

A Case for Composting

Composting offers commonsense option of disposing of dead stock.

by **Troy Smith**, field editor

Usually, farm and ranch kids learn early about the circle of life. When you're raised around livestock, there can be many opportunities to witness births of animals and deaths. Kids learn that despite good husbandry practices, some newborn calves don't survive, and cattle of all ages can and do die from the effects of disease and injury. They can be lost to blizzard, flood or lightning strike, and sometimes for reasons unknown. Kids that spend time in cow pens and pastures come to accept what Grandpa always said, "If you've got livestock, you'll get dead stock."

What do you do with the ones that die? In Grandpa's day, animal remains may have been dragged over the hill to a spot designated as the "bone pile." There, nature was allowed to take its course, usually with some participation by scavenging varmints or dogs. Other methods of disposal have included burial, burning or summoning the rendering truck to haul the remains away.

Disposal options

There is yet another method of dealing with livestock mortalities. An increasingly recommended alternative is composting. For environmental, social and economic reasons, Montana State University Extension Livestock Environment Specialist Tommy Bass advocates the practice by livestock operations to decompose animal remains. He says composting of livestock mortalities can yield a product with real value to an operation — a soil amendment containing organic matter and nutrients — while allowing producers to avoid disadvantages associated with other disposal methods.

Bass calls abandonment an unacceptable means of disposal, noting how fresh deposits to the ol' bone pile typically attract nuisance animals and may foster the spread of disease. It also may attract the attention of concerned citizens and regulatory authorities.

"If there are disease pathogens present, there is opportunity for them to spread through scavengers," says



►A composting bin constructed from big square bales is filled.

PHOTOS COURTESY OF THOMAS BASS, MONTANA STATE UNIVERSITY

Bass, emphasizing how, in contrast, the composting process can deactivate bacterial and viral disease-causing organisms and thus enhance biosecurity.

"Plus, abandonment may even help 'train' predator animals to consider cattle as a food source. The site of abandoned carcasses, or their odor, can be offensive to neighbors or passersby. If visible from the road ...

well, it really doesn't put agriculture's best foot forward," adds Bass.

Rendering of livestock mortalities certainly remains a viable option for some producers. However, the contraction of the rendering industry and the associated higher costs of dead stock pick up, in areas where it is available at all, is what first prompted Bass and other university extension specialists to look more closely at the viability of composting compared to other disposal methods.

Bass says burial works, provided the practice is allowed in the state where an operation is located and the producer complies with that

state's requirements for site location. These generally pertain to a potential burial site's soil type, distance from wells and waterways, plus depth to groundwater.

Burial typically is safe when accomplished properly, Bass says. However, buried carcasses or parts of them can persist in the ground for many years. Bass cites instances where development of former agricultural property uncovered burial pits containing intact animal remains.

"Producers probably don't want to leave that kind of buried legacy if the land is someday sold or the next generation decides to build something on the site," warns Bass.

Disposing of livestock mortalities at a licensed landfill is another form of burial. Its viability may depend on local regulations, individual landfill facility classification and management policy, and costs of transportation and fees. Depending on management, however, burial on the home-place or at a landfill may still present opportunity for the spread of disease pathogens.

Composting

"I think composting is a commonsense choice for a lot of cattle producers. It doesn't seem controversial to me," states Bass. "It's almost a no-brainer for some operations, like

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— Tommy Bass

Livestock Mortalities

large feedlots, especially if they have limited or no access to rendering. It can work for smaller operations, too. It's fairly low-input. Composting of a full-grown cow or bull can be managed above ground with basic equipment and resources already found on most farms and ranches."

Composting has been defined as the controlled biological process of converting heterogeneous organic matter into a more homogeneous, humus-like material. It's really about managing microbes — mostly bacteria and fungi that do the real work. Microbial decomposition of organic matter occurs naturally, of course, but the process can be hastened through management of the carbon, nitrogen, water and oxygen that microbes need to remain healthy and active. To satisfy these four needs, carbon and nitrogen must be supplied, and a balance between oxygen and water must be maintained.

Manure is a source of carbon and nitrogen, which is readily available to most cattle producers. Additional carbon sources include waste feed and hay, straw, chopped cornstalks, and other crop residues. Other carbon materials that could be used include gin trash, peanut hulls, wood chips and even shredded paper. Experts typically recommend blending manure with additional carbon materials, which will also add bulk to the mixture, allowing air spaces that provide needed oxygen. Mixing in a little active compost product, if available, can also help jump-start the process.

According to University of Nebraska–Lincoln Livestock Bioenvironmental Engineer Amy Schmidt, producers should determine what state and local regulations

apply to livestock mortality composting sites on the farm or ranch. Nebraska allows composting of dead stock on a site with a compacted soil base that is at least 300 feet (ft.) away from surface water or wells, but other states may have different requirements. The site should be relatively level, but well-drained so that water does not pond in the area. Typically, composting sites are subject to rules applying to animal waste facilities, requiring management of any runoff.

Composting piles can be built in the open, in windrow fashion, or contained within a three-sided bin or bunker, which can be constructed most simply with hay bales. Schmidt calls windrows or bins equally effective when composting piles are built correctly. A bin might allow for a smaller surface footprint, since it could accommodate layering of smaller animal mortalities, like calves.

Schmidt sees the primary advantages of windrow composting as the low cost, since no structures are required, and the ability to add mortalities at any time without disturbing any ongoing processes. Windrows seem the likely choice when producers must deal with many animals lost to a catastrophic event.

When starting a composting pile, Schmidt recommends laying down a layer of dry carbon material, 24 inches (in.) deep, as the base. A base area measuring up to 10 ft. by 12 ft. may be required for the carcass of a mature cow, so that the edges extend at least 24 in. beyond any part of the carcass that will be laid on top.

Once the carcass is in place, the rumen or abdominal cavity should be opened and the rumen punctured to avoid bloating and

bursting that can disrupt the completed compost pile. That done, additional moist carbon material should be added to completely cover the carcass to a depth of at least 24 in. No part of the carcass should protrude from the pile or be too near the edge, lest odors and scavenging animals become a nuisance.

Schmidt emphasizes that this "core" layer of material surrounding the animal should be moist — 50% to 60% moisture. It's essential to the composting process, but she doesn't expect very many producers to actually test samples of the material. Instead, they can apply the "squeeze test."

"It should clump together when squeezed in your hand, but it shouldn't be sopping wet," explains Schmidt. "I tell producers it should feel like a damp sponge."

The final step in preparing the compost pile is to "cap" it with a layer of dry carbon material. Sawdust, chopped straw or hay will work — even soil if a suitable carbon material is not available. This final layer acts as heat-trapping insulation and helps keep the core material from absorbing excessive moisture from precipitation. After that, there should be little to do for the next three months. However, the serious composter may want to monitor temperatures within the pile using a 36-in. temperature probe.

Schmidt says compost piles can begin generating heat quite rapidly, even during cold winter weather, if the microbes have appropriate amounts of carbon, nitrogen and moisture to thrive. During this first stage of composting, temperatures at the core of the pile should rise to approximately 130° F within

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Fig. 1: Cross-section of carcass compost pile layers



Source: *Composting Animal Mortalities*, published by Cornell Waste Management Institute. Illustrator is Bill Davis. http://cwmi.css.cornell.edu/Composting_Animal_Mortalities.pdf.

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a few days, and remain at that level for days or even weeks before dropping. Although it is not unusual for a well-constructed composting pile to reach even greater temperatures at its center, sometimes up to 150° F.

“We want the temperature right around 130° for at least three days before it starts to decline,” advises Schmidt. “Producers who monitor temperature should then turn the pile (stir and aerate the contents) when its core temperature falls below 120°.”

While monitoring temperature is advisable, the cost of those long thermometers runs close to \$150 each. Schmidt thinks many producers may consider that pretty pricey for an instrument they would use only once in a while. She says producers choosing to forego the temperature probe can monitor composting progress by checking it visually and olfactorily. The latter sense is often most telling, because foul odors from the pile generally signal a problem — usually excessive or inadequate moisture content, or body parts that are exposed or insufficiently covered.

If the composting pile was built well, a pile containing an adult bovine should complete the first heating cycle and be ready to turn after three months. Then it’s time to stir things up, introduce oxygen and probably some moisture, reshape the pile and cap it again. After completion of a second heating cycle, composting is usually complete.

“Composting of all soft tissue from a full-grown animal will usually be finished after a total of six months,” says Schmidt, noting that some bones may remain. “Remaining bones can be added to a new pile, along with a new mortality, for further decomposition



►After three months, only the skeleton remains of a cow placed in the bin for composting.

or disposed of in a dumpster, landfill or burial pit.”

Troubleshooting

What if things don’t go quite right and composting does not proceed as expected? Schmidt admits that composting doesn’t always go exactly right the first time a person tries it. Common mistakes include placing too little carbon material around the carcass to “feed” microbes and generate heat. Failure to cap the pile adequately may result in heat loss. Or, the core material may be too wet or too dry.

If the pile is too wet, Schmidt recommends mixing some dry carbon material into the existing core material and rebuilding the pile over the carcass. This will expose the partially decomposed carcass and create

odor temporarily, but it should improve the composting pile’s performance and improve the surrounding environment in the long term. When a composting pile is too dry, the top insulating layer can be removed, water can be added to the core material, and the covering layer can be replaced.

“So don’t be discouraged. Problems can be fixed,” advises Schmidt, urging producers to tweak their composting “recipe” and start again. “There’s a bit of a learning curve when starting to compost, but most people establish a routine process that works well and yields a predictable result each time.”



Editor’s Note: *Troy Smith is a cattleman and freelance writer from Sargent, Neb.*

Let nature do the job

In the Red River Valley of the North, near Bathgate, N.D., feedlot operator Russell Edgar turned to composting as an alternative to burying cattle mortalities. Burial during the cold of winter could be a particularly difficult chore. With needed composting materials easily accessible, Edgar thought composting of animal remains above ground made a lot of sense.

“This is wheat-growing country, so there is plenty of straw available. We use that as a base to lay the animal carcass on,” Edgar explains. “Then we use feed waste to cover the carcass.”

The feed waste used as the compost pile’s core material consists largely of silage and ground hay, which provide the carbon and nitrogen that microbes need to do their composting duty. This material is stockpiled until needed and usually is already starting to generate heat by the time it is put to use.

“It often seems to have nearly perfect moisture content, so a new pile containing a carcass starts heating up right away. We’ve probed piles and found temperatures getting up in the range of 140° to 150° (F) within a few days,” tells Edgar.

Departing from the typical recommendation calling for aeration after a few months, Edgar does not stir the compost pile. He leaves

it alone and, in his experience, the process still works. Composting of remains just takes longer — usually 12-18 months.

“Some producers may not aerate their piles as often as is recommended and still get their mortalities composted,” says Mary Berg, a North Dakota State University extension livestock environmental management specialist who has counseled Edgar and other area producers as they were starting composting mortalities.

“Some producers take a more relaxed approach to monitoring and managing a compost pile and get along okay. I think it’s because, like Russell (Edgar), they’ve found a really good recipe that heats up quickly and achieves really good initial breakdown of a carcass,” adds Berg, noting that constructing the pile well in the first place is another factor contributing to composting success.

According to Edgar, when he or one of his crew do open a finished compost pile, the only visible animal remains are snow-white bones — the large ones anyway, and it’s not a big job to bury those.

“Composting is a lot easier than burying whole animals,” states Edgar. “It works in the winter, there is nothing unsightly about it and there is no bad smell. Nature does a great job.”