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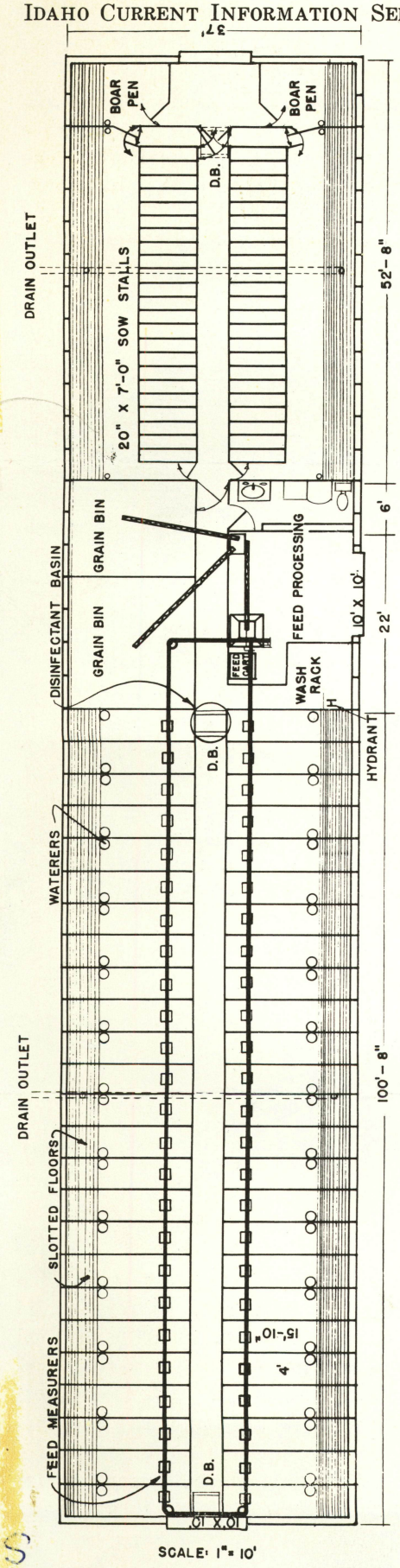

SWINE MANURE HANDLING AND DISPOSAL

Agricultural Extension Service
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*By John E. Dixon and Eric B. Wilson**

The selection of a manure disposal system is influenced by many factors including the value of the manure to the particular farm, the type of buildings housing the pigs, whether or not they have slotted floors, whether or not bedding is used, the availability of cleaning water, location of the swine establishment with relation to other community residents, sanitation laws, and perhaps several others.

Most studies indicate that the fertilizer and soil building properties of manure exceed the cost of hauling and spreading it on cropland. Even so, there is still quite a trend among farmers to just get rid of it in the least expensive way.

Manure handling methods may be classed as solid manure handling or liquid manure handling. There is not much new in handling solid manure. Bedding, scoop shovels, pitchforks and tractor loaders are used but with little improvement, if any, in late years.

LIQUID MANURE

Principal developments have been made in the handling and disposing of liquid manure. Liquid manure results from systems where the floors are washed down with water or where slotted floors cover pits in which a certain amount of water is left standing. Liquid manure may also result from scraping solid manure into a pit containing water.

CONFINEMENT REARING SYSTEMS like the one shown here have been added to a number of Idaho farm units in recent months. With their slotted floors, they have been great labor savers. The hogs themselves keep floors clean and disease down. Working scale plans for this 50-sow unit are available from the University of Idaho Plan Service. Ask for plan 72624.

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WATER CLEANING

To remove manure from concrete with a jet of water requires more water at higher pressure than can be obtained from an ordinary garden hose.

High pressure turbine pumps or roller-rotor pumps with a capacity of 10 gallons per minute at 100 pounds per square inch will provide adequate water and pressure for cleaning manure from concrete.

A simple nozzle that works very well can be made from a one-inch pipe cap. See figure 1. Grind the outside face of the cap so it is smooth and drill a ¼-inch hole through the center. Counter sink this hole from the inside so that the outside edge of the hole is still ¼ inch but sharp. Screw this cap onto a piece of pipe that will fit a 1-inch hose and you have equipment that will do a good job of cleaning manure from floors.

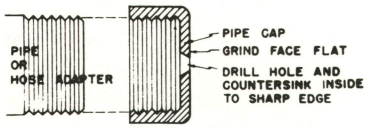

Fig. 1. Pipe cap nozzle.

SLOTTED FLOORS

Slotted floors are really catching on in the hog industry. They appear to be real labor savers. Many slotted floors are kept clean by the pigs themselves. However, it is generally agreed that they should be completely washed between litters or between bunches of pigs.

How much slotted floor is needed? For finishing hogs it appears that about 25% of the floor should be slotted. If one pen is used from farrowing to finishing this proportion seems to be about right for the entire life of the pig. A hog floor should slope approximately ½ inch to the foot from one side or end of the pen to the other. The slotted portion should occupy the lower end of the floor. See figure 2.

There have been some installations where the entire finishing floor was made of slats. This, however, has been found unnecessary. It works much better to have ¼ of the floor slotted and use the other ¾ of the floor for resting and eating such as in the limited feeding system.

Slats for slotted floors can be made from wood, concrete or metal. Some of the first ones were made from **expanded sheet metal rolled flat.** The cost of expanded sheet metal is somewhere around 40¢ per square foot, but by the time you supported it adequately the cost is about as high as other types of slotted flooring.

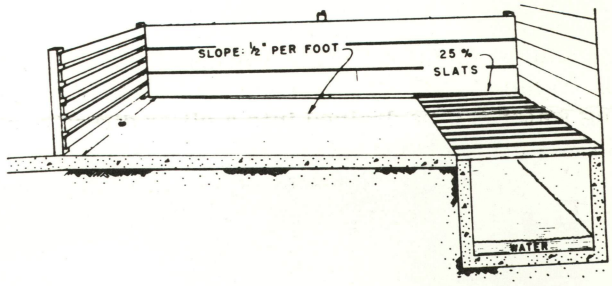

Fig. 2. Slotted floor over pit of standing water.

Wood for slotted flooring is not too satisfactory, because it wears quite rapidly and because it is more difficult to sanitize completely.

Concrete slats 5 inches across the top, 3 inches wide at the bottom and 5 inches deep reinforced with two steel bars make a satisfactory slotted floor at somewhere around 75¢ per square foot. See figure 3A.

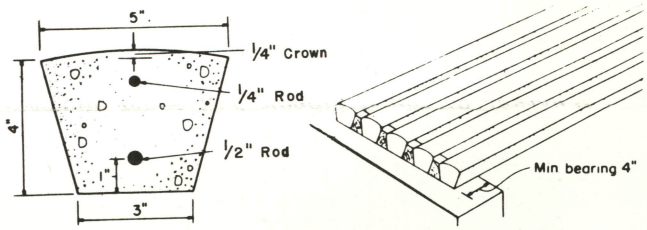

Fig. 3A. Concrete slats.

Metal channels from 1¼ to 3 inches wide with about 1-inch slots can be purchased for around $1 per square foot. These are usually formed into channel irons and are made with special corrosion resistant steel. See figure 3B. You might ask, "Won't little pig's feet slip down in the one-inch slots?" Yes, they will, but there is no harm done as long as they can release themselves. It doesn't take long for them to learn to avoid the slots.

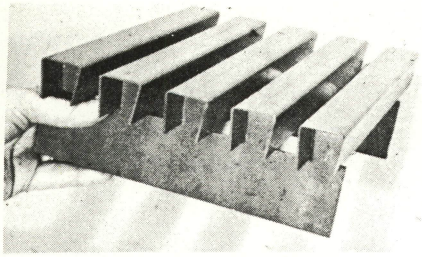

Fig. 3B. Metal slats.

PITS AND LAGOONS

Liquid manure that is washed from the floor or tramped through the slots into a pit of standing water can be drained into a pit or directly into a lagoon. Incidentally, drain tile should be 6 inches or more in diameter and be laid on a slope of ¼ inch per foot (2%).

The decision of whether to drain the manure into a pit or into a lagoon may hinge upon whether or not the value of the manure is considered high enough to make it worthwhile to save and spread on the land. It may also depend on whether or not the location and soil is suitable for a lagoon.

Lagoons should be 3 to 5 feet deep in soil that will hold water with a minimum of seepage. Dirt can be pushed out with a dozer. The earth embankment should stand as steep as possible in order that most of the pond will be at the recommended depth. A fence should be placed around the lagoon to keep livestock away and signs should be erected telling people what it is and to please keep away.

Whether or not a lagoon will cause undesirable odors depends to a considerable extent upon its size. Many lagoons have been constructed in Missouri and other midwestern states with a surface area of 15 square feet per hog. These, so they say, produce odor, but not any more than the hog floor itself. In Idaho we should plan to make them considerably larger than this—perhaps 50 to 100 square feet per pig. Even so, there will be some odor produced.

A lagoon may have to be cleaned out occasionally. However, the larger it is, that is, the more square feet per animal, the less frequently will it be necessary to clean it out. This is true for two reasons. In the first place, being larger it will hold more. In the second place, because it is larger and the solids will be less concentrated, they will decompose more completely.

The lagoon disposal system is a low cost way of disposing of hog manure. It is satisfactory as a system of getting rid of manure providing the odor produced is not obnoxious to the community, the drainage does not contaminate water supplies, and the fertilizer value can be sacrificed.

This system is also somewhat dependent upon water supply. The lagoon must be kept well filled with water if odors are to be kept down and fly and mosquito breeding kept to a minimum.

Manure pits are usually made as a concrete tank below the surface of the ground. A reinforced concrete cover is desirable but not absolutely necessary. The contents of the manure pit must be pumped out and disposed of at regular intervals.

Types of pumps. Two or three are available and fairly satisfactory for this operation. A specially made impeller pump with cutting blades is available. Another type of pump that will handle some solids with the liquid is the diaphram pump. If no bedding is used, the manure may be sufficiently liquified to use a centrifugal pump. A 1½-inch **centrifugal pump** will deliver about the same amount of liquid manure as a 3-inch **diaphram pump.**

Augers can be used successfully as liquid manure pumps. A 4-inch auger will pump about 50 gallons per minute when running at 1600 rpm. A 1-hp motor is required. The **chopper impeller pump** will move about 300 gallons of liquid manure per minute at 750 rpm.

Costs vary considerably. A 5-hp chopper pump lists at about $800 with motor, a 16-foot 4-inch auger with one-hp motor lists at about $125, a 3-inch diaphram pump with a 2-hp motor lists at about $400, a 1½-inch centrifugal pump with the same capacity would be about $250.

The manure pit or **tank size** depends upon the number of hogs, the amount of water used in cleaning or flushing, and the time interval between emptying. You can figure on about 1 gallon of manure per hog per day. If floors are washed, you can figure on another gallon per hog for wash water. Thus, you should have a capacity of about 2 gallons per hog per day for the number of days between emptyings.

With slotted floors over pits using standing water, figure about 2 gallons per pig per day if the pits under the floors are flushed once every two weeks. This assumes that the gutter under the slotted floor is 4 feet wide and will be filled to a depth of one foot of water after each emptying. If it is emptied more often than every 15 days, you will need to figure more than 2 gallons per day per pig. If the gutter is emptied at intervals greater than every 15 days, figure somewhat less than 2 gallons per pig per day.

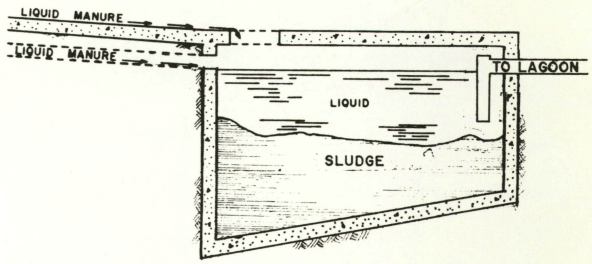

Fig. 4. Settling tank for use ahead of lagoon.

COMBINATION UNITS

A combination of lagoon and settling tank seems to offer a pretty good solution to this hog manure disposal problem. The disadvantages of the lagoon-only system are: odors produced by small lagoons and complete loss of fertilizer value. The disadvantage of the manure pit is that a lot of labor and equipment is needed to spread manure with a high water content and consequently low value per gallon.

In the combination system the manure is first emptied into a manure pit used as a settling tank. The overflow from this pit is discharged into a lagoon. About 1/10 of the solids overflow to the lagoon. Thus, it becomes necessary to haul only about ¼ as much material as with a manure pit, and the lagoon only needs to be about 1/10 as large as it would be without the settling tank (5 to 10 square feet per pig).

One difficulty immediately looms up here, however, and this is: the highly concentrated material in the settling tank becomes too thick to pump with ordinary equipment. However, if a sludge pump is moved around or put into the tank at intervals of about every 5 feet, the material can still be pumped.

Another system which appears to be workable would be to discharge liquid from below the surface in the settling tank allowing it to fill only approximately half full with solids. See figure 4. The top half would then be full of water and when agitated the entire contents would pump more or less readily. This would, of course, decrease the capacity of the tank.

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