Waste Management
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture, Food and Fisheries

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LARGE ANIMAL DISPOSAL

On-Farm Composting Option
South Coastal Region of BC

Caution

All composting of large animals contemplated on farms must follow the requirements of the ***Environmental Management Act*** and its ***Regulations***.

- ***Agricultural Waste Control Regulation – Code of Agricultural Practice for Waste Management*** allows for the composting of large animals on the farm if the compost is to be used only on the farm where the animal died and the compost was produced. Follow information provided in this factsheet.
- Composting of organic materials derived from off the farm (including large animals and animals containing Specified Risk Materials (SRM)), may be authorized under the ***Environmental Management Act*** and the ***Waste Discharge Regulation.***
- All large animal compost that contains SRM or has the potential to contain SRM is likely to be considered in the same fashion as a 'Class B Compost' under the ***Organic Matter Recycling Regulation***. Contact BC Ministry of Water, Land and Air Protection for more information on this type of composting and its use before starting any such operation.

Once the federal ***Health of Animals Act*** is amended, (expected to be complete fall 2005) composting of cattle mortalities from off-farm will require the approval of the Federal Minister of Agriculture. The composted product must then meet the ***Health of Animals Act*** and its ***Regulations***. Current proposed wording in that legislation reads as follows: Section 6.4 (5) *The Minister shall not issue a permit for the destruction of specified risk material unless the destruction is to be by incineration, or another method, that will ensure that the specified risk material and anything in which it is incorporated will not be used as food for humans or animals and will not enter the environment in such a way that it could contaminate any water or food supply.*

Mortalities are a normal part of animal husbandry. Livestock producers may dispose of mortalities from their own farms through one of the following means:

- Dead animal collection service
- On-farm disposal by:
  - Composting
  - Incineration, or
  - Burial

On-farm composting can be a practical, cost effective, biosecure, and environmentally sound method to dispose of large animal mortalities. This factsheet provides information to help you decide if on-farm composting is a viable option for your farm operation.

Topics addressed include:

- The Composting Process
- Site Selection
- Equipment Requirements
- Structures Required
- Sizing Structures
- Management
- Monitoring the Process
- Use of Final Composted Product

The Composting Process

Composting is the controlled decomposition of organic material. Bacteria, fungi and other micro-organisms convert organic material into a stable humus-like product that is easy to manage and pathogen-free.

The success of composting depends on creating a good environment for the microorganisms. There are four key components to a good composting environment: carbon to nitrogen ratio, moisture content, oxygen content and temperature.

- **Carbon to Nitrogen (C:N) ratio:** The organisms that do the composting need a proper balance of carbon and nitrogen in their diet. Animal carcasses are high in nitrogen. They need to be mixed with high carbon sources such as sawdust, wood shavings or straw to achieve a starting blend of between 20:1 and 40:1 on a mass basis.
- **Moisture:** Microorganisms need water to survive. The optimal moisture content is 50-60%; moist but not soggy.
- **Air flow – oxygen:** Compost piles need to "breathe". Oxygen levels need to remain around 5%. Air flow may be restricted if the particle size is too small or moisture level too high**.** Poor aeration can lead to odours.
- **Temperature:** Compost piles will naturally heat as a result of the decomposition process. The preferred temperature range is 54-60°C. To kill pathogens, temperatures above 55°C for three consecutive days are required.

Site Selection

- At least 30 meters (100 ft) away from wells or watercourses
- A level site not subject to flooding
- Runoff and/or leachate can be contained to protect surface and ground water
- Located out of sight of neighbors (aesthetics)
- Should be secure from predators

Equipment Requirements

Required

- Front-end loader or skid-steer loader
- Temperature probe about 1 m (3 ft) in length
- Compost site must be covered by a roof or be on an impervious surface - with a curb to capture run-off
- A source of carbon materials (sawdust, shavings, straw, calf pen waste)[1]

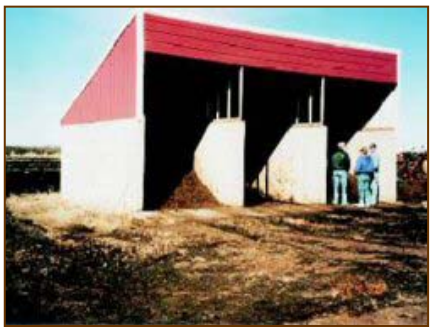
Preferred

- Moisture meter that can effectively monitor moisture between 30% and 70%
- Located away from animal feed and housing (rodent control)

Structures Required

Year round composting in the South Coastal Region of British Columbia requires a method that provides some form of protection of the composting material from high rainfall. For most small to medium sized operations this means utilizing a bin style composting method in a covered structure.

To investigate other types of composting, please refer to the BCMAFF Composting Factsheet 382.500-5 ***Composting Methods.***



Some styles of compost structures that could be used in South Coastal British Columbia

[1] Solid manure from a separator or waste from calf pens can be used if consideration is taken for the extra nitrogen in these products

Sizing Structures

The composting structure needs to be large enough to accommodate your farms composting needs. Three bins are recommended. Approximately 1.25 m^3 of primary bin space is needed for each kilogram of average daily mortalities (20 ft^3/lb). A dairy farm with 100 milking cows would need 3 bins approximately 3 m by 4.0 m (10 ft by 13 ft) and with piles no more than 2 m (6 ft) high. More bin space may be required for lower carbon and bulkier materials such as straw. Carcass to carbon source ratios on a volume basis are 1:1-2 for sawdust, 1:2-3 for woodchips and 1:3-5 for straw.

Table 1 provides an indication of the number and total mass of expected mortalities on farms in a year. These numbers can be used in the sizing calculator found on the Manitoba Agriculture, Food and Rural Initiatives web site.
http://web2.gov.mb.ca/agriculture/composting/index.php

For more information on bin designs see BCMAFF Composting Factsheet 382.500-5 ***Mortality Compost Bin Design***.

Table 1 Estimated Mortalities for Common Farm Animals and Poultry

Animal Type	Example Farm (entire year) # mortalities (total weight)
Dairy	100 milking cows 14 mortalities 6,400 kg (14,100 lb)
Beef	100 cow herd 7 mortalities 2,400 kg (5,300 lb)
Swine	100 sow farrow to finish 251 mortalities 5,075 kg (11,200 lb)
Broilers	100,000 broilers 5,820 mortalities 5,040 kg (11,100 lb)

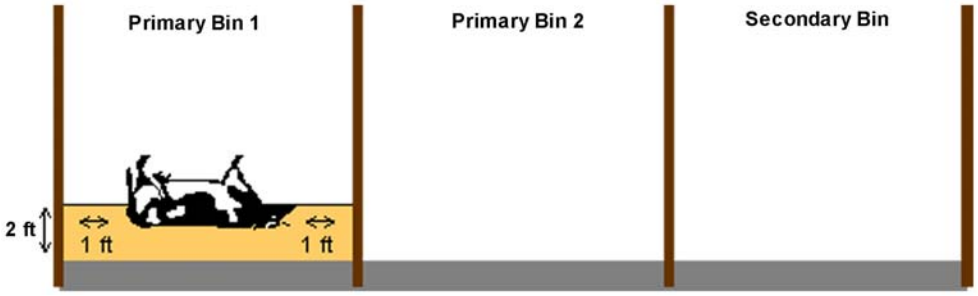
Management

Management of the process involves preparing the carcass and mixing it with the correct amount of carbon source and water to initiate the composting process. The temperature of the compost pile will rise and then fall over time. To speed up the process, reactivate the pile by re-mixing it when the temperature drops below 48°C. A separate bin is convenient for this second phase.

Whole carcasses will fully compost in 6 – 8 months. If the carcasses are cut into small pieces the process will be quicker.

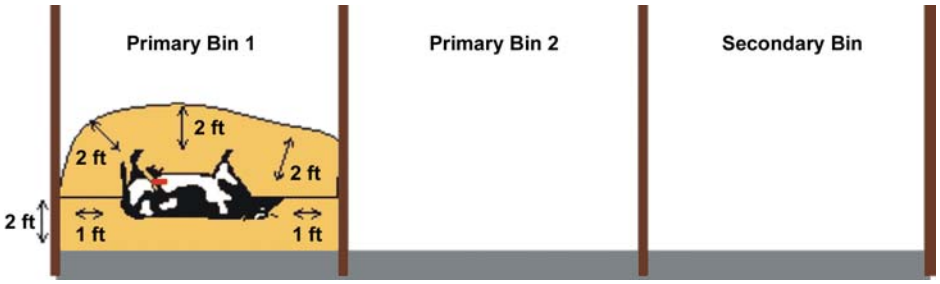
Building The Pile Within The Compost Bin

STEP 1 Place at least 0.6 meters (2 ft) of dampened carbon material at the base of the pile to insulate the compost pile and absorb liquids.



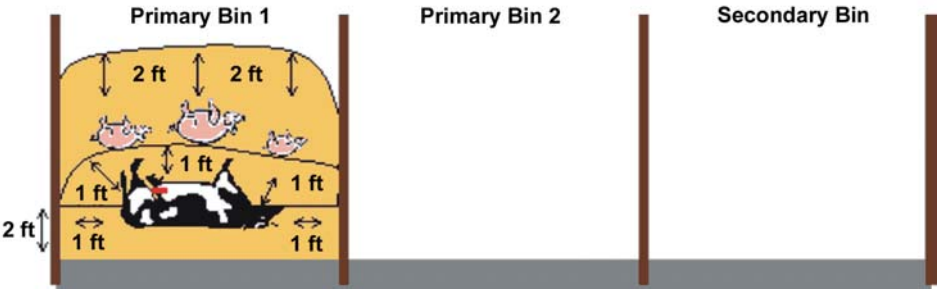
STEP 2 **Preparation:** Lay the carcass in the centre of the base on its back or side. For ruminants larger than 150 kg (330 lbs), it is recommended to cut open the thoracic, abdominal cavities, viscera, as well as, slice large muscle mass to accelerate the compost process and prevent possible explosion of the intestinal cavities. For non-ruminant animals, no lacerations are required. Before the animal is covered, wet the animal hair or fur with water; this provides good carcass to compost contact. **Placement:** Make sure there is at least 0.3 m (1 ft) of carbon material between the animal and the outside edges of the bin as the outer edges do not reach temperatures high enough for pathogen kill.

STEP 3 Cover the mortality with at least 0.6 meters (2 ft) of moistened carbon material. The 0.6 m layer of material will act as a biofilter to reduce unwanted odours. Ensure the pile's moisture content is greater than 45%.

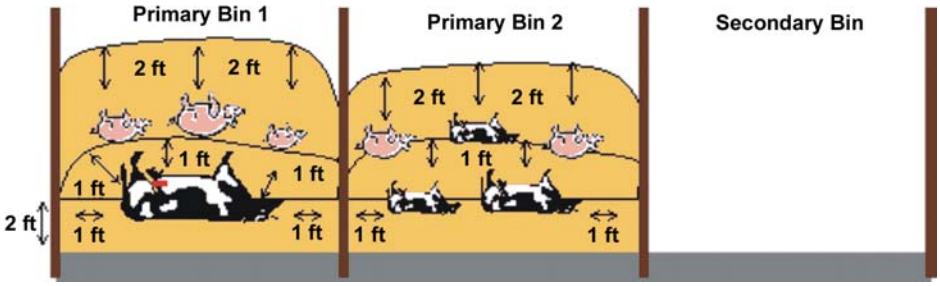


STEP 4 When starting a new layer, take off 0.3 meters (1 ft) of carbon material and place the animals on top of the previous layer. Be sure the height of the pile does not exceed 1.8 meters (6 ft). The top of the pile should be covered with a minimum of 0.6 meters (2 ft) of carbon material.

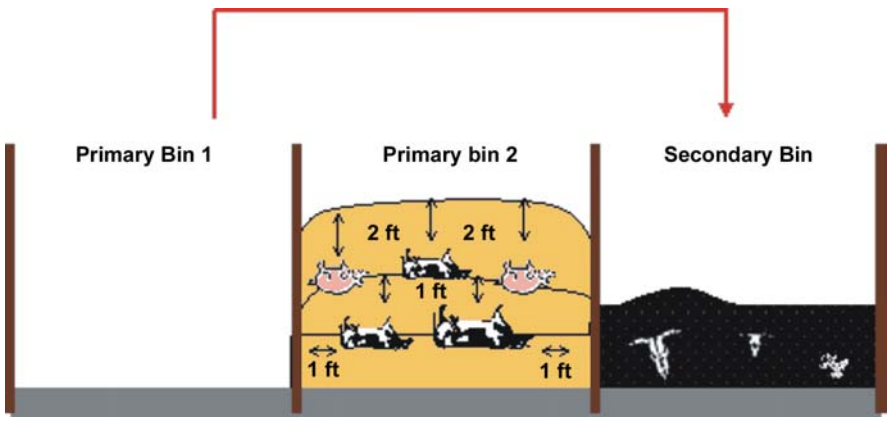
STEP 5 Continue to place carcasses on top of the pile ensuring that the carcasses are not touching. Once Primary Bin 1 is full you are in the **primary stage**. In this stage, the temperature should increase to 40-65°C.



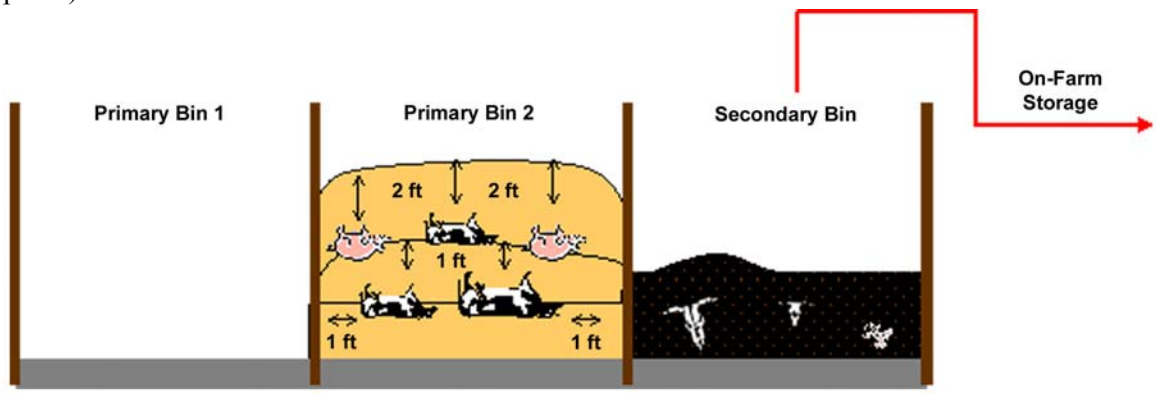
STEP 6 Once Primary Bin 1 is full, start filling Primary Bin 2 following steps 1-5 above.



STEP 7 Once the temperature in Primary Bin 1 stays above 40°C for seven consecutive days and then drops, the pile is ready to be emptied into the Secondary Bin (approximately 3 months). By this time the compost pile should contain bones and minimal flesh. Transfer the material from Primary Bin 1 to the Secondary Bin.



STEP 8 Once the pile is turned you are in the secondary stage. The secondary composting period is usually equal to the primary composting time (approximately 3 more months). Monitor the pile daily, the composting process is usually finished after the temperature is greater than 55°C for seven consecutive days and then drops. Check the pile, if there are no signs of flesh and only brittle bones left, the composting is done and can be applied on-farm. If all of the flesh has disappeared, the compost from the Secondary Bin can be emptied out and stored on-farm until conditions are suitable for land application (same time as manure can be spread).



STEP 9 After approximately 3 months, the contents from Primary Bin 2 should be turned into the Secondary Bin. If there are still signs of flesh in the contents in the Secondary Bin (remnants from Primary Bin 1), mix the contents from Primary Bin 2 with the contents in the Secondary Bin. Again, monitor the temperature daily, if the temperature is greater than 55°C for seven consecutive days and then drops (temperature drop should be close to ambient temperature) the compost should be finished. If there are no signs of flesh, composting is complete. Large bones may be present and can be sieved out and thrown back into a Primary Bin for further composting.

Monitoring The Process

- **Temperature**. For effective composting the temperature needs to reach from 55°C – 65°C for at least 7 days. For pathogen control the temperature must be over 55°C for 3 consecutive days. When the temperature drops below 48°C consider remixing the pile.
- **Moisture**. To test moisture, hold the composting material. If you squeeze the mixture it should feel moist but you should not be able to squeeze water out. If the pile gets too dry re-mix and add moisture.
- **Records** should be kept of the type and weight of the carcasses, the amount and kind of carbon material used and the daily temperature.
- Small **mortalities** (under 25 kg) may take 90 days for the complete cycle. Mortalities over 25 kg may take 180 days. It may take up to a year to compost large mortalities (over 200 kg). Note: The time to compost large mortalities can be reduced if the carcass is cut into smaller pieces.

Use Of Final Composted Product

Finished compost can be used as part (not more than 50%) of the carbon material for a new compost pile. This reduces the amount of new carbon material you need for the new pile and inoculates new compost with composting organisms.

If large animals are not shredded, bones may be left after the composting process. In order to deal with bones, the compost can be screened to remove them, and they can be returned to the primary bin. If they are brittle enough, they will disintegrate during spreading of the compost.

Compost may also be applied as a beneficial soil amendment, adding organic matter and some nutrients to your fields. Applications should not cause pollution and should be considered as part of your nutrient management plan. All application should be in compliance with the land application of soil conditioners or fertilizers as noted in the *Agricultural Waste Control Regulation*.

Summary

If site and conditions do not allow for on-farm composting of mortalities, livestock producers should choose one of the other alternative means of disposal listed below:

- Dead animal collection service
- On-farm disposal by:
  - Incineration, or
  - Burial

More Information on Composting

BC Agricultural Composting Handbook – Factsheet Series

The Bare Bones of Carcass Composting - Manitoba Agriculture, Food and Rural Initiatives

Composting Animal Mortalities: A Producer's Guide - Saskatchewan Agriculture, Food and Rural Revitalization

Acknowledgement

Some photos and graphics are used with the permission of Manitoba Agriculture Food and Rural Initiatives.

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