PLANNING

THIS CHAPTER WILL WALK YOU THROUGH THE PLANNING PROCESS, WHICH INCLUDES:

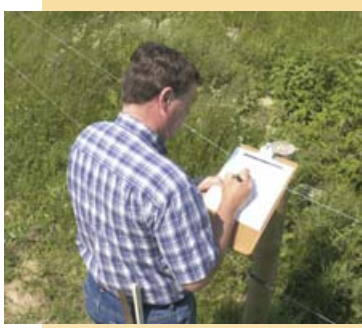
- **estimating mortalities in your operation**
- **selecting the most suitable methods based on your site and needs**
- **following protocols and keeping records.**

Most livestock producers would like to have a 0% mortality rate. But the reality is that animals die, and advance planning for dealing with deadstock is your best option. In terms of planning for catastrophes, thought should be given to how to handle mass disposal.

To get started, break the planning process into seven steps.

1. Estimate numbers and weights of deadstock, based on history and industry standards.
2. Examine the management options. Consider species, site suitability and costs.
3. Select the most suitable method.
4. Conduct a detailed site investigation – including soils and separation distances.
5. Implement the method.
6. Follow protocols for removal and biosecurity.
7. Keep records.

Make sure everyone involved in your farm operation is aware of your plan of action.



Having an estimate of expected deadstock allows for the next stages of planning.

STEP 1 ESTIMATE NUMBERS AND WEIGHTS OF DEADSTOCK

The estimation of the number and weight of deadstock for different livestock operations is difficult. Some factors affecting mortality include:

- ▶ management skills and practices
- ▶ breed
- ▶ disease resistance
- ▶ birthing ease.

The following chart was compiled from industry standards for various livestock operations in Ontario, and can be used for estimation purposes. Estimates can also be made from previous farm records if available.

The number and weight of an operation's deadstock are largely related to breed characteristics and management practices.

OPERATIONS AND SIZES[a] [c]	NUMBER IN HERD OR FLOCK	WEIGHT RANGE (kg)	AVERAGE[b] WEIGHT (kg)	NUMBER OF DEAD PER YEAR	CARCASS WEIGHTS (kg)	TOTAL DEAD/YEAR TOTAL CARCASS WEIGHT/YEAR TOTAL KG/UNIT/YEAR (or per animal placement)
100 BEEF COW–CALF						**13 dead/year**
COWS, PLUS 4% BULLS	104	500–770	590	3	1,770	**3,050 kg/year**
STILLBORN TO WEEK-OLD CALVES		40	40	4	160	**30.5 kg/beef cow/year**
CALVES (week-old to 7 months)	90	40–260	113	4	453	
REPLACEMENT HEIFERS (7 months to fresh)	15	250–500	333	2	667	
Example totals and kg/unit/year/placement calculations >>>>				13 dead/ year	3,050 kg/ year	3,050 kg deadstock/year ÷ 100 cows = 30.50 kg/beef cow/year
1,000 BEEF FEEDERS (1 cycle/year) – 2% DEATH LOSS						**20 dead/year** **7,253 kg/year**
FEEDERS PLACED/CYCLE (7 to 16 months)	1,000	260–568	363	20	7,253	**7.25 kg/beef feeder/year**
100 DAIRY COWS (large-frame Holsteins)						**14 dead/year** **2,786 kg/year**
MILKING-AGE COWS	100	522–860	635	3	1,904	**27.86 kg/dairy cow/year**
CALVES (week-old to 5 months)	20	45–182	91	3	272	
STILLBORN TO WEEK-OLD CALVES		45	45	7	315	
HEIFERS (5 months to fresh)	80	182–522	295	1	295	
100 DAIRY GOAT DOES						**20 dead/year**
MILKING-AGE DOES, PLUS 4% BUCKS	104	60–70	63	4	253	**458 kg/year**
KIDS BORN/YEAR (includes stillborns)	175	5–25	12	15	175	**4.58 kg/dairy goat doe/year**
REPLACEMENT DOELINGS (2 months to fresh)	13	14–60	29	1	29	
100 RIDING HORSES						**4 dead/year**
MEDIUM-FRAMED (1 to 10 years; 50% mares)	100	364–635	454	2	910	**1,260 kg/year** **12.61/riding horse/year**
COLTS/FILLIES (birth to 12 months)	20	82–364	176	2	350	
1,000 BREEDING FEMALE MINK (not including pelting losses)						**399 dead/year** **321 kg/year**
BREEDING FEMALES, PLUS 20% MALES	1,200	1.6–2.2	1.8	24	43	**0.32 kg/breeding female mink/year**
KITS/YEAR (5 born/litter)	5,000	0.01–2.2	0.74	375	278	
100 BREEDING RABBITS (does)						**678 dead/year**
BREEDING DOES, PLUS 5% MALES	105	4.0–5.4	4.5	5	22	**523 kg/year**
REPLACEMENTS – 30% (12 to 22 weeks)	32	2.3–5.4	3.33	1	3	**5.23 kg/breeding doe/year**
KITS/YEAR (8/litter x 7 litter/yr x 80% conception)	4,480	0.01–2.2	0.74	672	497	
100,000 CHICKEN BROILERS (6 cycles/year)[d] – 4% DEATH LOSS						**24,000 dead/year** **18,240 kg/year**
BROILERS PLACED/40-day growing cycle	100,000	0.04–2.2	0.76	24,000	18,240	**0.03 kg/chicken broiler/year**
10,000 BROILER-BREEDER HENS						**900 dead/year**
HENS	10,000	2.2–3.5	2.63	800	2107	**2,457 kg/year**
ROOSTERS (10% of hens)[e]	1,000	2.8–4.9	3.50	100	350	**0.25 kg/broiler-breeder hen/year**

OPERATIONS AND SIZES[a c]	NUMBER IN HERD OR FLOCK	WEIGHT RANGE (kg)	AVERAGE[b] WEIGHT (kg)	NUMBER OF DEAD PER YEAR	CARCASS WEIGHTS (kg)	TOTAL DEAD/YEAR TOTAL CARCASS WEIGHT/YEAR TOTAL KG/UNIT/YEAR (or per animal placement)
10,000 LAYER HENS (not including spent hens, end of cycle)	10,000	1.3–1.7	1.43	550	788	**550 dead/year** **788 kg/year** **0.08 kg/layer hen/year**
10,000 TURKEY HENS (4 cycles/year) – 6% DEATH LOSS						**2,400 dead/year** **6,392 kg/year**
HENS PLACED/CYCLE (day-old to market)	10,000	0.06–7.87	2.66	2,400	6,392	**0.16 kg/turkey hen/year**
10,000 TURKEY TOMS (3 cycles/year) – 10% DEATH LOSS						**3,000 dead/year** **14,920 kg/year**
TOMS PLACED/CYCLE (day-old to market)	10,000	0.06–14.8	4.97	3,000	14,920	**0.50 kg/turkey tom/year**
1,000 SOW SEGREGATED EARLY WEANING (SEW)						**4,412 dead/year** **22,602 kg/year**
SOWS AND GILTS	1,000	136–227	166	72	11,976	**22.60 kg/sow/year**
BORN/YEAR (12 born/litter; 2.3 litters/sow)	27,600	1.1–5.5	2.6	4,140	10,626	
1,000 SEW WEANERS (6.5 cycles/year) – 2.3% DEATH LOSS						**150 dead/year** **1,875 kg dead/year**
WEANERS PLACED/CYCLE	1,000	5.5–26.5	12.5	150	1,875	**0.29 kg/weaner space/year**
Example totals and kg/unit/year/placement calculations >>>>				150 dead /year	1,875 kg/ year	1,875 kg dead/year ÷ (1000 x 6.5 cycles) = 0.29 kg/weaner space/year
1,000 GROWER–FINISHERS (3 cycles/year) – 2% DEATH LOSS						**60 dead/year** **3,460 kg/year**
GROWER–FINISHERS PLACED/CYCLE	1,000	26.5–120	58	60	3,460	**1.15 kg/grower-finisher/year**
100 MEAT EWES						**25 dead/year** **700 kg/year**
EWES, PLUS 4% RAMS, AND REPLACEMENTS	120	69–100	79	5	397	**7.00 meat ewe/year**
LAMBS BORN/YEAR (includes stillborns)	175	5–25	12	17	198	
FEEDER LAMBS (born over the year)	140	25–55	35	3	105	
1,000 GRAIN-FED VEAL CALVES (1 cycle/year) – 7% DEATH LOSS						**70 dead/year** **9,403 kg/year**
CALVES PLACED/CYCLE (week-old to market)	1,000	45–313	134	70	9,403	**9.40 kg/grain-fed veal calf/year**
1,000 MILK-FED VEAL CALVES (2.5 cycles/year) – 4% DEATH LOSS						**100 dead/year** **10,167 kg/year**
CALVES PLACED/CYCLE (week-old to market)	1,000	45–215	102	100	10,167	**4.07 kg/milk-fed veal calf/year**

a: For operations with more than one cycle/year, death losses appear high (e.g., 100,000 chicken broilers × 6 cycles/year × 4% mortality rate = 24,000 dead/year).
b: Average weights are used as in NMAN software, and are skewed toward the smaller weights in the range.
c: Some operation sizes may seem too small or too large, but they are in multiples of 10 so it is easier to scale up/down.
d: Includes industry standard "2% extra" day-olds delivered to farm.
e: Does not include spiking with new roosters when older ones are shipped/euthanized because of breeding problems.

Deadstock can be composted effectively with minimal capital and operating costs.

STEP 2 EXAMINE THE OPTIONS

There are several BMP methods for deadstock disposal. In most cases, livestock operations use more than one method.

Consider the following criteria when exploring options:

- species suitability
- site limitations
- capital costs
- operating costs.

INCINERATION

- Neighbours live more than 100 metres (330 ft) from the candidate site. Smoke and odours should not be a nuisance to these neighbours.
- Carcasses are smaller than 200 kg (440 lb).
- Farmer has an incinerator that meets the regulation requirements and that has a Verification Certificate by Environmental Technology Verification (ETV) Canada.

Burial of dead farm animals is a common and legal practice, but it is not risk-free.

BURIAL

- Soil conditions are suitable – dry, well-drained, medium-fine materials.
- Site is far enough from production facilities, wells, tile drains, surface water, and neighbours.
- Farmer has access to backhoe or other earth-moving equipment.

COMPOSTING

- Site is suitable – proper soil, separation distances.
- Effective substrate is available – e.g., sawdust, wood chips.
- Necessary equipment is at hand – substrate chopper, loader, turning equipment etc.
- Labour is available to process carcasses and turn compost.
- Solid manure spreader is available to land-apply compost.
- Land is available for spreading finished compost.

COLLECTION

- Collection service is available.
- Biosecurity concerns are identified and addressed.
- Storage and collection areas are properly sited and screened from public view.

DISPOSAL VESSELS

- Soil conditions are suitable – deep, no shallow water table, no shallow bedrock.
- Site is far enough away from production facilities, wells, tile drains, surface water, and neighbours.
- Land is available and accessible year round.
- The vessel is suitable, low-cost, and liquid-tight – designed to withstand external soil pressures if necessary.

STEP 3 SELECT THE MOST SUITABLE METHOD

Once you have a firm estimate of expected mortalities and have considered the options, it's time to select one, or more, disposal options that suit your operation and site conditions.

First, look at the costs of disposal methods that otherwise fit a specific situation. Factors that influence costs are the total weight of deadstock, management, site layout, and size of the production unit.

Logistics will influence your choice – including location of production facilities, soil type, topography, amount of labour available, and access to equipment.

The estimated cost of alternative disposal methods for your operation, environmental risks and management preferences are important considerations. For more details, read the chapters on each BMP option further on in this book.

STEP 4 CONDUCT A DETAILED SITE INVESTIGATION

You can prevent deadstock management problems with proper siting.

Choosing sites as far from residences and public lands as possible can prevent nuisance challenges from odour and flies.

For soil-dependent BMPs such as burial, choose sites that pose minimal risk to groundwater contamination.

Site selection is a two-step process of picking the right location and selecting the right site.

The chart on the next page outlines the legally required setbacks for each disposal option.

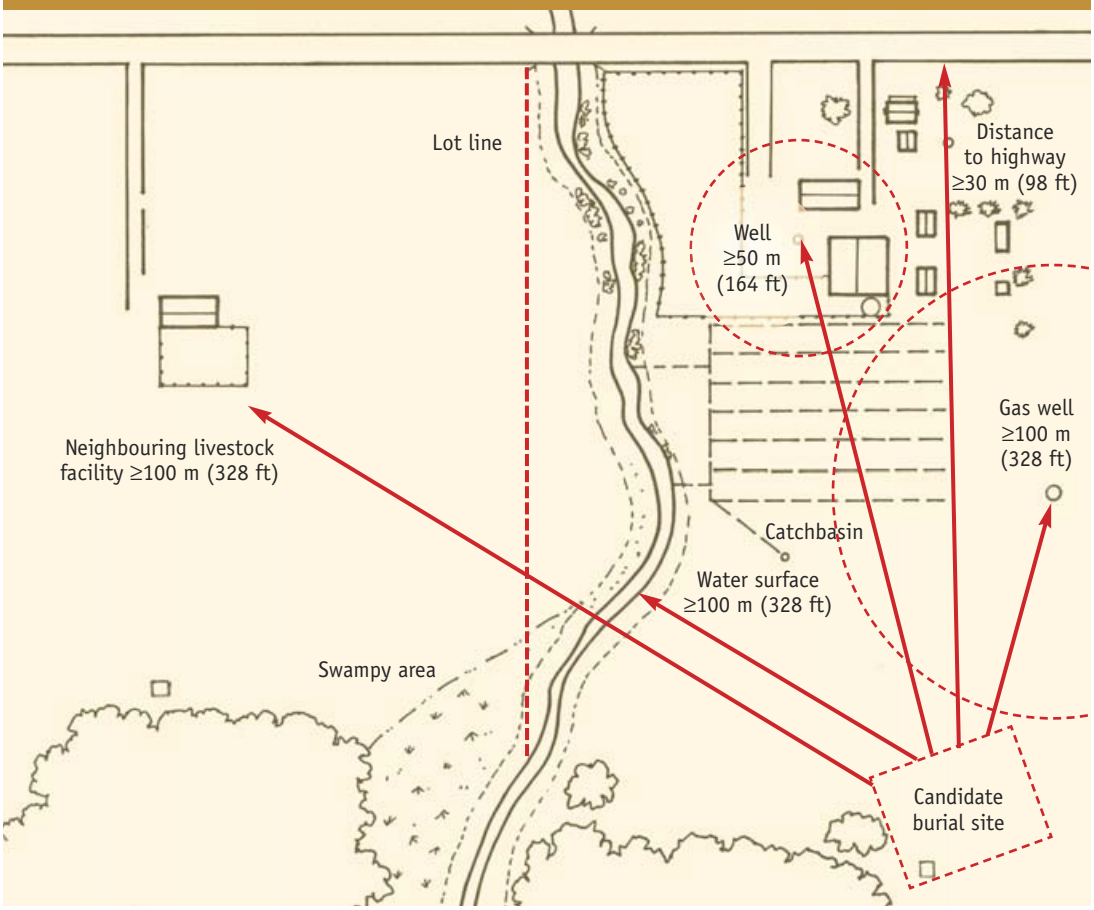
You should create a strategy of where and how deadstock will be disposed of on your farm over time.

DISPOSAL SITES MUST BE SET BACK FROM FEATURES BELOW		MINIMUM SETBACK DISTANCES FOR DEADSTOCK DISPOSAL OPTIONS			
		BURIAL PIT	**DISPOSAL VESSEL**	**COMPOSTING**	**INCINERATOR**
FEATURES ALONG WHICH SETBACK **LINES** CAN BE DRAWN	1. Highway	30 m (98 ft)	30 m (98 ft)	30 m (98 ft)	30 m (98 ft)
	2. Lot line of land on which the disposal site is located	15 m (49 ft)	15 m (49 ft)	15 m (49 ft)	15 m (49 ft)
	3. Flow path to the top of the bank of the nearest surface water or tile inlet	100 m (328 ft)	100 m (328 ft)	50 m (164 ft)	No restriction
	4. Field drainage tile	6 m (20 ft)	15 m (49 ft)	6 m (20 ft)	No restriction
	5. Lot line of land that has an industrial or parkland use	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
	6. Lot line of land in a residential area, or from land that has a commercial, community, or institutional use	200 m (656 ft)	200 m (656 ft)	200 m (656 ft)	200 m (656 ft)
POINT FEATURES AROUND WHICH SETBACK **CIRCLES** CAN BE DRAWN	7. Every part of a municipal well	250 m (820 ft)	250 m (820 ft)	100 m (328 ft)	No restriction
	8. Every part of a drilled well with depth at least 15 m (49 ft) and watertight casing to depth at least 6 m (20 ft)	50 m (164 ft)	50 m (164 ft)	15 m (49 ft)	No restriction
	9. Every part of any other well (e.g., gas well, other types of water wells)	100 m (328 ft)	100 m (328 ft)	30 m (328 ft)	No restriction
	10. Every livestock housing facility, outdoor confinement area, and residential structure located on land not part of the land on which disposal site is located (includes any neighbour's house)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
	11. Every point of another similar disposal site on the same registered parcel of land (e.g., burial site to another burial site, or disposal vessel to another disposal vessel, or composting site to another composting site)	60 m (197 ft) when the other burial pit is open or has been closed for less than 10 years	15 m (49 ft)	100 m (328 ft) except if composting takes place in a fully enclosed structure with: concrete floor; no more than three composting sites in the structure; and each of the composting sites is at least 0.5 m (1.6 ft) apart	No restriction
FEATURES ALONG WHICH SETBACK **FREEHAND** LINES CAN BE DRAWN	12. Lowest point of disposal site above the top of the uppermost identified bedrock layer or aquifer	0.9 m (3 ft) from bottom of burial pit	0.9 m (3 ft) if vessel is fully or partially buried; if vessel is above or on surface of ground, see regulation	0.9 m (3 ft)	No restriction
	13. Areas subject to flooding once or more every 100 years	Not acceptable	Not acceptable	Not acceptable	No restriction
	14. Organic soil, or soil that is hydrologic soil group AA and/or A	Not acceptable on organic and AA soils	No restriction	Not acceptable on organic, AA or A soils (unless placed on an impervious pad)	No restriction

PICKING THE RIGHT LOCATION

Picking the right location is easiest by first eliminating areas **not** suitable.

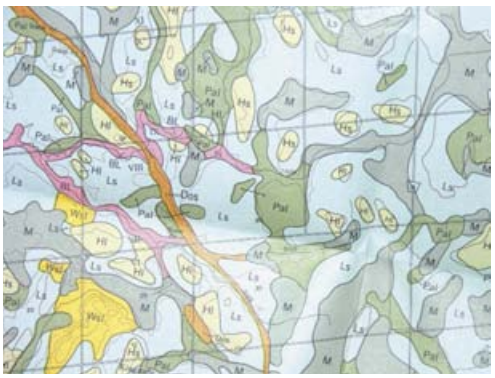
MINIMUM SETBACKS FOR BURIAL SITES



Here are steps for locating suitable burial sites based on the table on page 32.

1. **Obtain aerial photo of farm, to a scale at least 1:5,000 if possible (1 mm = 5 m).**
2. **Using a ruler, draw LINES on photo away from features in lines 1 to 6.**
3. **Using a compass, draw CIRCLES on photo away from features in lines 7 to 11.**
4. **Draw FREEHAND lines on photo around burial exclusion areas you have identified in lines 12 to 14.**
5. **Locate a spot(s) on the map where future burial(s) might be located that makes sense both from a legislative and practical access point of view.**

The site suitability criteria for burial sites are listed in Ontario Regulation 106/09 under the Nutrient Management Act, 2002: Disposal of Dead Farm Animals. It includes information on dealing with soil types, water table and bedrock depths, setbacks to neighbours, wells, and more.



Use a soil map, legend and report to shortlist candidate sites on your property. First, identify soil type(s) on your farm. Next, use the soil legend and report to eliminate soils that are too shallow, wet, organic or difficult to dig. Finally, note all sandy loam to clay soils that are well to imperfectly drained. This is your short list.

SELECTING THE RIGHT SITE(S)

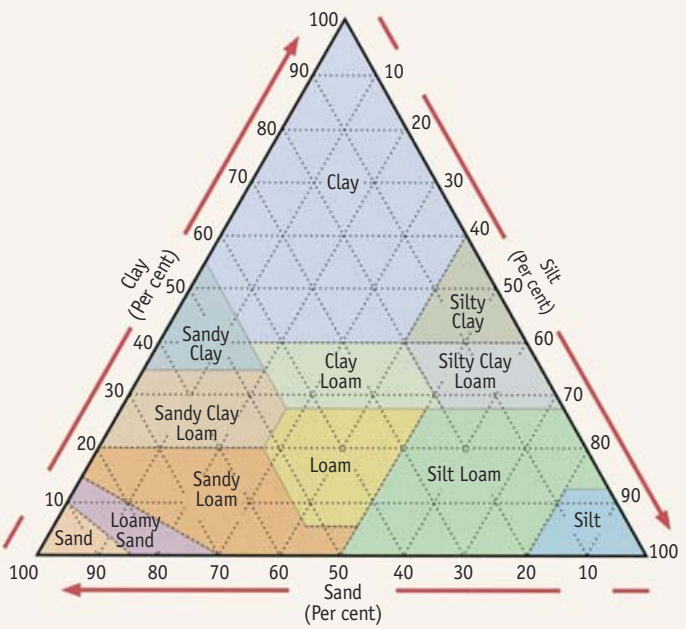
Not all soils are suitable for burial or other disposal BMPs.

Some, such as soils that are shallow to bedrock, don't have sufficient space. Wet or poorly drained soils are often too anaerobic for normal below-ground decomposition to take place. Wet soils can pose access problems for other BMPs such as composting and vessels.

Other soils are difficult to dig – such as stony or compacted soils. There are some soils that are composed of porous (gravelly, sandy) soil materials that could pose a risk to groundwater contamination.

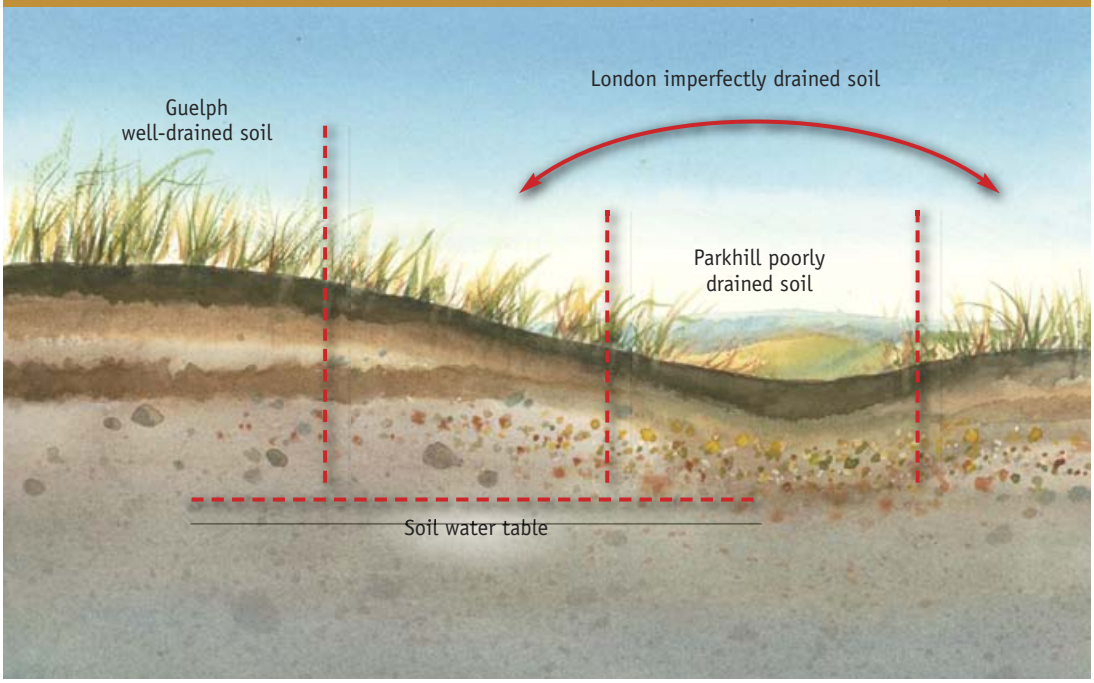
Generally, soil materials ranging from sandy loams to clays that are well to imperfectly drained should be suitable for on-farm burials.

THE SOIL TEXTURE TRIANGLE



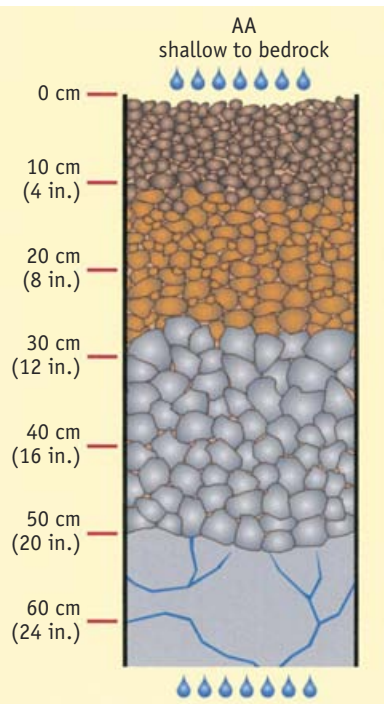
Most soil texture materials (except non-mineral or muck soils) are suitable for burial, provided the soil is deep, well-drained and relatively stone-free.

TOPOSEQUENCE OF SOILS – GUELPH LOAM CATENA (GUELPH–LONDON–PARKHILL)



Along with minimum setback criteria, soil drainage is a critical site-suitability factor. Drainage is related to soil material (texture) and depth to soil water table. Water table depth is usually tied to slope position – lower slope position soils are usually poorly drained.

Soils that are shallow to bedrock (< 0.9 m [3 ft.]) are unsuitable for burial and for below-ground disposal vessels.



HOW TO CHECK FOR SOIL TYPE

Select candidate sites that meet or exceed minimum setback criteria and that are not mapped as shallow, wet or gravelly soils. Check your local soil map.

1. Excavate one check pit per candidate site with a shovel, post-hole auger or backhoe. The check pit depth should be at least 1 m (3.25 ft) – and up to 2 m (6.5 ft) if burial site is for cattle or horses.
2. Verify soil depth to bedrock from soil surface. For burial or vessel sites, you need a minimum of 2.0 m (6.5 ft) depth.
3. Verify depth to water table. Check depth to standing water (saturated soil) in June or check soil-colour features any time of year. Wet sites often have standing water, saturated conditions and water-loving plants – such as willows, dogwood, cattails and sedges. After digging, wait at least 15 minutes and then look for standing water in the pit or auger hole. If standing water is not present, look for the presence of dull, bluish-grey (gley) colours with or without rust spots (mottles). Gley colours indicate zones of prolonged saturation (i.e., depth to soil water table). Mottles indicate temporary saturation. Avoid sites with gley colours in the top 50 cm (20 in.) from the soil surface for burial.
4. Verify soil material. Look for coarse-textured soil materials. For burial, avoid sites with >50% content of coarse soil materials – such as very coarse sands, gravels, and stones that have >1 mm particle size.

Mottles (rust blotches) and gley (grey colours) in the same profile indicate generally wet soil conditions, with a fluctuating soil water table. Gley colours alone usually mean a permanently high water table.

STEP 5 IMPLEMENT THE OPTION

Once the option has been chosen and the most suitable site selected, it's time for action.

Review the specific BMP section in this book for design and management considerations.

Also check the OMAFRA deadstock website for information on licensed contractors and suppliers of deadstock disposal technologies and services.

STEP 6 FOLLOW PROTOCOLS FOR REMOVAL AND BIOSECURITY

Proper handling of deadstock is part of making the selected disposal option work. All deadstock need to be handled safely and efficiently immediately following death. This will reduce the risks related to the spread of disease and to environmental contamination.

Read the next section for information regarding the proper procedures for deadstock removal, storage, cleaning and biosecurity.

STEP 7 KEEP RECORDS

You must record the following important information:

- species, age and weight of animal
- date and time of death where it is known
- cause of death
- date and disposal method
- location of disposal.

When disposal methods such as burial, composting or incineration are used, other records could be maintained that might be helpful from a management standpoint, even if they are not required from a regulatory standpoint, such as identifying soil type for burial, temperature of compost pile, and temperature of incineration unit.

Proper recording of deadstock is important and will be necessary for compliance with the regulation. Animals may die of disease, injury, or other causes, and the recording of this data provides another tool for decision-making in the management of the herd.

The Nutrient Management Act requires records be kept for two years, or for 10 years if specified risk material (SRM) is involved.

Producers who keep records are better positioned to make informed management decisions on corrective measures if necessary.

SAMPLE MORTALITY RECORD

TIME AND DATE OF DISPOSAL	ANIMAL SPECIES	AGE AND WEIGHT	CAUSE OF DEATH	TIME AND DATE OF DEATH (when known)	DISPOSAL METHOD	DISPOSAL LOCATION	OTHER INFORMATION
8:00 pm Feb. 2, 2008	Chicken	6 wks 2 kg	Inadequate ventilation	8:00 pm Feb. 2, 2008	Sent to lab	NA	NA
12:00 noon Feb. 14, 2008	Beef cow	4 yrs 1500 lb	Died of heart failure. Not found for 2 days.	Feb. 12, 2008	Buried	(see attached map for location)	NA
5:01 am Sept. 3, 2008	Calf	Newborn 95 lb	Died during birth	5:01 am Sept. 3, 2008	Compost pile	Compost pile	NA