

## SOUTHERN REGIONAL BEEF MANAGEMENT HANDBOOK

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### Deep Stacking Broiler Litter As A Feed For Beef Cattle

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Poultry producers are being challenged to effectively utilize litter. The industry is seeking ways to better capture the potential value of the litter as a fertilizer source, as a stock material for compost production, or as a feed for cattle. Of all these uses, litter is most valuable as a cattle feed. While it is generally not economical to ship litter long distances for use as fertilizer, the high value of litter as feed makes shipping it feasible.

As economic pressure increases on the beef cattle industry, producers will look for ways to reduce feed costs. Of all the alternative feeds available in North Carolina, litter has the greatest feeding value for its cost. Beef producers should seriously consider using litter in winter feeding programs, and poultry producers should consider stockpiling litter for sale later to beef producers. The purpose of this fact sheet is to provide information for producers who wish to deep stack poultry litter for cattle feed.

#### Broiler Litter as a Feed for Cattle

When processed by an acceptable method, poultry litter is an economical and safe source of protein, minerals, and energy for beef cattle. Processed litter makes a good protein supplement for both brood cows and growing calves. Using 4 pounds of broiler litter rather than a commercial protein supplement for brood cows will save the beef producer about \$20 per cow over a 100-day wintering period.

Litter also makes an economical substitute for hay, especially during drought years when hay supplies are short. Feeding 12 pounds of litter (rather than hay or silage and a protein supplement) per head each day will save the beef producer from \$20 to \$50 per head over a 100-day feeding period.

Broiler litter is the most desirable kind of poultry litter for feeding to cattle because of its superior nutritional value. It should contain 20 to 30 percent moisture and crude protein. The litter should also be low in ash (soil) and should be

free of hardware, glass, and other foreign material. Processed turkey, broiler breeder, and hen litter have also been successfully used as a feed, but they are less desirable feedstuffs than broiler litter. Details of feeding guidelines for poultry litter can be found in "Feeding Poultry Litter to Beef Cattle," North Carolina Cooperative Extension Service fact sheet AG-515-1.

#### Processing Litter by Deep Stacking

Acceptable methods of processing litter to make cattle feed include deep stacking, ensiling, dehydrating, and extrusion-pelleting. The most common method by far is deep stacking. "Deep stacking" refers to the process of stockpiling litter for later use. After stacking, the litter undergoes a combined composting-ensiling process. The action of bacteria generally heats the stack to a temperature of between 140° and 160° F. This is sufficient heat to kill pathogens such as *E. coli* and *Salmonella* that may be present in raw litter.

The product stabilizes following the initial heating, and the material is not turned and allowed to reheat as is done with composted litter (thoroughly composting the litter reduces the energy and protein availability in the material). Overheating (more than 160° F) may occasionally occur and reduces the feeding value by damaging both protein and carbohydrates. This problem can be controlled by packing the stack, covering the stack with plastic, or both.

After a minimum of three weeks of heating the litter should be ready for use as feed. Once the litter has undergone the heating process, it will retain its feeding value for an extended time, often for as long as 5 years.

The process should also result in a product that has a fine texture and an odor that suggests a smell of caramelized chocolate and is free of an ammonia smell, which increases the palatability of the feed. It should not be black with a burnt smell, an indicator of overheating; nor should it be gray-colored with a strong manure smell, an indicator

of underheating. Monitoring the stockpile temperature in several locations with a probe thermometer will help determine if the stockpile has been heated properly.

### Methods of Deep Stacking Litter

Procedures for storing litter are important because storage techniques often are the difference between a low and a high quality feed ingredient. There are several options for protecting the litter; choose the one most feasible for your operation.

**Permanent Structure with Roof.** The ideal storage facility for stockpiling litter is a structure with a permanent roof. Protecting the material from rain maintains its quality by eliminating excess moisture. Litter is also more easily handled when it is kept out of the weather.

A litter storage facility with a clear-span roof supported by outside walls or perimeter posts allows unobstructed loading and unloading. In structures with ceiling heights of 12 feet or greater, side walls protect against blowing rain.

Figure 1. Buildings recommended specifically for litter storage.

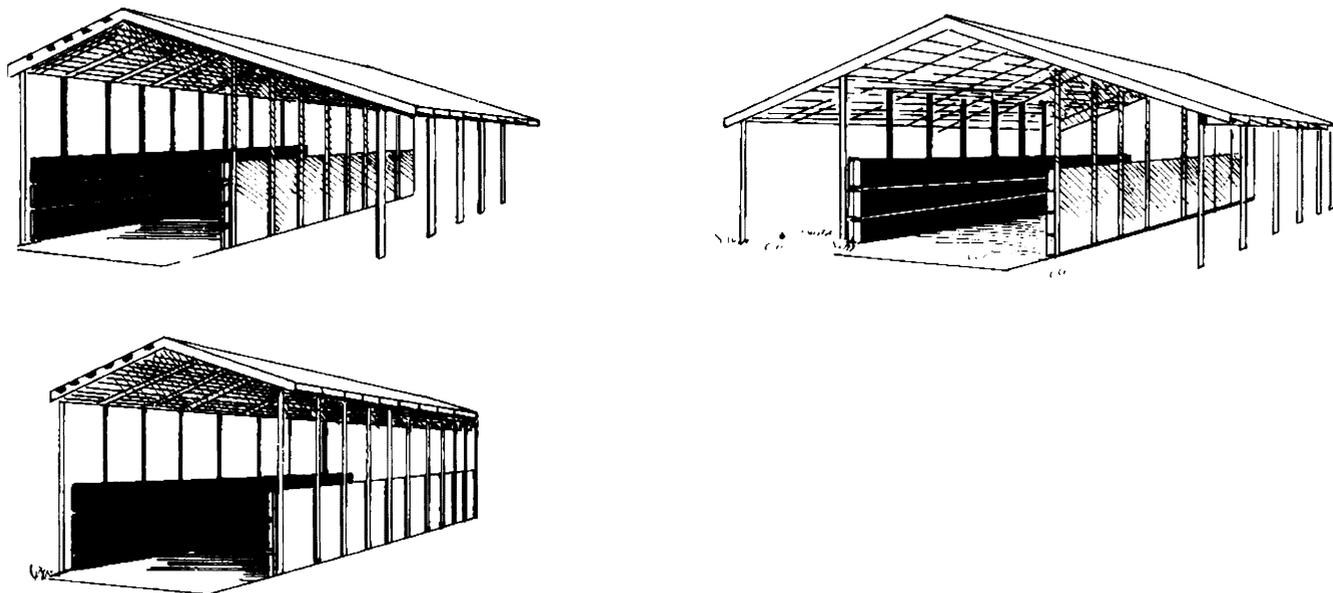
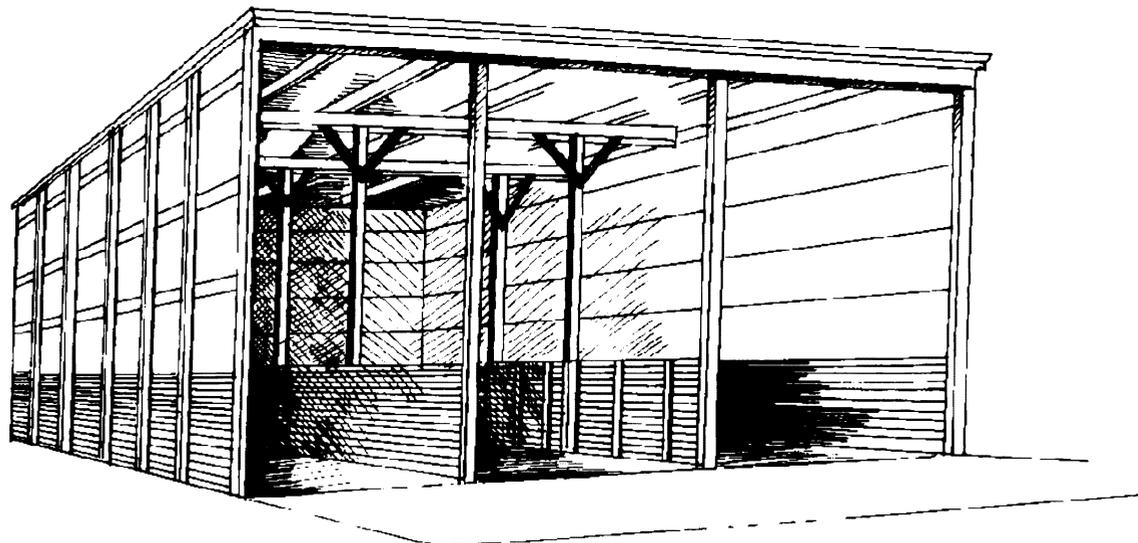


Figure 2. Three-sided commodity shed for litter and bulk diet ingredient storage.



High ceilings also make it easier to load, unload, and compact materials. Building types recommended for litter storage are shown in Figure 1.

A standard three-sided commodity shed is also suitable for litter storage. This type of building (Figure 2) is recommended for larger cattle operations that can use the shed for litter storage as well as storage of other bulk feed ingredients.

Existing roofed buildings or sheds also work well but usually have tractor-maneuvering limitations due to support posts and other obstructions. In wooden structures, particularly those without clear spans, stockpiled litter may cause spontaneous combustion, especially if it comes in contact with wood. Risk of spontaneous combustion can be minimized by monitoring litter temperature and avoiding stacking anything beyond 4 to 5 feet high in the areas where the material is in contact with wood. If building a new structure or modifying an existing structure for litter storage, consider the use of concrete block walls.

The siting of a fixed-roof facility is important since it is permanent. Considerations for siting the building include convenience to feeding site, easy access particularly in inclement weather, and terrain that enables minimal grading. Avoid placing the facility near wet areas or drainage ditches, streams, rivers, ponds, and lakes.

For stockpiling, stack litter 6 to 8 feet high at the peak of the stack to ensure a critical mass that promotes acceptable heating. The stack should be packed with a heavy-wheeled vehicle as the material is layered. Caution should be taken not to stack litter higher than 8 feet again to minimize the possibility of spontaneous combustion.

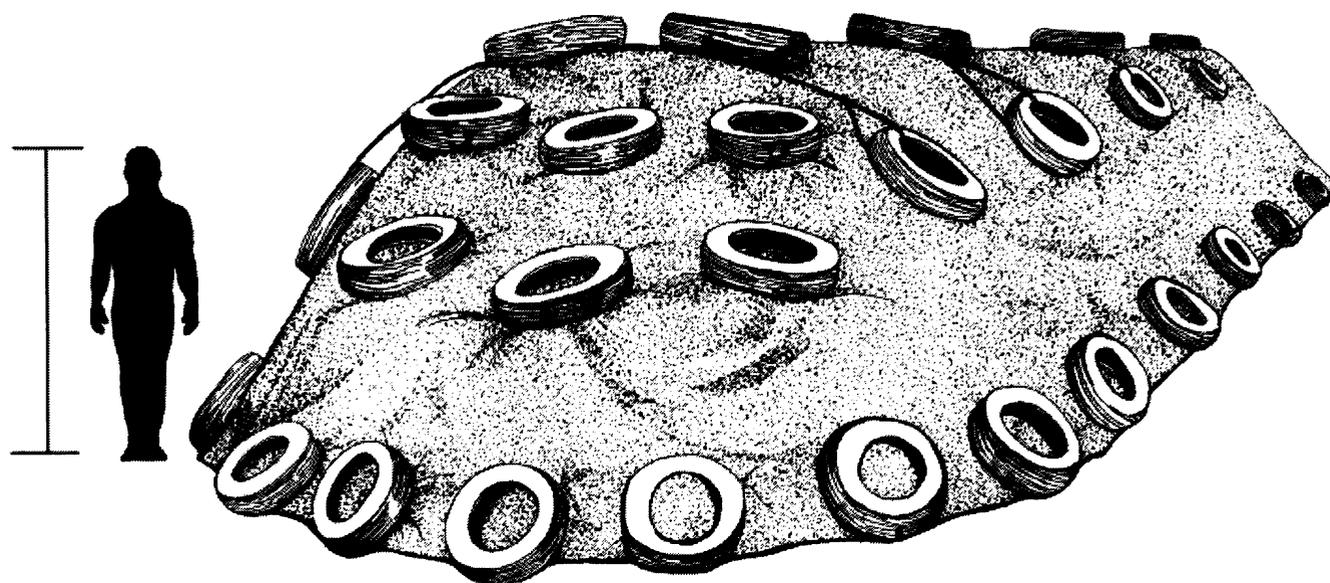
If the building does not lend itself to compacting the stored litter, the heating process sometimes will not proceed in a uniform manner and may result in overheating. If packing is not possible, cover the litter with plastic to limit oxygen availability and prevent overheating.

**Covered Temporary Stockpile.** Litter can be stockpiled in a temporary windrow or bunker arrangement with reasonable success. The advantage of such temporary storage is the low investment cost compared to permanent-roofed facilities. The disadvantage of windrow or bunker storage is the inability to protect the material from rain-water and assure a top-quality product.

Certain storage procedures can help protect the litter from excess moisture from inclement weather and provide a surface that is usually accessible for use at all times. The site for stockpiling should be selected carefully. Choose a high well-drained location avoiding wet areas, runoff or drainage areas, and other areas where running or standing water occurs. An impermeable base such as clay is preferred to prevent nutrient infiltration. The site should have a grass buffer around the storage area and be located at least 100 feet from any perennial waterway or drinking-water source.

Construct the windrow by dumping litter in a narrow pile. It is desirable to compact the litter to save space and ensure a good heat, but the windrow can be made without compacting. Compacting can be accomplished by driving over the initial narrow pile of litter with a heavy vehicle. Add additional layers of litter and compact each layer, continuing the process until the stockpile is deep (6 to 8 feet) and well-rounded with sloping sides. Once the windrow is constructed, apply heavy (6 mil) plastic sheeting carefully to prevent tearing. Anchor the edges to avoid wind damage by laying the edge of the sheeting over a trench about 12-inches deep encircling the pile and backfilling the soil over the sheeting. Lay used tires over the plastic to further avoid wind damage to the plastic. A properly constructed and covered windrow is shown in Figure 3.

**Figure 3. A properly constructed covered windrow of litter.**



Bunkers designed for storing silage on livestock farms (Figure 4) can also be used to stockpile the litter. A bunker allows deep stacking and better compaction of litter which reduces the area needed for storage. A cover of plastic or reinforced fabric should be anchored over the litter stored in bunkers to avoid rain damage.

### Summary

Broiler litter makes an economical and safe feed for beef cattle when processed appropriately. Increased use of broiler litter as a cattle feed would improve distribution of nutrients from poultry producers to beef producers and would improve the profitability of beef production.

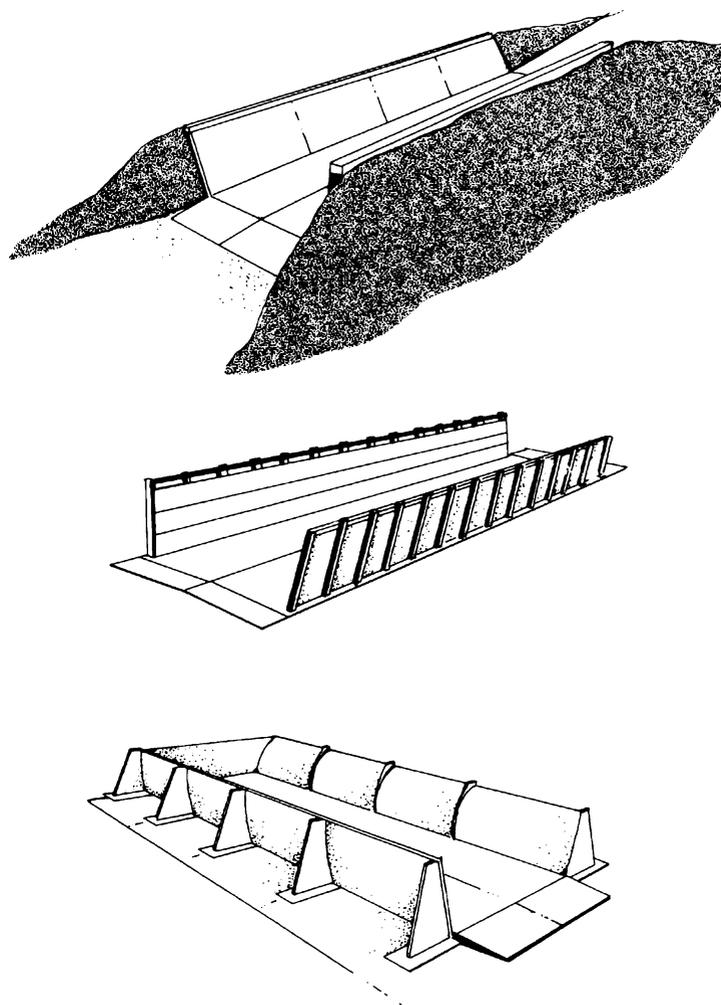
Deep stacking is the most common method of processing. During deep stacking, the stack of litter heats eliminating potential pathogens and improving palatability of the litter. For proper heating, litter should contain 20 to 30 percent moisture and should be stacked 6 to 8 feet deep for at least three weeks.

Beef producers are encouraged to seek litter when local broiler houses are cleaned out and stack for cattle feed. Poultry producers are encouraged to deep stack litter for sale during the winter to neighboring beef producers.

### Acknowledgement

The authors acknowledge the University of Maryland Extension publication, "Structures for Broiler Litter Manure Storage," which provided part of the information used in this publication.

Figure 4. Bunker silos can be used for litter storage.



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