



Storing Poultry Litter

Charles Fulhage, Extension Agricultural Engineer, University of Missouri

Missouri turkey and broiler operations accumulate litter in the production buildings during flock cycles. Litter is removed and spread or stockpiled for later application. Minimal clean out may be undertaken after each flock, with a complete clean out being done annually or biannually, depending on the producer's management scheme.

Advantages of storing litter

Clean out of a poultry production building depends upon several factors such as flock scheduling, equipment availability and custom operators' schedules. Ideally, litter should be spread at a proper rate as it is removed from the production buildings. However, clean out activities do not always coincide with the availability of open cropland or proper soil conditions.

Hence, litter storage can greatly increase the flexibility of a litter management plan and assure litter is applied under the proper conditions to protect the environment. Missouri regulatory guidelines recommend a minimum of 60 to 90 days storage for manure. Although storage in the production buildings can be

counted in this period, clean out schedules may not be compatible with land application schedules.

Additionally, composting dead birds also offers an advantage in storing litter because litter is an important ingredient in the composting recipe.

Combining litter-storage and compost facilities in a single structure, or adjacent structures, can offer convenience for managing both litter and compost.

Litter storage size

The size of a litter storage structure depends upon the amount of litter resulting from a production building clean out, and the number of cleanouts.

Poultry litter is a mixture of raw poultry manure, and bedding material such as sawdust, wood shavings or rice hulls. The litter produced in a given operation depends upon management techniques and other factors such as the amount of fresh material added between flocks and after total clean out.

Table 1 gives estimates of litter production for broiler and turkey operations in Missouri.

Table 1. Estimated litter production.

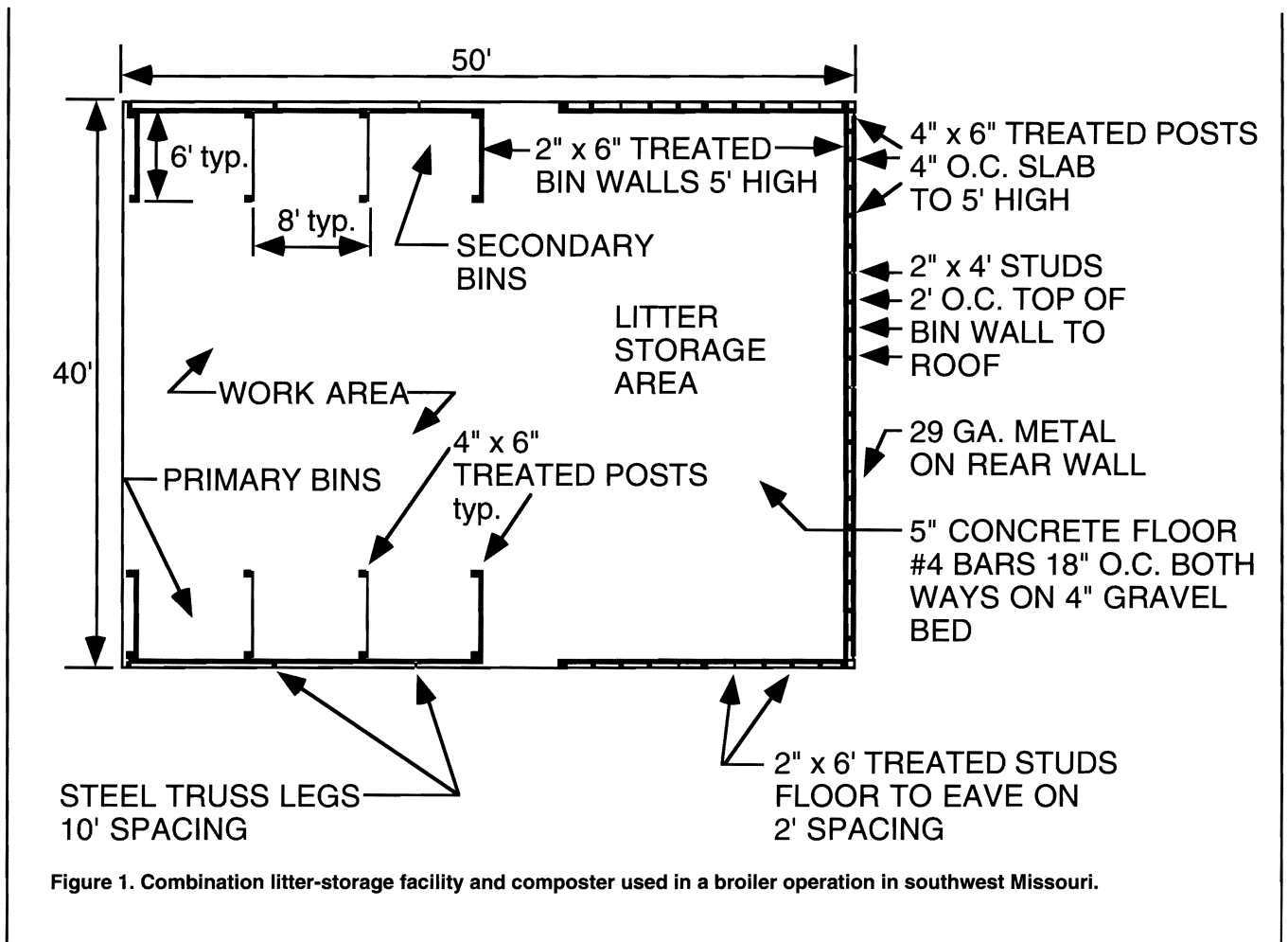
	Broilers		Turkeys	
	lbs.	cubic feet	lbs.	cubic feet
Litter produced per pound of bird marketed	0.6	0.017	1.0	0.029

Table 1 values are averages, so whenever possible, litter production estimates should be based on actual experience. Litter saturated with water due to spillage around waterers is called "cake" and should be removed between flocks or more often. Dry litter is usually allowed to accumulate between flocks, with an annual total clean out.

The following example illustrates the use of data in Table 1 to estimate litter storage requirements.



A litter-storage structure can increase flexibility and convenience in managing poultry litter.



Example 1.

Estimate the volume required to store six month's litter production in a broiler operation in which 5 flocks of 20,000 birds are grown to a market weight of 3.5 lbs. annually in each of four buildings. Litter production is based on 2.5 flocks.

Using the broiler data from Table 1 yields the following:

$$\begin{aligned} \text{lbs. bird marketed} &= 2.5 \text{ flocks} \times 20,000 \text{ birds} \times 3.5 \text{ lbs} \times 4 \text{ buildings} \\ &= 700,000 \text{ lbs. bird marketed in six months} \end{aligned}$$

$$\begin{aligned} \text{Litter weight produced, lbs.} &= 700,000 \times 0.6 = 420,000 \text{ lbs.} \\ &= 210 \text{ tons} \end{aligned}$$

$$\begin{aligned} \text{Litter volume, cu.ft.} &= 700,000 \times 0.017 \\ &= 11,900 \text{ cubic feet} \end{aligned}$$

Litter management

Good litter management practices include collection, handling, storing and land application. The single most effective management practice is to minimize the amount of water spillage. Keeping litter dry reduces the amount of cake to be removed and allows a more flexible clean out schedule.

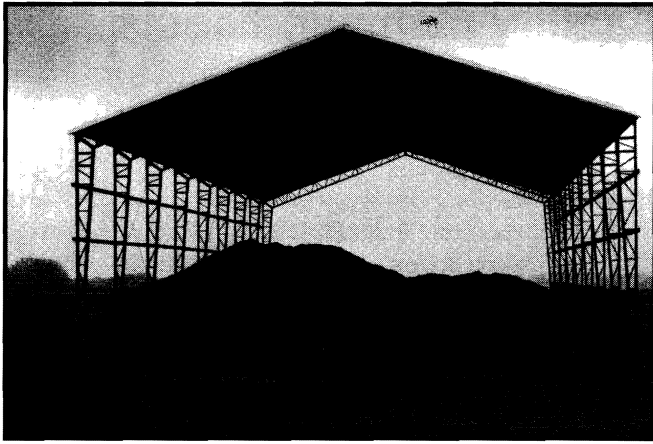
Modern poultry watering equipment is effective in reducing spillage which causes excessive wetting of litter. Reduced spillage saves water; improves bird quality; improves the production environment; reduces the release of ammonia from the litter; reduces the volume of cake; and extends the time between litter clean out.

Types of litter storage buildings

The primary purpose of a litter-storage facility is to provide a place to keep the litter dry until it is spread. So litter-storage facilities should be located on well-drained sites which will allow all-weather access for loading and unloading.

Open stockpiles

With open or uncovered stockpiles there is a high



Construction materials and designs used in poultry production buildings may also be used for litter storage structures.

potential for surface or groundwater pollution from runoff or leaching. Missouri regulations require runoff or leachate from a manure storage area be controlled and applied to the land in a pollution-free manner. As a result, an open stockpile will likely require additional control measures to be acceptable.

Locate open stockpiles on high, well-drained ground so runoff can be controlled and directed to a storage basin or a grass filter area. The pile should be built in a long, narrow shape to make packing easier.

Driving over these piles with wheeled vehicles will provide compaction and more litter storage per unit volume, as well as, increase the ability of the pile to shed rainwater. New litter should be added to the top and compacted in shallow "lifts." Make the pile wider at the top so the end result is a well-rounded top surface with sloping sides.

Observe appropriate safety precautions when operating wheeled vehicles on litter stockpiles.

Covered stockpiles

A covered stockpile is better than an open stockpile. Covering a stockpile reduces wetting and could eliminate runoff. A suitable site should be selected in the same manner as an open stockpile. While compaction of the litter is not necessary, it does allow more litter to be stored in a smaller area and it reduce the potential of wind-blown litter.

For the cover, use plastic sheeting that is at least six millimeters thick and replace the sheeting after one or two seasons or when needed. To insure the cover will remain in place, anchoring the edges is important. This can be done by laying the plastic across a small trench and backfilling with soil or by covering the edges with a ridge of soil or gravel on flat ground. Old tires placed on the surface reduce billowing and flapping due to wind.

Bunker-type storage

Litter may be stored in bunkers similar to silage bunkers. These structures usually have above-ground,

outward-tilting, parallel concrete sides six to 10 feet high, with a concrete floor. Sometimes these structures are partially or fully built into the ground with vehicle access into the structure for convenient loading and unloading. Litter compaction will allow more storage in a smaller space.

As with stockpiles, bunker storages should be covered if at all possible. With no cover, polluted runoff and leachate can result in a pollution problem. Once again, plastic sheeting weighted with old tires can be used as an effective cover.

Roofed-storage structures

The most convenient and easily managed litter storage structure is one with a permanent roof. These structures provide most effective protection and they eliminate the yearly labor and management requirements of the plastic cover. Roofed-storage structures should be clear span, with support posts along the outside walls.

Interior posts will interfere with vehicle traffic and could be a source of ignition if spontaneous combustion conditions were to occur. Interior height to the trusses should be 10 to 12 feet to allow for litter accumulation and operation of loading equipment. Walls must be designed for the appropriate lateral pressure if litter will be stacked against them. The wall area above the stack may need to be enclosed to prevent entry of rain and to minimize wind effects in blowing litter.

Storage facility design

The design of litter storage facilities can take many forms. The first step in developing a design is to determine the volume of storage needed as illustrated in Example 1. After the volume is determined, the building length can be estimated by assuming width, sidewall height and peak height of stacked litter.

Building width depends upon the availability of clear-span trusses which carry the design snow loads pertinent to an area. Litter storage structures 40 feet in width are common in the poultry producing areas of the United States. Scissor-type wood trusses, or steel angle frame-type trusses commonly used in poultry production buildings, can provide the needed clear-span requirement. Truss spacing depends upon the individual truss manufacturer's requirements.

Sidewall height is the height that litter is stacked against the building sidewalls. Heights of three to six feet are common because the wall must be designed to resist the lateral pressure of the stored litter.

Typical wall construction is treated wood posts 4 feet on centers, with 2" x 6", or 2" x 8" treated planking nailed on the inside faces of the posts to form the wall. Concrete can also be used to make a durable, structurally sound sidewall.

Although litter may be stacked only three to six

