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COW MORTALITY DISPOSAL

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Currently, many dairy cows which die on the farm are picked up by rendering services and removed from the farm. However, recent public concern about Transmissible Spongiform Encephalopathies (TSE's) may soon impact the dairymen's ability to dispose of dead animals. Because of concern about Bovine Spongiform Encephalopathy (BSE), the feeding of mammalian protein in sheep and cattle feed is now prohibited. This may have an impact on animal rendering and result in additional costs involved with the disposal of dead animals. This is no small problem as an estimated 1-2% of dairy cows die on the farm each year. For a 2000 cow dairy, this might be 20-40 cows per year. It is important for producers to become aware of the disposal options available to them as well as the public health, nuisance, and environmental impacts involved.

Regardless of the disposal method which is used, several guiding principles should be considered. First, the dairyman must take responsibility for disposal; otherwise, the county or state authorities (environmental or public health) will intervene and prescribe the necessary disposal steps. Disposal should be timely to prevent a local nuisance or impact on public or animal (domestic or wild) health. A reasonable disposal time is 24-48 hours after death. When selecting a temporary holding site, great care should be taken to prevent unnecessary exposure of dead animals to the public. The disposal method should preclude access to the carcass by wild animals and birds. Various setbacks or distances from property lines, streams, underground water, and other structures are necessary to protect public health and water supplies. All these principles should be considered before any disposal method is put into practice.

CARCASS DISPOSAL CHOICES

1. Rendering

Where the service is available, rendering is usually the method of choice. In some areas, it is unavailable or so costly for "pick-up" of dead animals as to be prohibitive. The frequency with which pick-ups are made may also be a determining factor. It is very important to avoid offending with foul odors and unsightly carcasses, neighbors and others who pass by the farm.

Many producers prefer that the vehicle used to pick-up the dead animals not enter areas of their farmstead which may result in exposure of their live animals to disease agents. Prohibiting their entry is a form of biosecurity and is certainly reasonable and desirable. But, it is not acceptable to lay the carcass alongside the entry road or by the highway without some screening to obscure the view of the carcass. A screened entry to a temporary holding area may be a solution for some dairies. Examples of appropriate screening include fences, bushes, etc.

A refrigerated carcass storage unit for use prior to pick-up would be ideal and provide a better product to the rendering facility. Such a unit would hide the carcass and contain and control odors. A unit sufficiently large to hold a carcass would require an initial investment (\$2,000 - \$5,000) as well as power and maintenance costs (\$1 - \$2.00 /day). It would also have to be cleaned and sanitized periodically.

2. Burial

Burial has long been one of the easier solutions for disposal of cattle mortalities, and it is still a reasonable alternative for some areas. A trench can be dug using a backhoe and then animal carcasses put in and covered with a layer of dirt. This can be done on a continuing basis as the animals die. As a general guideline, the trench should be 7 feet wide and 9 feet deep for mature cows. At this depth, 14 sq ft of floor space at the bottom of the trench is needed for each mature cow carcass. Deep burial controls odor and spread of disease and also keeps the carcass out of sight. It does require the use of large equipment and uses up land space that is not available for other purposes.

Burial may be prohibited in some localities, even on the producer's own land. Check with local county authorities on any restrictions or guidelines before beginning to bury dead cows. In other areas, it is not a good idea, even if it were not prohibited, because of a high water table and contamination of water sources. Burial may be an option for smaller operations but larger dairies may have trouble finding enough space to make burial an environmentally acceptable option.

3. Landfill

Landfilling is a reasonable alternative but many local landfills do not accept large animal carcasses or the cost may be prohibitive. Also, the landfill may not be open for access when needed or convenient. If a landfill is to be used, haul the carcass in a way that prevents leakage of carcass fluids on the roads. Also, cover the carcass to screen it from public view.

4. Incineration

Incineration works well with carcasses up to about 40 pounds. The burning of carcasses in an incinerator may be especially desirable in outbreaks of some contagious diseases, although it may still produce air pollution (smoke and odor). Availability of an incinerator may be a serious limitation, and it is usually quite costly (3-5 cents per pound). Incineration may result in more public complaints about odor and air pollution than other disposal methods. When multiple deaths occur, local authorities may permit a one-time, open-air burning of carcasses on an emergency basis.

5. Composting Carcasses

Composting is the controlled biological decomposition and conversion of solid organic material into a humus-like substance called compost. The process is aerobic, meaning it requires the presence of oxygen. Natural microorganisms such as bacteria and fungi break down the complex organic compounds into simpler compounds.

Composting is an alternative for mortality disposal because it is cost effective, environmentally sound, biosecure, and easy to accomplish. With a correctly designed and operated compost system, the carcass is not placed where surface or ground water would be contaminated. The carcass is degraded to a useful farm product (soil amendment) without the production of objectionable odors or the attraction of flies and scavenging birds or animals.

Composting has been used widely for disposal of poultry and swine carcasses and more recently for successful disposal of cattle carcasses. Local regulations should be consulted as these may limit the size of animal that may be composted. For an emergency or catastrophic loss situation, be sure to contact the local / state health and environmental officials. Composting has been recommended by the Environmental Protection Agency (EPA) as one of the better methods for disposal of carcasses and manure.

Most pathogens (disease causing bacteria and viral agents, etc.) are destroyed during the composting process. Composting does not destroy bacterial spores. Some persons may question the safety of composting cattle mortalities. Be aware that permits have been granted to allow composting of even municipal sewage sludge and then sale of the compost for use on home flower or produce gardens. However, the commercial companies involved must either show a salmonella and Escherichia coli count below a certain level or they must provide records showing that the compost reached a minimum temperature for at least a minimum time.

The principles that must be followed for successful composting are outlined below. The first four listed (a - d) are essential to successful composting. The last three principles (e - g) are preferred but not essential:

a. **Aeration.** Aeration is essential. It can be supplied by periodic “turning” of the compost material or by providing airtubes within the compost pile.

b. **C:N.** The ideal carbon to nitrogen (C:N) ratio is about 25:1. Other co-composting substances must be used along with the animal carcasses to cover them, retain and absorb moisture, control odors, and provide other sources of carbon and nitrogen for the microorganisms to use. The presence of too much carbon will result in a very slow composting process. The presence of too much nitrogen, especially as ammonia, will result in odor problems. The carcass provides nitrogen. Sources of carbon are sawdust, straw, wood shavings, or rice hulls. The most successful co-compost is green sawdust. The sawdust contains enough moisture and nutrients to produce an initial heat. Sawdust produces a porous pile with small particles conducive to the compost process, is easy to handle, and develops a good bio-filter effect. A bio-filter is a biological filter used to reduce odor-producing compounds through the process of adsorption. Manure containing straw, hay or other vegetation from livestock housing has been found to be too wet and becomes too compact for a good co-compost.

c. **Moisture.** The moisture content should be in the range of 40 to 60%. Too little moisture will result in slowed or interrupted composting. Too much moisture will result in anaerobic conditions with the resultant odor problems.

d. **Temperature.** Temperatures should be measured to assure that the process is occurring properly. Bin compost can be maintained at 135 to 145 F with animals less than 300 pounds. A single, larger animal in a pile will reach only 100 F. This lack of temperature may be permissible if the animal has died of an accident or other non-

pathogenic reasons. If a large animal is diseased, then pathogen kill can only be assured by partial dissection and use of a bin composter where higher temperatures can be maintained.

e. **Pretreatment.** Pretreatment is unnecessary for carcasses less than 300 pounds. For larger animals, the animal is laid on its back or side and cut to expose inner organs. This prevents bloating and allows quicker access of the composting microorganisms. The skin and larger muscle masses are sliced to break the skin and open more surface area. The limbs are laid flat for easy coverage with the co-compost.

f. **Facilities and equipment.** Proper facilities and equipment are very helpful in producing a good compost product. For a hot compost process, all composting should be accomplished in roofed, open-front bins on concrete. The bin width and length should be determined based on the size of the tractor bucket and the largest animals to be composted, respectively. The maximum height of the pile in a bin should be five feet. The concrete base will allow immediate identification of an overload problem as evidenced by leachate. (Leachate can be easily contained by adding new sawdust.) The concrete would also increase access to the bin/pile for turning in wet weather.

g. **Site for use.** Because bacterial spores and the prions causing TSE's are not destroyed by composting, it is recommended that compost containing animal carcasses be used on fields producing crops for animal consumption rather than on home gardens.

Four different methods of carcass composting will be described and discussed.

Three-bin composting has been commonly used for poultry, swine, and, more recently, for cattle carcasses. Place a 12 inch layer of co-compost material in the bottom of the bin and extend it 12 inches beyond the perimeter of the carcass. Place carcass on top of this layer and then cover with more co-compost. Other carcasses are added and covered as further death losses occur. It is desirable to have approximately 80% co-compost and 20% carcasses. After 1 month, the contents that have been collected into the first bin are transferred to a second bin and eventually to a third bin. This transfer process provides aeration as well as mixing of the composting material. From the third bin, it is usually ready to spread on farmland. Some producers put some of the compost from this third bin back into bin one (up to 1/3 of the co-compost needed), to get the composting process started more quickly. Bins can accept whole animals up to 300 pounds body weight. Larger animals can be composted in bins but will require dissection to reduce the carcass size. Constructed bins should be fitted with a roof to keep out excess moisture and with a concrete floor to prevent contamination of ground water in areas with high water tables. The site should be positioned to avoid any run-on and run-off water.

Composting can also be conducted in **single, temporary bins**. Frequently, these bins are constructed from large bales of low-quality hay or straw, spaced apart to accommodate the length of the carcass plus one to two feet. Place at least one foot of co-composting material under the animal and top the carcass with an additional foot of co-composting material. With adequate cover, there is no odor and scavenger animals are not attracted to the compost bin. The compost in the bins is ready for turning in three to four months, with field spreading in six months. If space is not a concern, the compost could be left in the bin any length of time over six months without turning.

Windrows can also be used to compost carcasses. First, construct the windrow on a paved or well-drained soil surface. The windrow height should be about two feet and the width should exceed the width of the carcass by one to two feet. Place the carcass in the middle, maintaining the 12-inch perimeter of co-composting material, and cover with three more feet of co-composting material. It is not necessary to turn the windrow, but it could be performed one to three months after adding the carcass.

Research from the University of Maryland recommends that a bin or pile be batch loaded with a maximum of 10 pounds of animal per cubic foot of compost mix. A bin or pile can also be sequentially loaded over time as mortality occurs to a maximum capacity of 20 pounds of animal per cubic foot of compost volume. It is very important to keep records of temperature, turning times, and the amount of animal weight added to the compost so that tasks are done in a timely manner and the system is not overloaded.

With adult animals, you should expect the skull and long bones to be present even after six months of composting. However, the bones are soft and these large bones break up easily when passed through a manure spreader. Or, the compost could be screened to remove the large bones prior to land application and these bones could then be buried or landfilled.

A more recent innovation in composting is the **“in-vessel” process**. Composting using the “in-vessel” technique is divided into two stages. The first stage occurs very rapidly and at high temperatures while in the composting vessel. The second stage takes longer and can be accomplished in windrows. A large, round drum is constructed with baffles inside to aid in turning the compost material. A source of aeration is supplied, the drum is set on an angle and rotated continuously. This system provides for conservation of moisture and heat so it is a much more controlled composting system.

The in-vessel system has been used in Texas for composting of manure from a 400-cow dairy and also for the co-composting of poultry litter and poultry carcasses. In an Arizona study with swine carcasses, the carcasses were co-composted with municipal solid waste and sewage sludge. The retention time of the materials within the vessel was only three days. The material coming from the vessel was screened and then windrowed to allow further time for the composting process. Different amounts of carcass weight were used and ranged from 250 to 3000 pounds per batch (with 13.5 tons of co-compost), but the amount of carcass used had no measurable effect on the end product. It was a very efficient means for disposal of hog carcasses. The bones were separated out by screening and could be put back in the composting vessel for another cycle or buried.

There are a number of reasons to plan ahead for the disposal of cow mortality. These reasons include reduced risk of disease transmission, reduced frustration, and improved public relations. Determine the viable alternatives for your area and expected costs. Learn the laws and regulations for your specific area. And last but not least, develop a plan for disposing of animal mortality.

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