Resources (e.g. cages, food, etc.)</td>
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Suggested Readings