Composting
FACTSHEET

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MANAGING PORK MORTALITY COMPOSTING SYSTEMS

COMPOSTING INGREDIENTS

The composting of dead swine requires the addition of a carbon source to ensure proper carbon/nitrogen ratios are present for the composting process.

Experience thus far suggests that sawdust is an ideal carbon source due to its small particle size, ease of handling, absorbency and high carbon content. The use of straw as the only carbon source has been less successful, with lower composting temperatures, leaching of fluids from the composting pile, and longer time required to complete the process. When sawdust is used as a carbon source, plan to provide about 6¼ cubic metres of sawdust per 1000 kilograms of carcass (100 cubic feet per 1000 pounds) to be composted. For farrow-to-finish operations, total sawdust requirements are about one-quarter to one-third cubic metre annually per sow in the herd.

A precise carbon/nitrogen ratio does not seem to be necessary to obtain good composting, and most composting with sawdust as the carbon source has been done without adding supplemental nitrogen. However, if sawdust is used according to the above recommendations, some supplemental nitrogen may have to be added to obtain the ideal carbon/nitrogen ratio of 25. The addition of about 3 kilograms of ammonium nitrate (NH_4N0_3) in dry, granular form per 100 kilograms of swine carcass will provide the nitrogen necessary to achieve this carbon/nitrogen ratio. The ammonium nitrate should be mixed with the sawdust used to cover the carcass and can be applied by simply "hand-scattering". As noted previously, most composting is accomplished without the use of additional nitrogen, but this practice may help in starting up a new composting cycle and obtaining desired composting temperatures.

The type of sawdust used in composting can influence the success of the operation. Although a fine or small particle size sawdust is not absolutely necessary, large wood chips and shavings do not seem to work well. Sawdust or wood refuse material generated from bark and/or mulching operations may contain rocks, stones and other foreign material in addition to excessively large wood particles, and should not be used for composting.

Tests on fresh sawdust obtained from seasoned logs or kiln-dried lumber indicate a moisture content of 20 to 30 percent. Sawdust stored in piles tends to collect moisture, increasing its moisture content.

The ideal moisture content in a composting pile is 50 to 60 percent. Swine carcasses have a moisture content near this range. Since a large proportion of sawdust obtained from covered piles may be very dry, it may be necessary to adjust moisture content or add water to the composting recipe. If the sawdust is exceptionally dry or the composting pile becomes dry due to the internal heat generated, it will be necessary to add more water for optimal decomposition. The moisture content of sawdust or a composting mixture can be judged somewhat by its appearance and feel. Sawdust that has a damp appearance and feels damp is probably near the proper moisture content. If it appears wet, or free water can be squeezed out, it should be allowed to dry to a drier condition before being used. Fresh

sawdust taken directly from kiln-dried lumber or seasoned logs will probably be too dry necessitating the use of extra water. Water should be added as needed to obtain a damp feel and appearance. Very dry sawdust (20 percent or less moisture) may require the addition of up to 150 to 250 litres per cubic metre (1 to 1½ gallons of water per cubic foot) to obtain the proper moisture content. Water should be added by sprinkling or spraying as the sawdust is placed on the carcasses. The over-addition of water should be avoided, as excessively wet mixtures do not compost properly and may require removal and remixing with dry sawdust to recover the process. "Green" sawdust from fresh-cut, unseasoned logs may have a moisture content as high as 80 percent. Such sawdust may be too wet for optimum composting, and should be allowed to dry somewhat or should be mixed with drier sawdust or finished compost before use. A water line and hydrant installed at the composter will facilitate water addition and general cleanup activities.

Temperature is the best indicator that the composting process is proceeding properly. Temperatures in the composting pile should rise to the 55 to 70 °C range, indicating active microbial activity, and facilitating rapid breakdown of carcasses.

COMPOSTER MANAGEMENT

Although composters are simple and relatively easy to operate and manage, certain procedures are necessary to ensure that the process proceeds efficiently. The following steps should provide acceptable finished compost in a swine operation:

1. Start a primary composting bin by placing at least 300 mm (12 in) sawdust under and around the first carcasses. Carcasses placed directly on dirt or concrete floors, or against bin walls will not compost properly.
2. Place carcasses in the primary bin as necessary. It is very important to use sufficient sawdust so each carcass is covered on all sides with a minimum of 300 mm (12 in) of sawdust. Small pigs may be grouped or placed with somewhat less sawdust between them. A 300 mm (12 in) sawdust cover between carcasses and the pile surface should always be maintained to minimize odours and rodent problems. Hoofs, legs, ears, or snouts should never be left sticking out of the pile. Most problems in swine composting arise when insufficient sawdust is used as a top cover. A pointed rod or dowel can be used to measure the thickness of the cover. Large carcasses may need to be recovered after a day or two as sawdust settles. The compost pile should be roofed.

   Carcasses placed in warm sawdust begin composting more quickly. This can be accomplished by placing more than the minimum 300 mm (12 in) sawdust cover over the previous carcasses. This allows the sawdust to heat up so that successive carcasses are then buried in this pre-warmed sawdust. A loader bucket can be used to dig out a cavity in the pre-warmed sawdust, before a fresh carcass is placed. If finished compost is available, it should be used to cover the carcass to provide additional heat and bacteria to initiate the composting process. Fresh sawdust should finally be used to provide the top cover thickness needed for a new cavity for the next carcass.
3. Monitor temperature of the composting pile with a long-stem, dial-type thermometer. When composting is proceeding properly, temperatures will reach 55 to 70 °C. Primary bins started during cold weather may not begin composting immediately. However, if carcasses are buried with the proper amounts of sawdust, composting should begin on its own as temperatures warm up gradually. There is usually enough heat in active (as opposed to newly started) compost piles to continue composting through cold weather. If sawdust is used as recommended, its insulation characteristics are sufficient to minimize the effects of cold ambient temperatures.
4. After the last carcasses placed in the primary bin have composted for three months or longer, move the contents to a secondary bin. This step provides mixing and re-aeration of the material so that the compost will "finish off" properly.
5. After the pile has composted another three months in a secondary bin, it should appear as a dark, granular, nearly black, humus-like material with very little odour. Some resistant ingredients such as teeth may still be identifiable, but should be soft and easily crumbled.

6. Use finished compost referenced above for "starter" material on new carcasses being composted in primary bins. This provides heat and bacteria to enhance startup of the composting process. Experience has shown that up to 50 percent of the sawdust requirement for composting can be met using "recycled" finished compost. However, plan to use fresh sawdust in the amounts described for starting up a new composting operation until sufficient finished compost becomes available. Haul and spread finished compost as needed using a conventional manure spreader. Apply finished compost at agronomic rates for the crop being grown. Obtain a laboratory analysis of the compost for nitrogen (N), phosphate (P_20_5), and potash (K_20) for precise fertilizer content.

7. Keep fresh sawdust as dry as possible because dry sawdust encourages a better composting process. In the Fraser Valley sawdust piles should be covered to maximize dryness and minimize the generation of leachate. Fresh sawdust in a pile will shed some water if the pile is mounded, and has no pockets or depressions.

8. Keep the area around the composter mowed and free of tall weeds and brush. Watch for any leaching that might occur. Using more sawdust in the bottom of the bins can help eliminate leaching problems.

COMPOSTER DESIGN

In sizing a pork composter, it is necessary to know, or estimate, the number and weight of average daily mortalities expected. Actual past death loss data should be used in sizing composters for existing operations. For new operations having no history of average death loss see the data in Table 1 for information. Once the average daily mortality weight is known the number and size of composters can then be calculated. See Mortality Compost Bin Design, Factsheet No. 382.500-10 for more information.

TABLE 1 AVERAGE ANNUAL DEATH LOSS FOR SWINE IN CONFINEMENT

	Weight Range (kg)	Average Weight (kg)	Annual Death Loss (%)	Annual Death Loss Per Animal Space (kg)
Sow Herd[1]	160 - 180	170	6 - 8 %	10 - 15
Nursery[2]	6 - 25	15	22 - 26 %	1.5 - 6
Finishing	25 - 115	70	10 - 12 %	2 - 14

[1] Includes all mature animals, farrowing sows, gestating pigs, and boars
[2] Includes losses in farrowing house prior to weaning

This is one of a series of Factsheets on Composting. A list of references used in producing this series is included in the Composting Factsheet "Suggested Reading and References."

COMPOSTING FACTSHEET SERIES PREPARED BY:
Hog Producers Sustainable Farming Group;
Pacific Agricultural Research Centre (Agassiz),
Agriculture and Agri-Food Canada; and
Resource Management Branch, BCMAF

FOR MORE INFORMATION CONTACT:
RESOURCE MANAGEMENT BRANCH
Ministry of Agriculture & Food
1767 Angus Campbell Road
Abbotsford BC, CANADA V3G 2M3
Phone: (604) 556-3100 Fax: (604) 556-3099