A BETTER METHOD FOR BURYING ANIMAL CARCASSES

by
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How to properly dispose of animal carcasses has been an issue for as long as people have been domesticating animals. One of the oldest and simplest techniques for disposal is by burial. It is relatively inexpensive and doesn’t take much time or effort. Traditionally, burial has been accomplished with 2 primary goals in mind: (1) to dispose of (get rid of) the carcass and (2) to prevent the spread of disease, though odor control probably has also been a consideration. Standard thinking has typically been “the deeper the excavation, the better”. The focus of this paper is how burial can accomplish the original 2 goals and also include 2 others: (1) protection of groundwater resources from leachate generated by decomposing carcasses and (4) facilitation of carcass decomposition.

Shortly after accepting the position of State Soil Scientist for the State of Maine in April of 1988, I was asked to locate a suitable site for burying several thousand chickens that died because of a fan malfunction in a couple of egg layer hen houses. It was late June and the air temperatures were in the 90’s. I didn’t have much time before the chickens would be in a condition where transportation would be impossible. The Department of Agriculture had rules concerning the “Disposal of Dead Poultry” which specified dead poultry could be disposed of by several methods including disposal pits, incinerators, rendering, burial or heated septic tanks. The only standards for burial pits were for keeping rodents and insects out and the burial standards only specified that at least 2 feet of cover was required. Burial was only allowed in emergency conditions or other conditions approved by the Division of Animal Industry. Not much guidance. After doing a bit of speedy research, I came upon a draft set of guidelines developed by the Maine Department of Environmental Protection who was concerned that annual disaster burials were being done in a manner that could impact ground and surface waters. These guidelines included the following recommendations for burial sites: 300’ minimum setback from open water or sand or gravel deposits as well as private water supplies and residential dwellings, 1000’ setback from public water supplies, ground slopes of less than 8%, minimum of 5’ of separation from the carcasses to the seasonal water table or bedrock, and no burial within the 100 year flood plain. There was no limitation on the length or width of a disposal site. In referencing USDA burial requirements, I noted that they recommended burial excavations be 15’ – 20’ deep, to ensure disease control. It didn’t take me long to discover that finding a site, which would meet these guidelines for burial and that could be easily accessed would be nearly impossible. My first attempt ended in a stuck dump truck full of rotting chickens near a very unhappy neighbor. I therefore took it upon myself to develop a set of standards that were technically sound
but were more reasonable and would achieve my 4 goals. As a basis for these standards, I relied upon my experience as a septic system designer as well as my knowledge of soils and engineering. These standards have since been incorporated into a revised “Disposal of Dead Poultry” which is now called Chapter 211- Rules for the Disposal of Animal Carcasses. The “Dead Poultry” title was dropped because I soon learned that other animals such as cows, horses, sheep, goats, pets, etc. also die and needed to be disposed of.

Traditional burial is not practical in Maine because most of our soils are either shallow to bedrock, hardpan and/or seasonal water table. This is primarily because of glacial activity that occurred as recently as 10,000 years ago. About the only soils in Maine with over 5’ depth to the seasonal water table are sands and gravels where burial was (and should be) prohibited. We also have many wetlands, streams (including seasonal streams), lakes and ponds and other waterbodies in Maine, which would make meeting the setbacks from surface waters recommended by the Maine DEP difficult to achieve. I knew from my experience as a septic system designer that a septic disposal field, generating hundreds of gallons of wastewater per day, could be installed in Maine with only a 12” separation from the seasonal water table. Septic systems could also be as close as 100 feet from a drinking water well and 20 feet from a building. These standards were established over 30 years ago with no reported incidences of groundwater contamination from properly designed, installed and maintained disposal systems. It therefore stood to reason that the separation distance from animal carcass to the seasonal groundwater table proposed by the Maine DEP was overly restrictive as were the setback distances between animal carcasses and a number of site features. I also learned that long and narrow disposal fields were superior, environmentally, to square shaped disposal fields. It stood to reason that large volumes of carcasses could be a significant source of leachate and contamination, if disposed of in a small area, especially if the burial was for a pit type of design were carcasses were to be stacked on top of each other in multiple layers. If however, the burial site layout specified shallow, long and narrow trenches along the contour, the leachate volume would be spread out, thereby lessening the environmental threat. In addition, narrow trenches provide a significant amount of sidewall (soil contact area with the carcasses) that is able to absorb leachate and facilitate the interchange of oxygen. The sidewalls would also provide microbes and a media for plant roots to use in order to reach the decomposing carcasses.

The typical burial design I used in the early years was for 2’- 4’ wide trenches that were separated by a distance equal to the width of the trenches. The bottom of each trench was designed to be elevated 12” above the seasonal water table and 24” above bedrock. Generally, carcass thickness in the trenches was limited to 24” or less or the thickness of a single carcass, for large animals. Trenches were usually no more than 5 feet deep (to accommodate the 24 inches of carcasses and at least 18 inches of cover material) and could be excavated into hardpan soil layers, if there was no seasonal groundwater table (site was on top of a knoll or a curtain or drainage ditch was installed). I reasoned that the impervious soil would not be a problem because leachate would be limited and could be slowly absorbed into the soils or be taken up by deep plant roots that would likely reach down to the nutrient source. I reasoned that carcass disposal might be
slow at a depth of 5 feet and in hardpan soils but would still take place in time for a site to be reused after the last trench was filled. I usually designed enough trenches to last for 5 to 10 years, depending on site conditions. Over time, I became more concerned about decomposition rates in deeper burials and started to revise my designs to be much shallower. I knew that over 90% of the microbial activity in soil is in the upper foot and most plant roots are also quite shallow. Shallow burial should also be more aerobic and should allow for warmer temperatures in the summer time. I therefore, started to design trenches no more than 30 inches deep (except for sites that were only to be used on a one-time or very infrequent basis) and that would be above hardpan layers. These shallower trenches would need to have a foot of soil mounded above them to create the 18-inch cover material I require. I also started to specify a more sandy-textured fill to provide a more aerobic environment than fine-textured soils could provide. To accommodate disposal in the winter, I did and still do recommend excavating one or more trenches before the ground freezes (depending on the volume of carcasses to be disposed of) and to place sheets of plywood over them. This will help to prevent accidental injury to people and wild animals and provide cover for the carcasses until the ground thaws and soil can be placed on them. Hay can be placed on the carcasses at this time of year as a cover material, if desired. To date, I have designed approximately 50 animal carcass burial sites and have never been called back because of a problem with any of them (or for any other reason).

One of the facilities I was asked to design a burial site for was an animal shelter. It was being overwhelmed with pets being dropped off, many of which needed to be euthanized and disposed of. It was apparent that they either needed a large disposal site or one that could be reused (a real challenge and goal number 5). During my initial site visit, I discovered that the property was mostly wetland with a brook in the lower part. By moving up to the highest part of the lot (about 100 feet from a paved road), I was able to locate an area that was not quite a wetland. It had however, a seasonal water table at 6”–8” below the mineral soil surface due to a large contributing watershed and a dense hardpan layer at about 15 inches. It was also upslope of and only 98 feet from the shelter and about 150 feet from the shelters well. My only realistic option was to do a little engineering to overcome the soil limitations. The first step was to install an upslope diversion ditch to intercept the perched, seasonal groundwater table. Next, I called for 4 feet of a loamy sand fill material in a 60’ x 60’ area. I did not want to bury the animals in the cool, dense hardpan because I knew this site would have to be reused and was concerned that the decomposition rate would be insufficient. The design called for 10, 60-foot long trenches, three feet wide and separated by 3 feet. It was my intention that the 10 trenches would be used until full and then the shelter would excavate new trenches between the full ones. That would give about 10 years before the first trenches would need to be used again.

In 1997 (5 years after designing the site), I visited the shelter when I was in the area on other business. I learned that the shelter had fully utilized the first 10 trenches but they were unable to use the area between the trenches due to instability of the soil. I was therefore asked to design an expansion to accommodate future carcass disposal. When I took a look at the site, the reason for the instability became apparent. Decomposition was
so complete in the trenches that the 3 feet of sandy soil between them was collapsing when equipment tried to drive on the site. I suggested that they hire a contractor with a backhoe on tracks or small dozer to drive over the site and re-level the soil. New trenches could then be excavated so that the site could be reused.

In September of 2006 I visited the site again, in preparation for this workshop. I learned from the shelter manager that they had just completed the 3rd rotation through the site and were starting on the 4th. All I could see in the excavated trench and spoil pile for remains were a few bleached bones. Decomposition was complete and rapid, as I had hoped for. To date, the shelter manager said approximately 6,500 – 7,000 cats and dogs have been buried in the 60’ x 60’ area (about 500 per year). They even accept occasional pets and road kills from the local Animal Control Officers, particularly during the winter. They prefer the idea of burying the pets to incineration, there is little odor from the site in comparison to incineration (there was little odor the days I visited the site), it is a very convenient disposal method and the cost savings has been substantial. Using today’s cost for having the animals incinerated at a licensed facility (one that meets air quality standards for emissions), the manager figures it would have cost between $65,000 and $70,000 to have disposed the animals over the 14 years the burial site has been in use. They are quite pleased with the performance of the site and have no plans to use any other means.

In preparation for this conference and paper, I made a number of calls to animal control officers in towns where I designed a carcass disposal site. Not many had excavated into filled trenches but a few were either curious or an excavation was made by mistake. What I learned was that carcasses at the bottom of the deeper trenches, in fine textured soils and/or with a hardpan were still pretty much intact, as much as 10 years later. Carcasses in the more shallow burials however, particularly in the sandier textured soils, were completely decomposed with only a few bleached bones left behind.

The lesson learned seems to be that animal carcass disposal by burial can be an effective, efficient and environmentally sound practice that can even lend itself to reuse. When you think about it, decomposition of animal carcasses by burial needs the same basic requirements as decomposition by composting: carbon and nitrogen, oxygen, microbes and temperature. Burial, shallow burial that is, also uses a couple of other mechanisms to assist in the decomposition process; plant roots and insects (particularly carrion beetles). In most cases, at least in Maine and for sites, which will need to be reused, the site will require varying degrees of engineering. Shallow burial in sandy soils seems to work best but aquifer protection prevents those soil types from being used. It is better to bring sandy soil to a more suitable burial site and then, along with other site modifications as needed, build the disposal area above grade. For cases where the animal carcasses are or may be infected with a highly contagious disease, I recommend using a hot compost mix as a cover material. This allows for a shallow burial and shallow cover (2 feet or less). If manure and feed need to be disposed of as well, they can be used beneath the carcasses to create a compost mix that will speed up the decomposition process even more.
GENERAL NOTES:

1. Prepare site by removing existing vegetation in disposal area and fill extension area.

2. Place a minimum of 48 inches of loamy sand or finer soil on the area marked for carcass disposal and then taper at 3:1 slope to original ground after a five foot shoulder.

3. Excavate trenches according to attached plan and profile, on an as needed basis, starting with Trench #1 and then working in numerical order.

4. Place carcasses in trenches, six inches above original grad elevation, to a thickness of no more than 24 inches and then cover with a minimum of 18 inches of sandy loam or finer textured fill.

5. Stabilize fill surface according to attached specification “Stabilization of Disturbed Soil Areas by Permanent Seedings of Grass”.

6. Inspect burial site periodically during warm weather months. Cover any soft spot or breakout immediately after detection.

7. Stabilize all areas where additional fill is applied or where previous stabilization efforts have been unsuccessful, as outlined in number 5 above.

8. Contact the Department of Agriculture or the Maine Soil and Water Conservation Commission after four years so that the site can be inspected and evaluated for possibility of reusing trenches.

9. If you have any question, encounter a problem or wish to expand the disposal area, contact the Department of Agriculture at 287-3117 or the Maine Soil and Water Conservation Commission at 287-2666.
This is a trench that has been excavated 4 times.