NSW DEPARTMENT OF PRIMARY INDUSTRIES

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Procedure – Disposal of large animals by composting

Authorised by	Leader, APFHEPR	**Authorisation date**	1 Sep 08
Authorisation period		**Effective date**	1 Sep 08
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REVISION HISTORY

Version	Date	Amendments	
		Section	**Details**
1	26 July 07		For approval
2	1 Sep 08		Re-formatted

1. Application / Scope

- Composting here refers to above-ground aerobic decomposition of dead large animals, such as cattle, sheep, goats and pigs. It does not in this instance include anaerobic decomposition (above-ground burial).

- Windrows are constructed to promote aerobic composting by allowing the flow of oxygen through the pile. The organic matter reduces odour, attracts few insects and absorbs leachate from the decaying carcasses.

- Composting is one of several options for the disposal of dead animals. Composting may also be an option for holding dead animals pending their disposal by another means.

- Composting may be used for either small or large numbers of animals.

- Composting is best undertaken as soon as possible after the animals have been killed. Composting can be undertaken at any time, within the limits of handling decomposed animals, post the death of the animals.

- Composting is undertaken in an open paddock/field – this approach requires:
    - Control of run-on and run-off from rainfall;
    - Considerations of the water table depending on soil type etc;
    - Management of potential pests eg birds, insects, foxes & feral pigs;
    - Use of plant/heavy machinery to construct and manage the compost.

- This procedure does not describe the end use of the compost post the composting cycle. The compost should be "disposed" of in a suitable area after the following considerations:
    - Isolation from similar enterprise farms;
    - Isolation from dwellings and other areas frequent by people;
    - Run off to dams, water ways etc.
    - End use of crops/pasture
    - Requirement to further process or remove large bones

- The end product can be held for an extended period in a stockpile and can be treated as non contaminated.

- The composting process will reach temperatures high enough to kill FMD virus. The actual composting process will also degrade viruses and bacteria.

- There is a possibility that the community may see a risk associated with composting. The community and neighbours in particular should be kept informed of the on site actions.

2. Abbreviations / Definitions

3. Resources / Equipment

- Organic matter – approximately a third by weight of the total weight of the animals to be composted or approximately 9-10m^3 for each large carcass (450-500kg). Options include mulched green waste, silage and used chicken litter. Wood chips can be used but the composting process may be slower than material with pre-existing micro-organisms. Coarse material such as hay should be ground (to maximum 5cm length) and combined with manure/litter to reduce compost times and increase initial temperatures.

- Where the compost is imported from an outside source, there may be a risk associated with the potential transfer of weed seeds, insects, pests, chemical residues and endemic pathogens. These risks will need to be assessed and managed appropriately.

- A stockpile of excess organic material is required for windrow maintenance.

- PPE – as for Personal Decon kit (see SOP) including respiratory protection, sun protection, reflective vests (for working around plant) and hard hats.

- Communication - radios for on site communication particularly for plant operators

- Ready access to facilities for personal hygiene and adequate supplies of non-potable and drinking water.

- Equipment to measure:
    - temperature inside compost windrow eg data logger that can be buried (by sliding down PVC tube into compost)

- Facilities for decontamination of personnel and equipment exiting composting site.

- Hand tools such as shovels, pitchforks, rakes, broom. Ladder may be required.

- Pest control measures eg bait stations, fencing (maybe electric).

- Water supply from a hose or similar.

- Signs to restrict perimeter entry to compost site.

- Current and forecast weather conditions for the period to construct compost windrow.

- Plant, equipment and qualified operators for
    - Construction to manage water run-on and run off
    - Construction of facility to catch run off (to prevent it directly entering a watercourse)
    - Build and load compost windrow
    - Transport organic material on site
    - Transport animals to site
    - Holding/slaughter yards adjacent to site if animals are to be slaughtered on site

4. Warnings

- Plant & equipment operation – all personnel on site (other than the qualified operators) must be accounted for and in zones not used by the machinery. Personnel moving around the site must be clearly visible (eg reflective vests) and have separate paths to the machinery.

- In addition to the PPE as per Personal Decon SOP, the minimum PPE worn should be as for a construction site eg solid footwear with non slip sole, hard hat (subject to clearance), reflective vest, sun protection, +/- ear/eye protection as needed.

- Only qualified personnel are to undertake tasks requiring tradesmen eg connection of utilities and operation of plant.

- Every effort should be taken to identify and reduce the presence of work place hazards including:
    - Features that may lead to slips, trips & falls eg uneven or wet ground
    - Exposure to disinfectants being used (mixing & application)

- Overlap between pedestrian, vehicle and plant traffic
- Poor hygiene (dining, toilets & showers)
- Hazards associated with catering ops (hygiene, kitchen hazards)
- Open pits or similar
- Poor communication around the worksite
- Sharp edges, corners etc on fences, buildings, yards
- Fuel storage & handling
- Adverse environmental effects
- Poor manual handling techniques
- Excessive odour from decomposing animals
- Stress related to dealing with dead animals
- Inadequate lighting or operations during night time

- Safety Advisor should routinely undertake risk assessments as part of audit processes.

- Rest Breaks - staff will need to be managed so they have adequate rest breaks.

- Site selection should be made to avoid public distress, reduce disease risks and protect property and water resources

- Electrical hazards outside may be underground and also overhead. Similar care should be taken in regard to other services such as gas, water, sewerage and communications.

- Use of an inappropriate organic material (ie too wet, too fine or too coarse) will lead to leachate leaking from the windrows, insufficient heat production and/or retention slowing composting, excessive odour, excessive insect infestations, compaction of windrows, reduced oxygen flow and insufficient temperatures for pathogen destruction.

5. Procedure

5.1 Preparation

- Collect information on:
  - Number, age and weight of animals
  - Availability of organic material on farm
  - Availablilty of organic material from other local sources
  - Available plant and operators on site
  - Dimensions of proposed composting area to determine length and number of windrows
- Develop plan of operation – including risk assessments and site map.
- Site selection requires protection of water resources, property, public view and reduction of disease risk, requiring a site that is:
  - Accessible by large trucks for organic material and carcass delivery
  - Well drained location not subject to runoff or pooled water, and outside the 100 year floodplains or wetlands
  - At least 200m from homes, public roads, or other areas frequented by the public
  - At least 60m from water sources (eg wells, streams) or visible bed rock outcrops
  - Away from timbered areas or buildings that could harbour rodents and burrowing predators.
- Consideration to be given to bunding the area to arrest potential run-off and run-on to the area

5.2 Construction – windrow width & height

Large animals (eg. mature cattle) – Figure 1

- Construct windrows with layers of organic matter and 1 layer of carcasses:
  - Organic material as base – 5-6m wide and minimum depth of 60cm
  - Create a depression in the centre of the base to accommodate the body and assist in the legs lying flat
  - Single layer of carcasses placed with backbones touching in centre and feet pointing to outside
  - Optional layer (15-30cm) of moist manure covering carcasses
  - Deep final layer of organic material covering carcasses – at least 1.2m in centre and 0.5m along the sides
  - Completed windrow should be approximately 5-6m wide and no more than 2.6m high

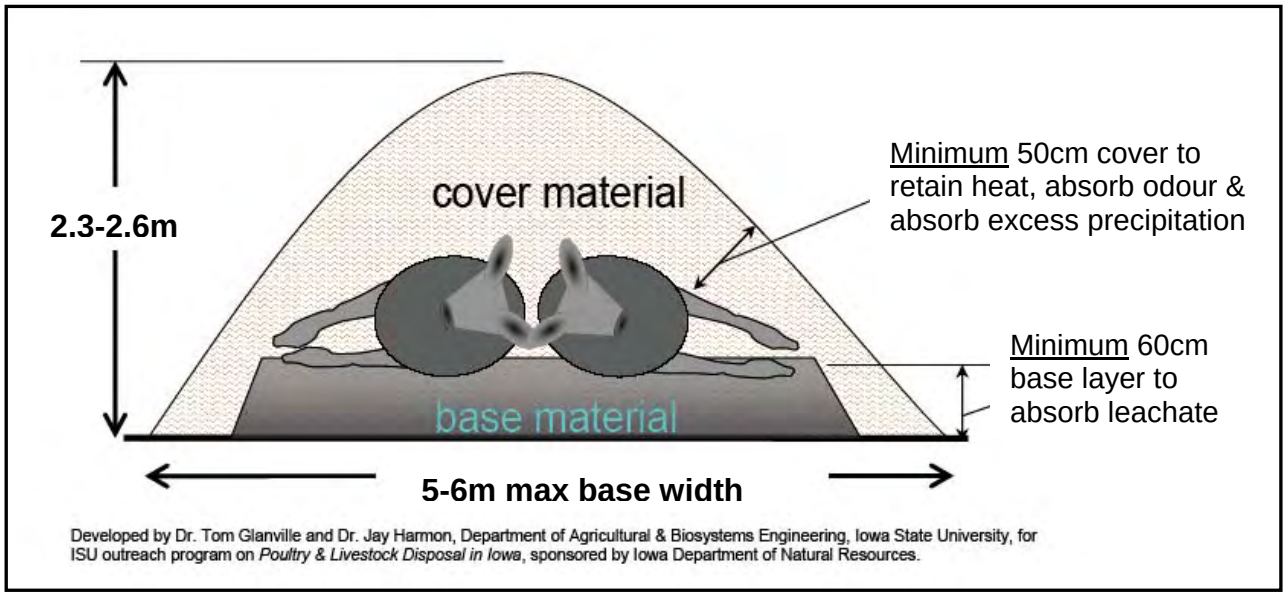

Figure 1: Windrow construction for large animals

Smaller animals (eg. calves, sows, pigs) – Figure 2

- Construct windrows with layers of organic matter and 1 layer of carcasses:
  - Organic material as base – 5-6m wide and minimum depth of 60cm
  - Layer carcasses to maximum depth of approx 1m ie 2-3 carcasses
  - Place 10-15cm of organic matter between carcasses in the same layer
  - Place 15-25cm of organic matter between layers
  - Deep final layer of organic material covering carcasses – at least 1.2m in centre and 0.5m along the sides
  - Optional layer of soil (300-500mm) can be used to protect windrow
  - Completed windrow should be approximately 5-6m wide and no more than 2.6m high

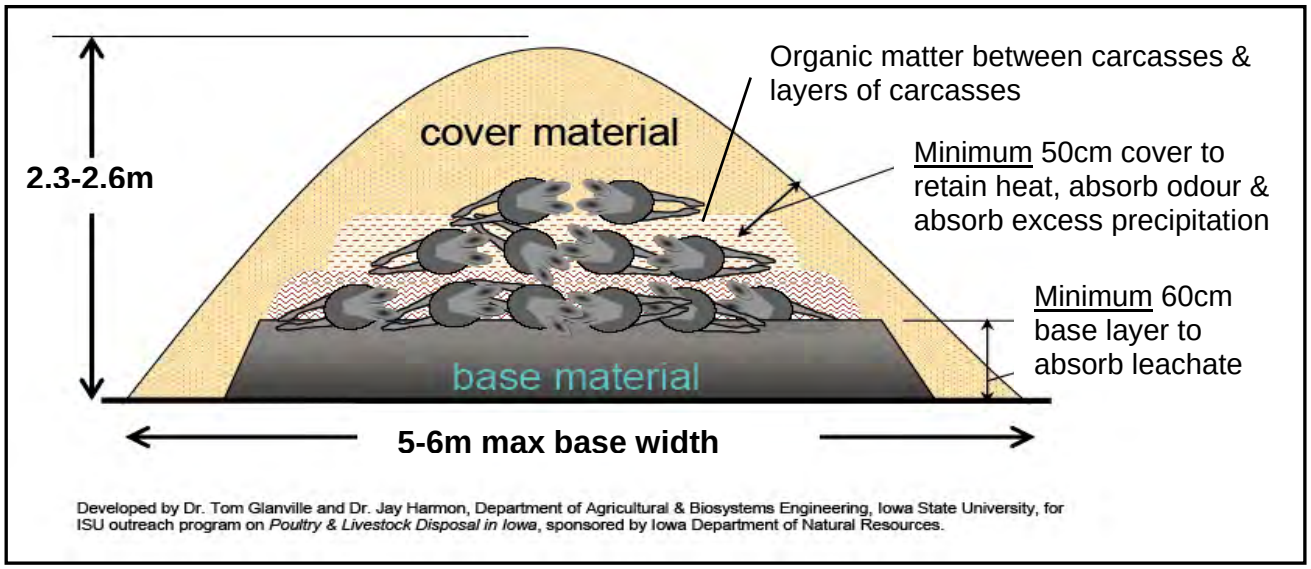

Figure 2: Windrow construction for smaller animals

Single carcasses or a few small carcasses

- Construct windrows as above with a minimum pile width of approx 3m to provide sufficient pile volume to retain heat during cold weather

NOTE
A. Construction of layers will require careful operation of the plant.

B. No part of the carcass or contaminated material (eg manure) should be exposed when the windrow is complete.

5.3 Construction – windrow length & spacing

- Allow approx 2.5m for a maximum of 1 tonne of carcasses, ie
  - 2 x full-sized cattle carcasses (450-500kg each), or
  - 4 x 225-250kg sows or calves, or
  - 8 x 110kg pigs

NOTE: Every 100m of windrow will accommodate 40 pairs of 450kg carcasses

- Leave at least 2-3 loader lengths (ie 15-20m) between adjacent windrows to facilitate pile maintenance and construction
  - Loader length is length of loader from tip of bucket to rear of loader
- Consider splitting long windrows to multiple shorter windrows to facilitate pest control and aid pile maintenance. Length may be restricted by current fences or other obstacles.

5.4 Management of composting process

- Dataloggers
  - Insert a minimum of 1 datalogger in every windrow positioned below carcass level along the centre line.
  - It is preferably to have 3 dataloggers per windrow – 1 in the middle and 1 at both ends.
  - Ensure the locations are clearly marked.
  - Use of a conduit is recommended.
  - Dataloggers should be checked at regular intervals.

- The ideal compost temperature is dependent on the infective organism.
  - Typically the compost temperature will be approximately 55°C in about 5-9 days and climb to around 70°C in about 10-14 days however this will depend on organic material used (FMD is killed at 56°C after 30 minutes).

- If the temperature does not reach the required level, contact the LDCC.

- The windrow should not be mixed unless required to rectify a poorly composting windrow.
- Manage pests by baiting, fencing, trapping, covering or other means as deemed necessary.
- Restrict access to windrow area – erect signs and construct temporary fencing (if necessary) with gate to allow access for monitoring.
- Apply organic material to cover carcasses that may be exposed due to windrow collapse, adverse weather, or predator/pest interference. Organic material may also be used to soak up visible leachate from carcasses.
- Composting is considered complete when:
    - Temperature has reached the required level for the necessary time to kill the target pathogen, and
    - Breakdown of carcasses is 80-90% complete, ie no soft tissues

NOTE: Topsoil under windrows may accumulate salts or other phytotoxic materials that may suppress crop/pasture growth. Tillage of these soils may break up the affected layer which can then be mixed with uncontaminated soil.

5.5 Post compost management

- Estimated time for decomposition of large carcasses to skeletal remains is 4-10 months depending on external air temperatures, moisture content of composting pile and size of the carcasses. Large bones (of cattle particularly) and possibly wool will remain in the compost for longer periods.

6. References

- Draft guidelines for emergency composting of cattle mortalities. http://www3.abe.iastate.edu/cattlecomposting/
- Ausvetplan manual for relevant disease

7. Appendices