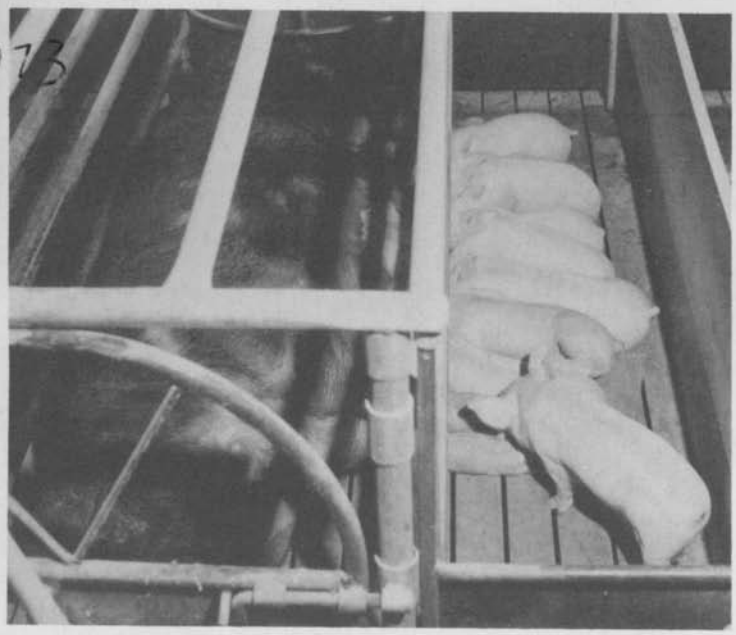
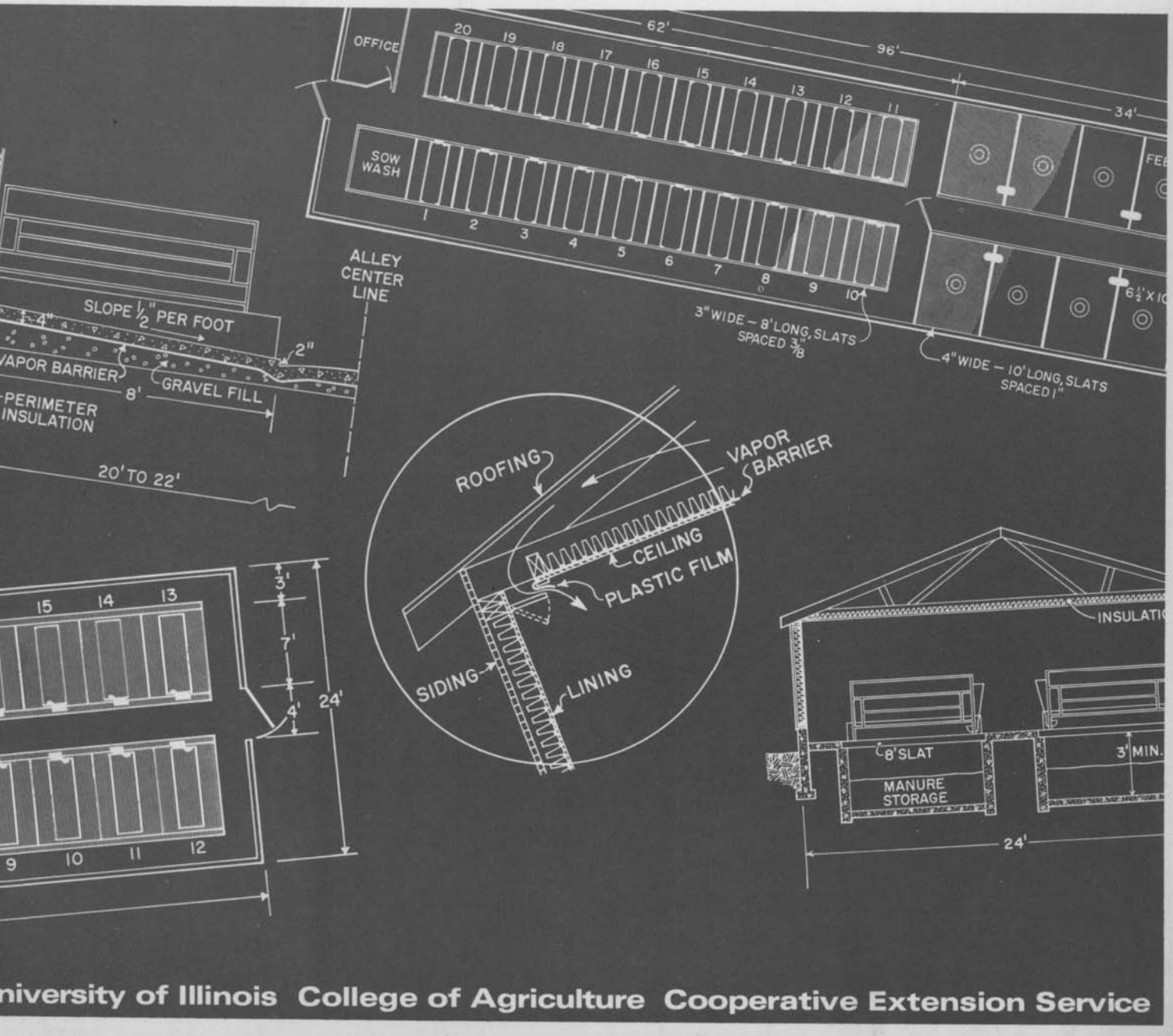


FARROWING HOUSES for SWINE

Circular 973



niversity of Illinois College of Agriculture Cooperative Extension Service

FARROWING HOUSES FOR SWINE

Illinois farmers use many types of farrowing houses, but some standard patterns are being developed.

Some farmers continue to use portable houses on pasture for farrowing. Many, particularly those with larger operations, have turned to a more sophisticated central farrowing house in search for ways to increase production with a minimum of labor. A 1966 survey showed that 70 percent of Illinois hog farmers used central farrowing facilities at least part of the time.

Good management is the most important requirement for a successful farrowing operation. It is more important in the farrowing building than in other phases of a swine operation. Well-planned and properly constructed buildings and equipment will make good management easier, but they cannot help the farmer avoid the consequences of poor management. Farmers must use a higher level of management with a central farrowing house than with a pasture system.

This circular provides you with general guidelines for planning and managing central farrowing houses. You must work out the details with your extension adviser and equipment and materials distributors.

CONTENTS

AUTHORS: This circular was prepared by A. J. Muehling, assistant professor of agricultural engineering, and G. R. Carlisle, professor of animal science.

Urbana, Illinois

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15M—12-67—94992

THE BREEDING HERD

Farmers usually keep their sow herd on pasture in portable housing. Open shelters (Fig. 1) are satisfactory if they face south or southeast. Make certain these shelters are well bedded during cold weather.

Total confinement of the breeding herd interests many farmers today. The sow herd is usually the last unit moved into confinement. Producers who have confinement farrowing and finishing units are looking for ways to have better control over the breeding herd and, at the same time, to reduce the labor needed.

Most interest has been in group confinement of sows using partially slotted floors (Fig. 2). Allow about 15 square feet per sow. Some producers tie (tether) their sows in small individual stalls. While this gives the best control over individual sows, there is not yet enough experience with this to know what problems will arise.

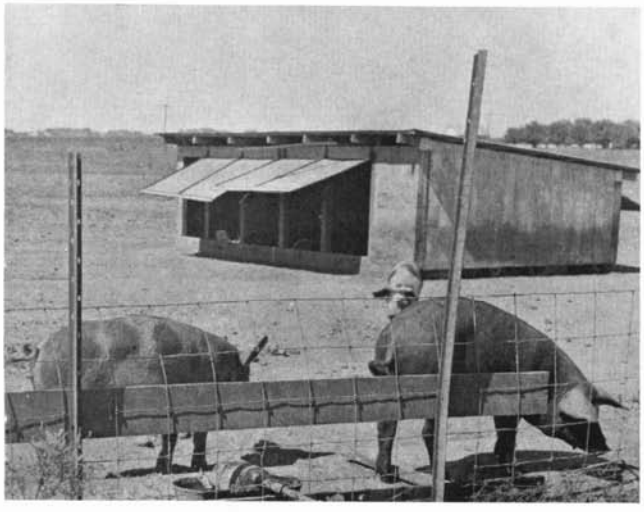


Fig. 1. Open shelters for the breeding herd should face south or east.

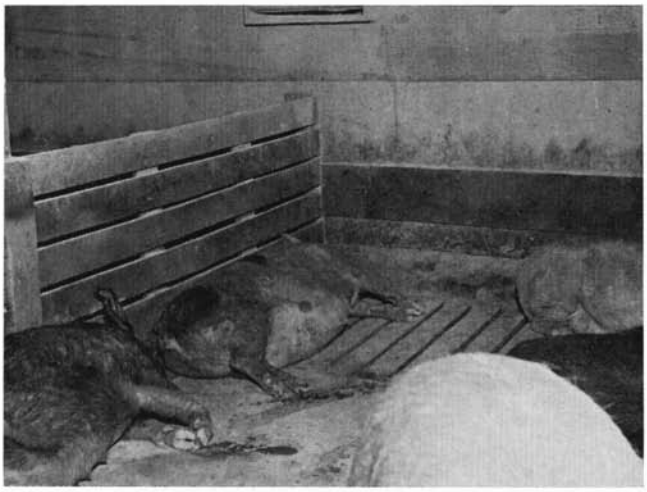


Fig. 2. Allow about 15 sq. ft. per animal when confining sows in groups. These partially slotted floors reduce cleaning labor.

Fig. 3. Individual farrowing houses located on good pasture.

Fig. 4. Portable farrowing houses can be large enough for several sows. These multiple-unit portable farrowing houses are typical of many used in Illinois.

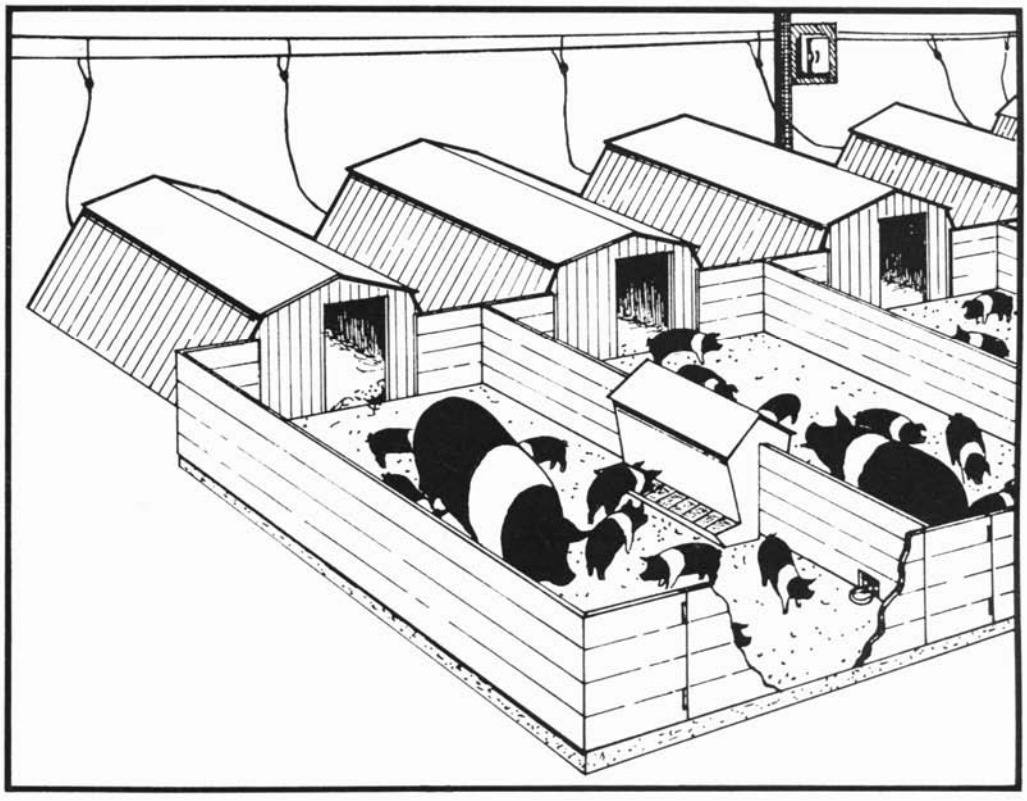


Fig 5. Portable houses pulled up to concrete slab for winter farrowing provide some advantages of central farrowing houses.

PLANNING THE FARROWING HOUSE

Portable Farrowing Houses

Farrowing with portable houses is done either in the field or at the farmstead, and many farmers are using portable houses with success. Tenant farmers may have no other choice. Individual houses (Fig. 3) and multiple-sow houses (Fig. 4) are both suitable. You can place these houses on clean rotation pasture during most of the year, then move them to the farmstead and line them up on a concrete slab for winter farrowing (Fig. 5). If you centralize the individual houses during winter you will have some of the advantages of a central house, such as the use of electric power for heating and a concrete floor for feeding.

The floor of a portable house or an outside run could be slotted to reduce labor (Fig. 6). The hogs work the manure through the slotted floor and this eliminates the need for frequent cleaning. You can move the house occasionally and then load any accumulation of manure and spread it on the fields. Bank the slotted area with straw to reduce drafts during the cold winter months.

Central Farrowing Houses

Central farrowing houses provide the best environment with a minimum of labor. Pressure water, gas and electricity for heating, bulk-feed storage, and concrete floors reduce labor and enable one man to care for larger numbers of sows. Adoption of slotted floors further helps reduce daily chores in a farrowing house.

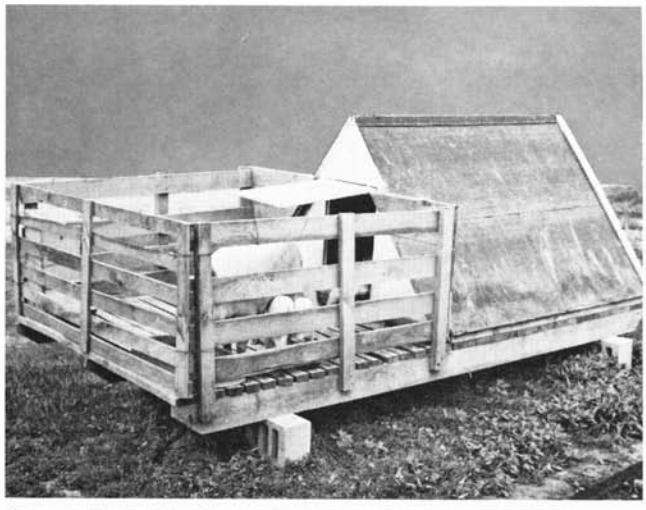


Fig. 6. Portable farrowing house using slotted floors.

A modern central farrowing house is a specialized building that requires a large investment. Do considerable advance planning to avoid costly errors and later changes.

Location of the Farrowing House

Today farmers must consider entire enterprises when planning the location of individual buildings. If you are considering a farrowing building now it is likely you will continue to expand by adding a nursery unit, finishing unit, feed-processing unit, or a combination of these at a later date. Be sure to allow room for other confinement buildings in the same area.

When you plan new buildings keep the location of the farm home in mind. You can control odors by locating swine buildings downwind and not less than 150 feet from the home. Most Illinois summer breezes are from the southwest, so locate the farrowing house and all of the hog enterprise to the north or east, of the home.

Utilities are important in the location of a hog enterprise. Electric power and water should be accessible.

Locate buildings on a well-drained site. You may have to use earth-moving equipment to change existing slopes so the drainage is acceptable.

Basic Farrowing Layouts

The basic farrowing unit used in Illinois is the 5-foot by 7-foot farrowing crate. It takes less space than most farrowing pens and offers a good deal of protection for the baby pigs. Many types of commercial farrowing crates are available or you can build your own crates.

An alternative to the farrowing crate is a partially slotted, 5-foot by 10-foot pen that you can use for both farrowing and nursing (Fig. 7). The pen should have guard rails at all times. You can place a temporary farrowing crate in the pen at farrowing time. Remove the crate to turn the pen into a nursery. Provide a creep area that has heat in the floor in the front of the pen. Cost per sow for these pens may not be much different than for farrowing crates, since the pens take up more space than the crates.

Fig. 7. A 5-foot by 10-foot partially slotted nursery pen for sow and litter.

Solid-Floor Farrowing

Solid-floor farrowing houses are usually used in small swine operations where bedding and labor are readily available. To reduce cleaning labor to a minimum when using solid floors, turn the sow outside for feed and water twice a day. This will greatly reduce cleaning inside the house. Figure 8 shows a typical diagram of a solid-floor farrowing house. A 20-foot-wide house with a 4-foot central alleyway is acceptable. Slope the floor under the crate ½ inch per foot into the alleyway for adequate drainage. Have an adjoining concrete feeding floor where feed and water are provided for the sows. In larger houses divide this feeding floor and handle the sows in two groups to make it easier to get them back to their crates.

Slotted-Floor Farrowing

The use of slotted floors will save more labor when used in farrowing houses than when used in other phases of confinement production. Besides the saving in labor, the use of slotted floors disposes of manure in a storage

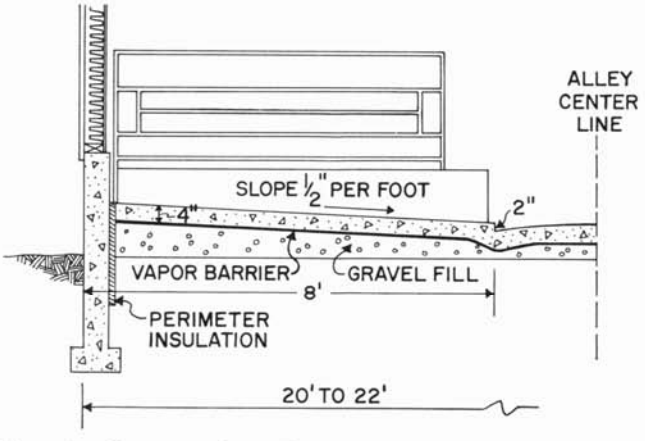


Fig. 8. Cross-section of typical solid-floor farrowing house.

Fig. 9. A typical modern central farrowing house with attached bulk feed bin.

pit and results in cleaner, drier floors for the little pigs, providing a more sanitary environment.

When you use slotted-floor farrowing crates (Figs. 9 to 13), you can keep the sows in the crates until weaning, doing all of the feeding and watering in the crates. Hand-feed the sows so you can watch them to make certain they are eating properly.

Farrowing units can be partially slotted (Fig. 14) or totally slotted (Fig. 15). In partially slotted units the front 1 foot and the back 2½ feet of the floor are slotted, while the center is solid. An advantage of the solid center is that it provides a solid portion for the pigs to lie on. If you use a solid concrete center with no pit beneath it, install heating units in the part where the pigs lie.

Size and Uses

When you plan a central farrowing house the first thing to consider is the number of farrowings per year for which you want to provide facilities. If the swine enterprise involves less than 4 farrowings a year, it is not usually economical to use a central farrowing house. Your cost per litter in this case will be lower if you use some type of portable housing.

Four farrowings a year. A system commonly found on Illinois farms involves farrowing sows 4 times a year, with one group farrowing every 3 months. By limiting the breeding season to 3 or 4 weeks, you can plan farrowings to avoid peak work loads caused by other farm work.

In this system you can use a central farrowing house as a combination farrowing house and nursery for weaned pigs. Remove sows from the building at weaning time. Leave the pigs in the farrowing crates until you move them to a finishing building or other finishing area. Clean and disinfect the building and leave it idle for a few days before the next group of sows enters the building. This means you will leave the oldest pigs in the farrowing house until they are about two and a

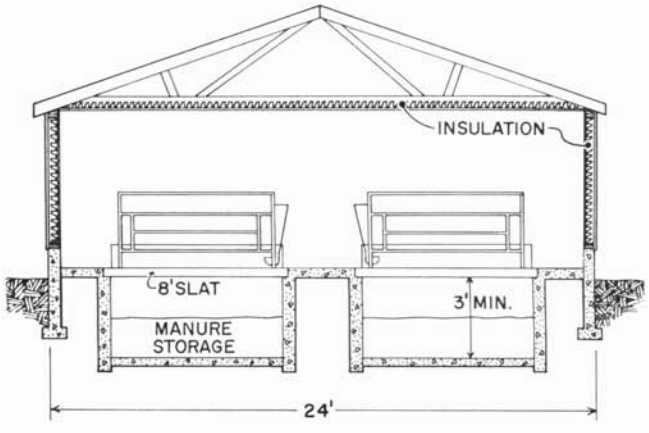
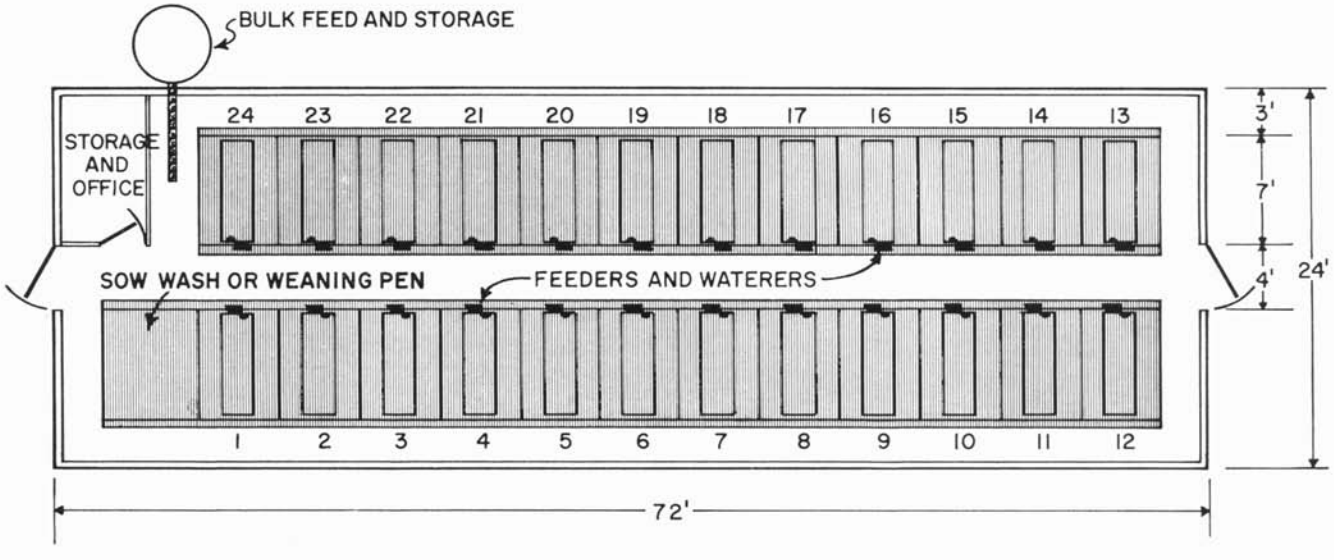


Fig. 10. Floor plan and cross-section of slotted-floor farrowing house.



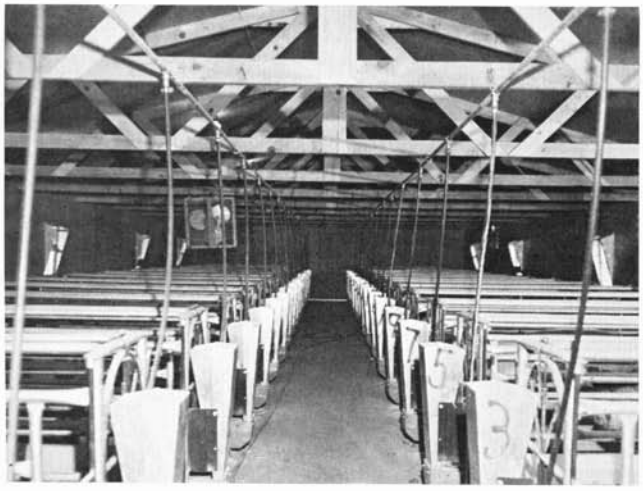


Fig. 11. Two rows of farrowing crates fit in a 24-foot building.

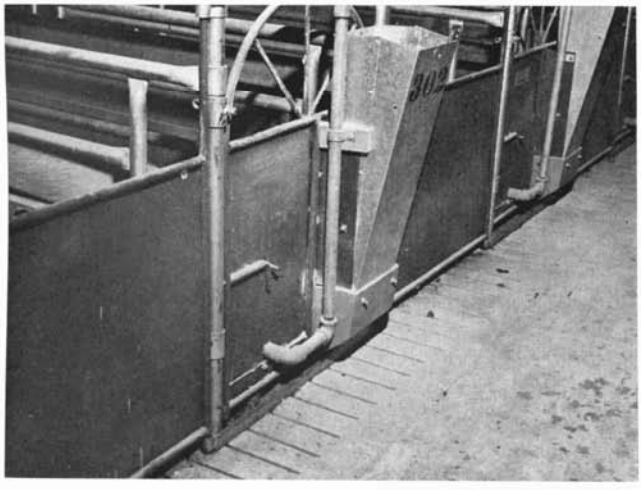


Fig. 12. Eight-foot slats extend beyond both ends of the farrowing crate.

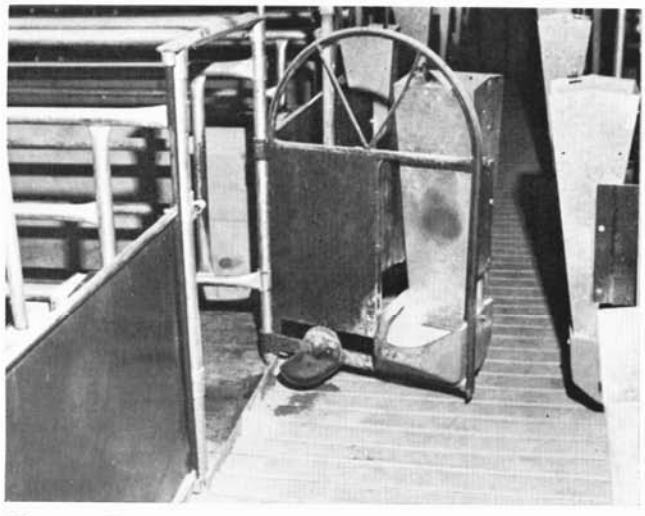


Fig. 13. You can open the front gate of some crates to move the sows.

half months old, the youngest between six and eight weeks old.

After the pigs are weaned a completely slotted floor will be cleaner than a partially slotted floor since the newly weaned pigs may dung and urinate on the solid area after the sow is moved from the crate.

Another advantage of this system is that if your farrowing period is a month long, the number of sows you can farrow is 10 to 15 percent larger than the number of crates you have. At weaning combine a few of the litters farrowed earliest and this will free a few crates for sows that farrow near the end of the month.

A disadvantage of this system is that the pigs spend a larger proportion of their lives in the expensive farrowing house than they do in other systems discussed in this sec-

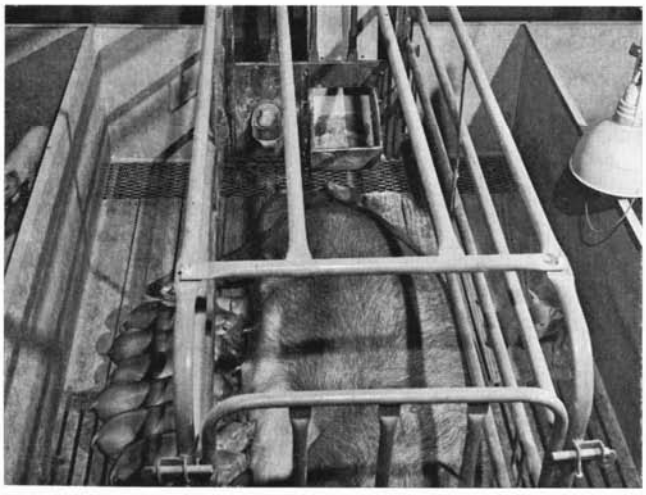


Fig. 14. A partially slotted farrowing crate using 1 foot of ¾-inch expanded metal in front and 2½ feet of metal slats behind.

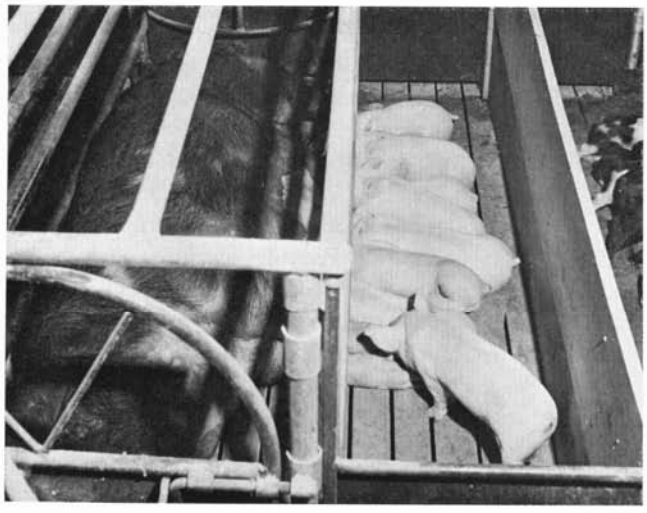


Fig. 15. Totally slotted farrowing crate using 3-inch concrete slats spaced ⅜-inch.

tion. But it is an advantage not to have to move the pigs at weaning time, because of the added stress on the pigs.

Six farrowings a year. Plan for 3-phase housing — farrowing, nursery, and finishing — if your operation will include 6 farrowings a year.

In this system, a group of sows is farrowed every 2 months. If you restrict the breeding season to 3 weeks and leave the farrowing house idle for a few days between farrowings, the youngest pigs will be not over a month old when you move them to the nursery. If you use a nursery for both sows and pigs, the transfer of early farrowing sows and litters to the nursery will permit you to use the same crates twice during one farrowing period. This means you can have 10 to 20 percent more sows than crates. If you use the nursery only for weaned pigs, plan to have a farrowing crate for each sow in the group, because the last sows to farrow will be in their crates before any litters are weaned.

Eight or more farrowings a year. You must use a very high level of management if you want to farrow more than 6 times a year.

Restrict breeding periods to 3 weeks and have one crate for each sow. If the nursery building is designed only for weaned pigs, it will be almost impossible to arrange time for a clean-up and idle time between farrowings. If you use two smaller farrowing houses, you will have more time to empty each house and provide a sanitation break between farrowings than with one larger house.

Producers who are top managers have been able to run eight to twelve farrowings per year through a house. But if you have not had much experience with a central house you should start out using the house at less than the most intensive use until you have learned to cope with any problems that may arise.

Waste Disposal Systems

Waste disposal has become a major problem on commercial hog farms, particularly waste disposal from finishing units. Farrowing and nursery units also present a problem, but they do not accumulate as much manure as finishing units.

If you use solid floors, remove the manure each day and handle it as a solid. Provide adequate floor slopes (½ inch per foot) so liquids will drain off. If bedding is used manure is easier to handle.

If you use slotted floors you will usually have to handle the manure as a liquid. The pigs work the manure through the slotted floor to a storage pit below. Urine and wastage from waterers normally provide enough liquid in the pit to keep the manure fluid.

The depth of the pit will determine how long you can store manure before emptying it. Plan on about four

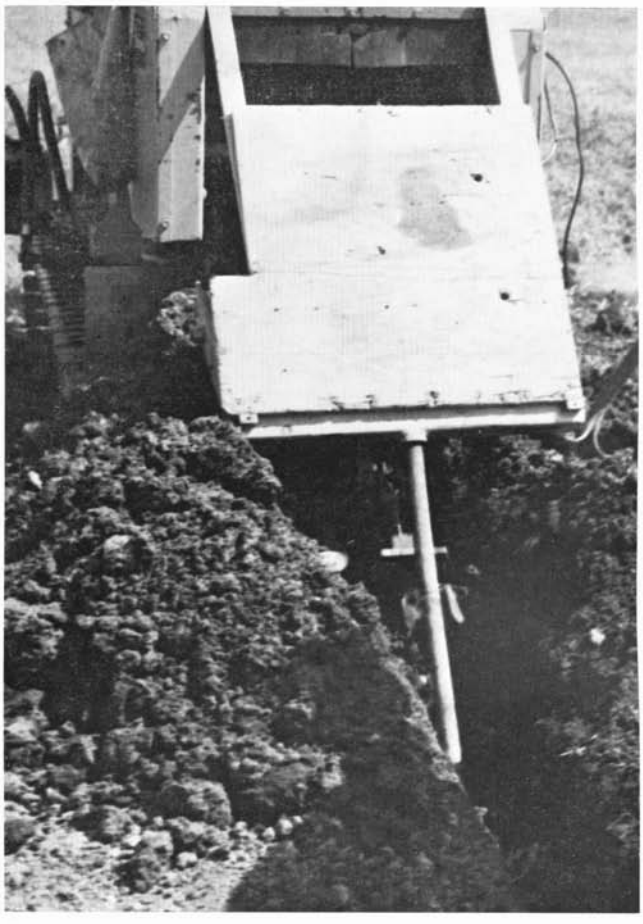


Fig. 16. You can dig the pit wall with a small trencher and pour concrete with very little forming.

gallons (about ½ cubic foot) of liquid manure per day for each sow and litter. Keep waterers in good repair because excessive water leakage can soon double to this amount. Plan at least a 3-foot-deep pit in new construction. In remodeled units this depth may not be possible because of existing building design.

The pit walls can be either cast-in-place concrete or concrete block. Where soil conditions allow, you can save most of the forming by using a small trencher (Fig. 16) to dig out the pit walls. You will only have to do a minimum of forming along the top of the trench. Then pour concrete into the trench. Later remove the center earth with a back hoe and you will be able to cast the floor and slats.

Place at least a 3-inch concrete floor in the pit. Slope it a maximum of 6 inches per 100 feet toward the end from which the manure will be emptied. To empty the pits as completely as possible, provide a sump hole from which the manure will be pumped.

There are several ways to dispose of liquid manure. You can haul it to the field, drain it into a lagoon, treat

Fig. 17. Some producers use a commercial vacuum tank wagon to spread manure.

it with an aeration rotor and then dispose of it, or you can use a combination of methods.

Because central farrowing houses produce less manure than finishing houses, most Illinois farmers use a vacuum tank wagon to haul the manure to the field (Fig. 17). These 800- to 1,500-gallon-capacity wagons are easy to use and have worked well. If your central farrowing house has a pit that is 8 feet wide and 4 feet deep, you will not need to haul manure over 3 times a year.

Be sure to open the building and to see that it is well ventilated anytime manure is agitated after it has been stored for some time, because the agitation will release toxic gases and cause odors. There have been isolated cases of asphyxiation of hogs from gases released when manure was vigorously agitated.

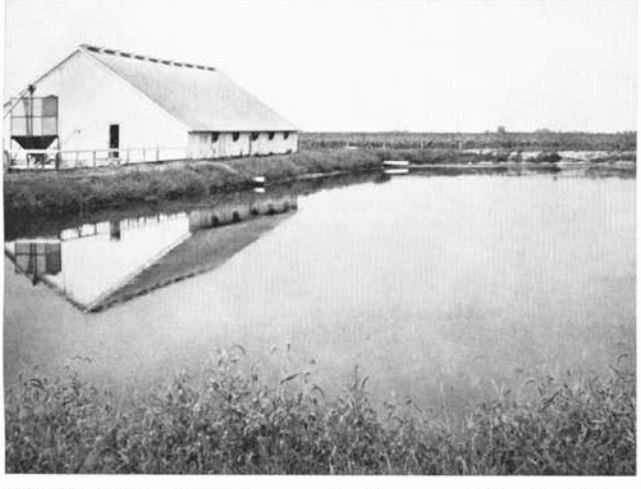


Fig. 18. You can use lagoons to dispose of the liquid hog manure. A lagoon close to the farmstead should be enclosed by a fence.

Some producers prefer to empty the manure into a lagoon (Fig. 18). The lagoon should provide about 1,000 cubic feet of storage per sow and litter. If the lagoon is 5 feet deep, there would have to be 200 square feet of surface area per sow and litter.

If you drain manure into a lagoon, store the liquid in the pit and then empty it periodically. Tile lines are less likely to clog or freeze if a quantity is flushed at a time. It is not necessary to have as deep a storage pit when you use a lagoon as when you haul.

The continuous-aerobic-oxidation ditch is a recent development in waste disposal for farrowing and nursery houses. The oxidation ditch has an aerator rotor that turns continuously, circulating the liquid manure in an oval channel. The rotor also beats oxygen into the contents and keeps all solids in suspension so they can be broken down by aerobic bacteria. When this treatment is functioning properly it eliminates most odors associated with liquid manure storage and also decomposes the organic solids. The sludge must be settled out and hauled, but liquids can be discharged into normal drainage if treated properly. The oxidation ditch has been working well in a few farrowing houses, but needs extensive testing before firm recommendations can be made.

Slotted Floors

Wood, concrete, and steel slotted floors have been used in farrowing houses, but concrete appears to have the longest life. When slats were first used they were made of narrow wood (1¼ inches) and spaced 1 inch apart. Such wide spacings with narrow surfaces caused problems with the small pigs getting their legs caught, so recommendations now call for narrower spacing. Today it is common to use a 3- or 4-inch-wide slat and a spacing of about ⅜ inch.

Experience has shown that slats laid parallel with the sow work better than those laid perpendicular to the sow. A sow pushes to the side with her feet when getting up and will get footing from the gaps between the parallel slats. Little pigs can also get better footing when they are nursing if the slats run parallel with the sow.

Wood slats. Wood was one of the first materials used in slotted floors for farrowing units. It has the lowest initial cost, particularly where native hardwood is readily available. Oak is preferred, but other hardwoods such as elm, hickory, and maple can be used. It is best to work these woods while they are green. Preservative treatments should not be used because they may irritate the pigs' skin. Wood slats work best if you plane the sides and tops.

Wood slats can cause several problems. If the hardwood slats are worked green, they must be fastened securely in place to reduce warping. Place them somewhat closer than the desired spacing because they shrink

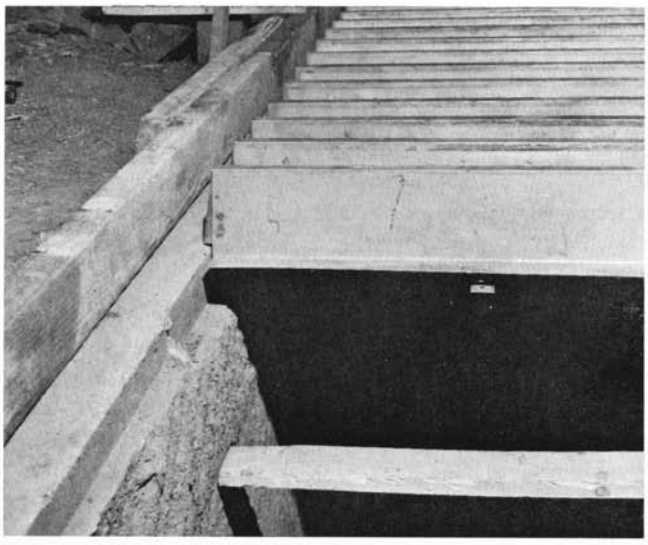


Fig. 19. Commercial cast-in-place metal forms for concrete slats.

while drying. Since they shrink and warp while drying and because of wear while in use, it is difficult to maintain a uniform spacing. The maximum life is about four years and many need replacing after only two years. Wood slats are also quite slick when wet and more difficult to keep clean than concrete or metal.

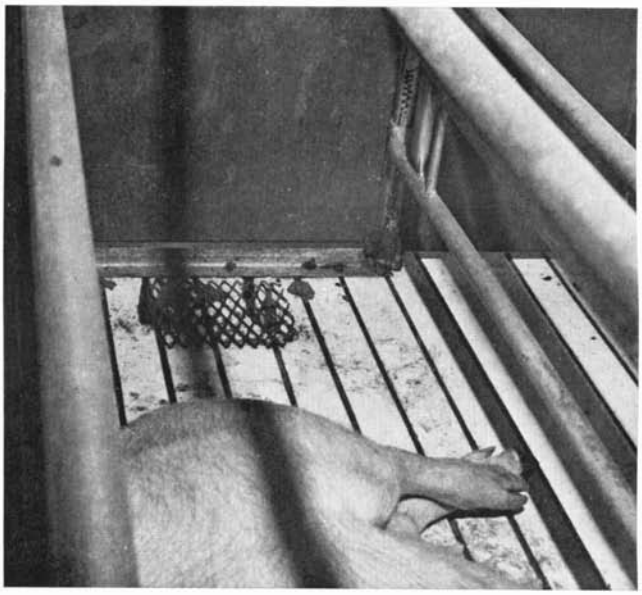
Concrete slats. Concrete slats are now widely used in newly constructed houses. A typical slat has a 3- or 4-inch-wide top with a ⅜-inch spacing. Commercial cast-in-place metal forms have increased the use of this size (Fig. 19).

The quality of concrete used in slats is important. Use a rich concrete mix with 7½ bags of cement per cubic yard of concrete. Limit the maximum size of aggregate to ¾ inch. For 8-foot slats locate a ½-inch reinforcing rod ½ to ¾ inch from the bottom of the slats. Cure the slats by spraying them with a curing compound or covering the entire slat area with plastic. Use a steel trowel to finish the slat surface as smooth as possible to reduce abrasions on baby pigs' knees. Some producers have used floor sanders to smooth the tops of the slats. High-quality concrete slats should last the normal lifetime of a building.

The narrow ⅜-inch spacing of slats may result in some manure buildup at the rear of the crate before and shortly after pigs are born, because it is the activity of the pigs that works the sow manure through the slats. The manure buildup is worse when the sows come off pasture and are slightly constipated.

Several different floor adaptations have been used to reduce this problem. Fig. 20 shows two holes (2 inches by 6 inches) cast in the floor to give access to the pit. They provide a place to dispose of the manure during the short time until the pigs are large enough to work the manure through the slats. These holes are covered with expanded metal during farrowing. Fig. 21 shows a second solution that seems to work even better. Widen the gaps between the slats to 1 inch for a 2-foot-square section inside the crate at the rear of the sow. This wider spacing results in better cleaning in this area. This area must be covered during farrowing. Covering the area with expanded metal or a metal grate works best, because it lets the moisture through, but welded wire mesh, burlap, roll roofing, and plywood have all been used.

Steel slotted floors. Steel slats of all types and expanded metal have been used for farrowing. Most steel



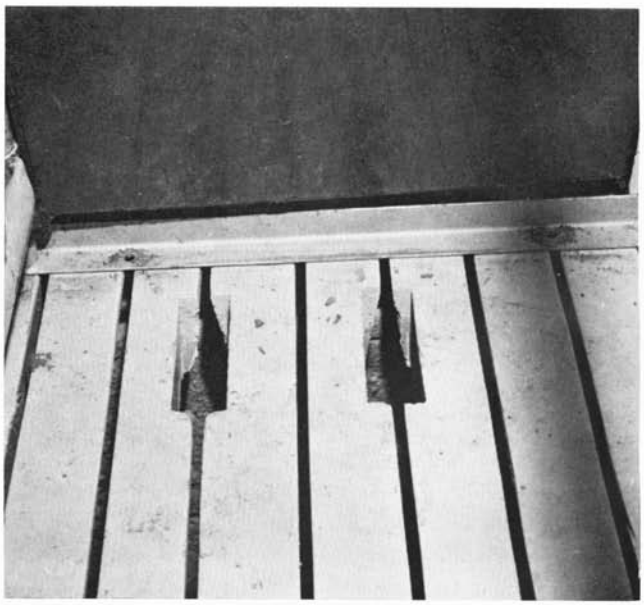


Fig. 20. Holes cast in slats give access to pit. Holes are covered with expanded metal during farrowing.

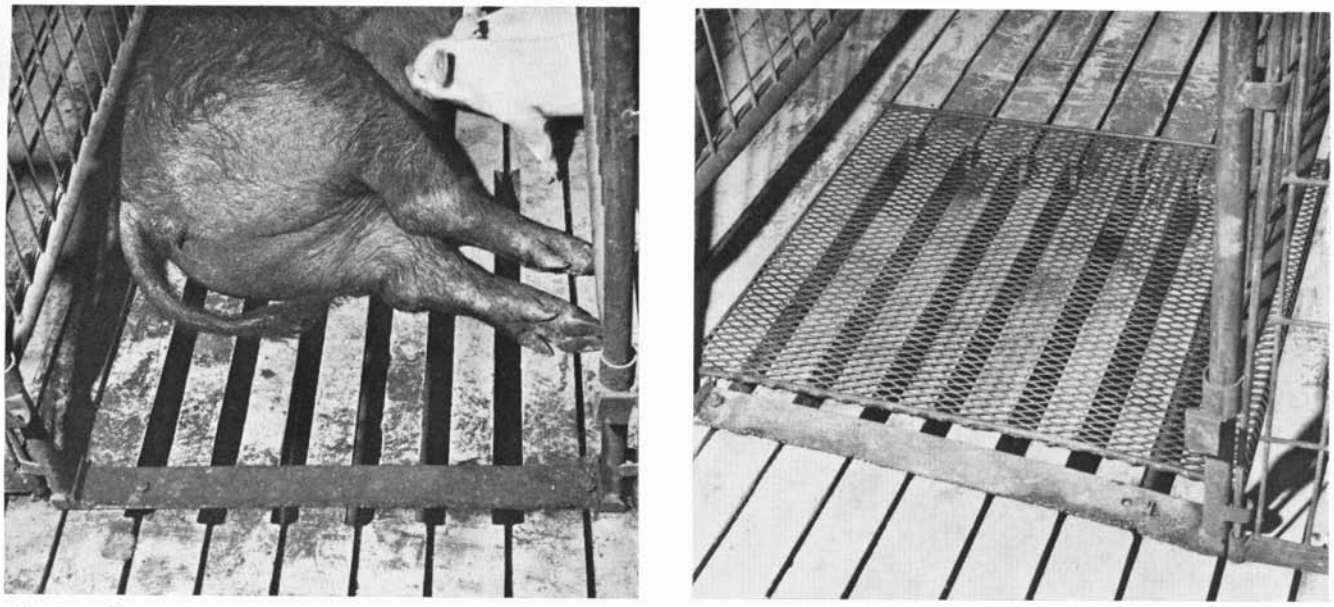


Fig. 21. Concrete slats with 1-inch spacing behind sow. Cover wide gaps during farrowing.

slats need a coating on the underside to reduce excessive corrosion from exposure over the manure pit.

Manure probably is worked through expanded metal better than almost any other type of slotted floor. Use size ¾-inch, 9-11 gage, flattened expanded metal. Expanded metal in some instances has been coated with various materials to extend its useful life. The life of expanded metal depends on several factors. You must provide plenty of support for it. Do not let support spacings for small pigs exceed 12 inches. Support it every 6 inches where it will carry the weight of the sow. Make sure the supports cannot move. Lay the material so the long opening will be parallel with the sow to reduce teat damage.

Expanded metal that lies in a wetted area will deteriorate much faster than that which is supported so it can dry off. Some expanded metal in continuous contact with wet manure became worthless after a year of use. Expanded metal that has been supported so it can dry has been in use more than five years.

CONTROLLED ENVIRONMENT

A central farrowing house must have adequate insulation and ventilation to provide acceptable conditions inside the house. The major problems are controlling moisture and temperature inside the house during the winter and controlling the inside temperature during extremely hot weather. Insulation and ventilation are necessary to solve both problems.

Insulation

Use insulation for three reasons: (1) to reduce heat gains during the summer, (2) to reduce heat losses during the winter, and (3) to control condensation.

With enough insulation to reduce heat loss, animal body heat will provide much of the heat needed for acceptable ventilation, and to maintain a satisfactory room temperature. A space heater is needed to supplement animal body heat in cold weather. Insulation does not eliminate the need for a space heater, but it reduces the fuel bill. Heat is needed for proper ventilation because as cold air is brought into the building the heat causes the air molecules to expand, thus enabling them to carry more moisture out of the building.

Multiple farrowing has resulted in an almost continual use of some farrowing houses. It is almost impossible to avoid farrowing during the coldest (January and February) months and during the hottest (July and August) months of the year. Hot-weather farrowing is often a greater problem than cold-weather farrowing. It is relatively easy and inexpensive to provide a space heater for extra heat during cold weather, but it is difficult and quite expensive to provide mechanical refrigeration during hot weather. Insulation can play an important role in reducing heat gain during hot weather.

Moisture condensation during cold weather is a major problem in farrowing houses. Your ventilation system must remove moisture produced by the hogs before it condenses on surfaces. Moisture will condense out of warm, moisture-laden air any time the air comes in con-

Table 1. — Insulation Values (R) for Common Construction Materials

Common construction materials	Resistance (R) Per inch	For thickness listed
Insulation materials		
Batts or blankets		
fiberglass, mineral rock, rock wool	3.70	....
wood fiber	4.00	....
Boards and slabs		
½-inch insulation board	2.63	1.32
expanded polystyrene	3.70-5.00[a]	....
urethane foam	6.67[a]	....
Loose fill		
fiberglass, mineral wool, rock wool	3.70	....
vermiculite (expanded)	2.08	....
sawdust and shavings	2.22	....
Building materials		
25/32-inch wood siding	....	0.98
3/8-inch plywood	1.25	0.47
½-inch plywood	1.25	0.63
¾-inch wood siding	1.25	0.94
¼-inch hardboard	0.72	0.18
⅛-inch cement-asbestos board	0.25	0.03
4-inch poured concrete	0.08	0.32
Windows		
single, glazed	....	0.89
double, glazed (storm windows)	....	2.22
double-pane insulating glass	1.50	1.75
Air space		
¾-inch or more space	....	0.91
with reflective lining on one side	....	2.17
Surface conditions		
inside surface	....	0.61
outside surface (15 m.p.h. wind)	....	0.17

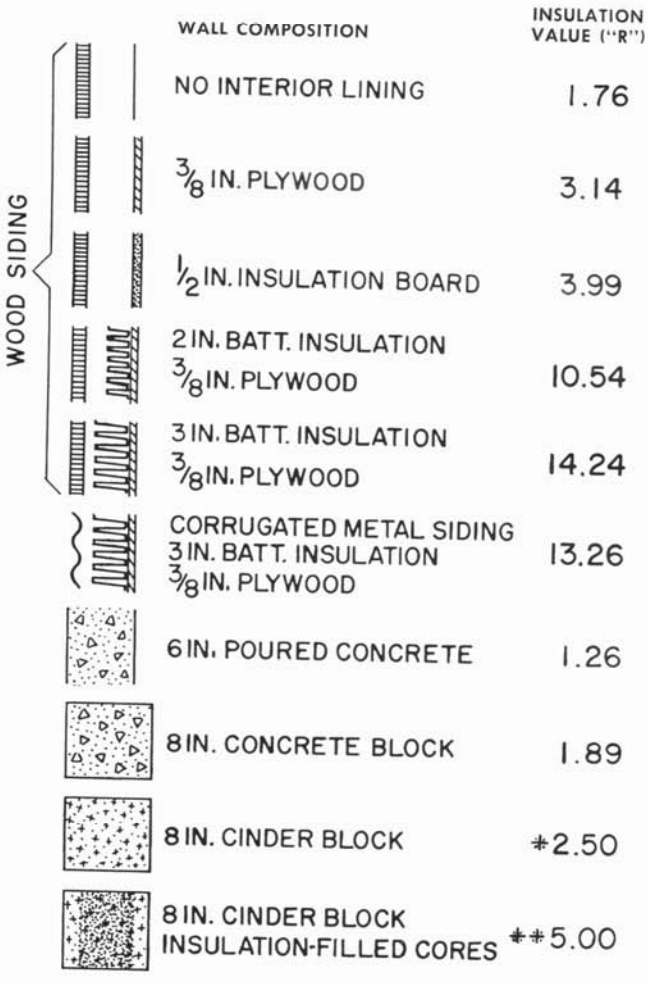
[a] Varies slightly with different products.

tact with a cold surface. Insulate walls and ceilings to control undesirable damp conditions inside the house. Moisture promotes decay of building materials and contributes to many disease problems in a farrowing house.

The relative insulation values of some of the common building materials used today are listed in Table 1. All layers of a material used in a wall or ceiling add to the total insulating value. You can easily see that the total insulation value adds up fastest when using batt insulation or one of the rigid foams. One inch of batt insulation has an insulation value of 3.70, so 3 inches would equal 11.1. One inch of insulation board has an insulation value of 2.63, so the commonly used ½-inch board has a value of only 1.32. The common sheet materials, such as plywood and other wall coverings have some insulation value, but it is small. An air space has some value (0.91), but the relationship is not linear — 3 inches is not better than 1 inch.

The recommended minimum insulation value in Illinois is 10 in the sidewalls and 14 in the ceiling. For example, if you use batt insulation, this amounts to a minimum of 2 inches in the walls and 3 inches in the ceiling to meet the minimum standards. The illustration below shows the total insulation value for some of the common wall constructions used today.

Insulation Values of Different Walls



*Will vary slightly with different aggregate
**Varies with different insulation

Masonry walls have a fairly low insulation value. If you put up masonry walls, use block made from a cinder or lightweight aggregate and fill the cores with insulation (vermiculite or the same dry aggregate used to make the block). Paint both sides of the wall with waterproof paint to keep moisture out of the insulation.

You must apply insulation properly for it to work well. All insulation values in the tables are for dry insulation. If moisture penetrates the insulation, the insulation value

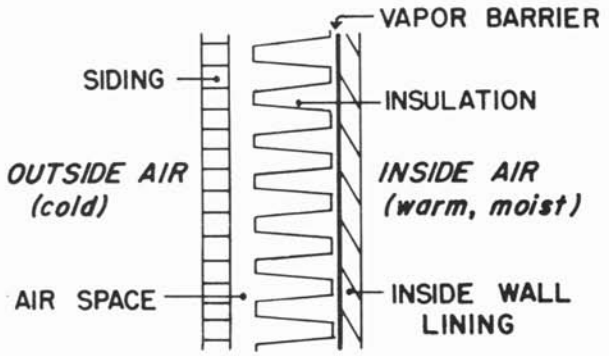


Fig. 22. Protect insulation with properly installed vapor barrier.

will drop considerably. You must protect the insulation on the warm side of the wall with a vapor barrier (4-mil plastic film or the equivalent). Staple on a vapor barrier and then add an easily cleaned, durable lining such as exterior plywood, corrugated metal, or cement-asbestos board. Fig. 22 shows the proper location of the vapor barrier. Some batt insulation has a vapor barrier on one side. Because of the difficulty of sealing all the joints, it is still advisable to put on a separate vapor barrier in large sheets over the batt insulation and then put on an interior lining.

Ventilation

Each sow and litter adds over a gallon of water a day to the air in your farrowing house. This moisture must be removed from the farrowing house through the ventilation system. Excessive moisture can directly and indirectly cause disease problems, extra labor, and rapid deterioration of the building.

Windows are not needed in a central farrowing house, but you can include a few to provide some natural light. Do not instal an excessive number of windows because they may be cold and drafty. Windows also provide some means of opening the building for natural ventilation during hot weather or a power failure.

Usually, a farrowing house needs two separate ventilation systems — one for winter and another for summer. The winter system is often used to supplement the summer system, but it is difficult to design one system suitable for both seasons.

Winter ventilation. The main purpose of winter ventilation is to move water vapor out before it condenses on cold surfaces, such as windows, doors, and uninsulated surfaces, and to evaporate spilled water and urine. A dry building, particularly a dry floor, is necessary to raise small pigs successfully. Even in the coldest weather you must maintain some ventilation to remove the moisture produced by the hogs. Make certain the house is well insulated to prevent condensation and to keep the house from getting too cold when outside temperatures are low. During cold weather you will need supplemental heat to maintain proper temperature while providing adequate ventilation. A gravity-type ventilation system is not dependable in buildings with low ceilings. A system using rated fans installed according to the manufacturer's instructions is best.

The suggested ventilation requirements (cubic feet per minute) are:

	Winter	*Summer*
Farrowing house (per sow and litter)	50	350
Nursery building (per 30- to 50-pound pig)	15	100

Supplemental heating requirements are (B.t.u.'s per hour):

Farrowing house (per sow and litter)	2,000
Nursery building (per pig)	200

The ventilation values are based on maximum air movement requirements for mild winter days. Have some means of providing less than maximum ventilation during the coldest weather. Use one fan with two speeds or a motorized shutter or use two or more fans.

Space air inlets so they will provide good air distribution. With exhaust fans in one side, a slot inlet in the ceiling along the opposite side will provide good air distribution with a minimum of drafts (Fig. 23). If you instal fans on the ridge and exhaust the air, you must provide inlets along both sides (Fig. 24). The fans can be controlled with thermostats or by a combination of timer-thermostat. Get further assistance in planning your ventilation system from your county extension adviser, local power supplier, or the local ventilation equipment distributor. Additional information is available in MWPS-8, "Swine Housing and Equipment Handbook," a booklet available from your county extension adviser or from the Department of Agricultural Engineering, 202 Agricultural Engineering, Urbana 61801. It costs one dollar.

Summer ventilation. The major problem during summer is to keep the sows cool. Normally, if you move enough air to keep the sows comfortable during hot weather, this will also remove the moisture produced by the animals.

You can use natural ventilation during the summer. Instal insulated doors that you can open on both sides of the farrowing house (Fig. 25). Be certain to close these doors when the temperature falls or the small pigs soon will be affected by the resulting cool drafts.

You may want to add more fans for summer. Normally producers use such fans to blow inward and provide air movement over the sows. Some producers have installed ducts and fans so that during hot weather each sow has a separate source of air (Fig. 26). Others supplement natural ventilation during times of extreme heat

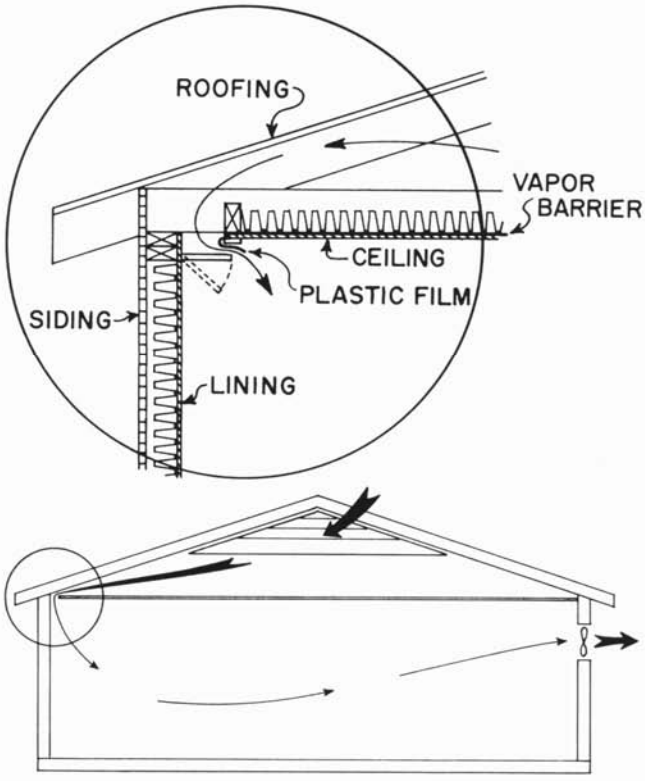


Fig. 23. Diagram of slot-inlet system of ventilation.

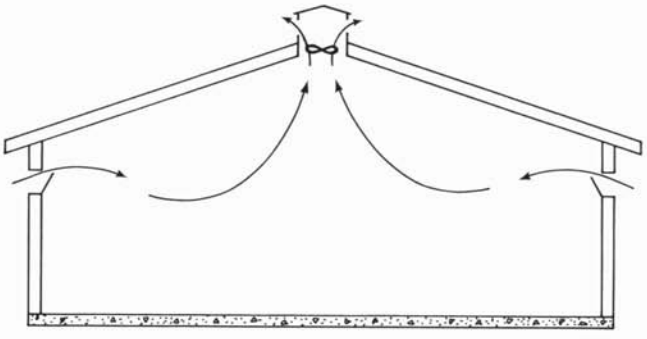


Fig. 24. Diagram of exhaust ventilation system with fan on ridge.

when there is little natural air movement by putting in window fans or setting up large portable fans (Fig. 27).

Heat for Farrowing Houses

All farrowing houses in Illinois should have some space heat. A good general recommendation is to provide a minimum of 2,000 B.t.u.'s per hour per sow and litter in an insulated farrowing house. Provide additional heat if nursery pens are a part of the farrowing building. You can use electric, oil, or LP-gas space heaters. All space heaters using oil or gas should be properly vented to the outside. You may also need to use space heaters to maintain acceptable temperatures when the house is only partially filled, since hogs in a partially filled farrowing house will not heat the building as well as hogs in a totally filled house.

Fig. 25. Side doors allow additional air movement for summer ventilation.

Fig. 26. Ventilation duct with individual air supply for each sow during the summer.

Adequate space heat is particularly essential in slotted-floor farrowing buildings. Maintain higher room temperature in these buildings, because drafts are more troublesome than on the more conventional solid floors. It is becoming more common to use supplemental heat

Fig. 27. Additional portable fans can help relieve the stress of hot weather.

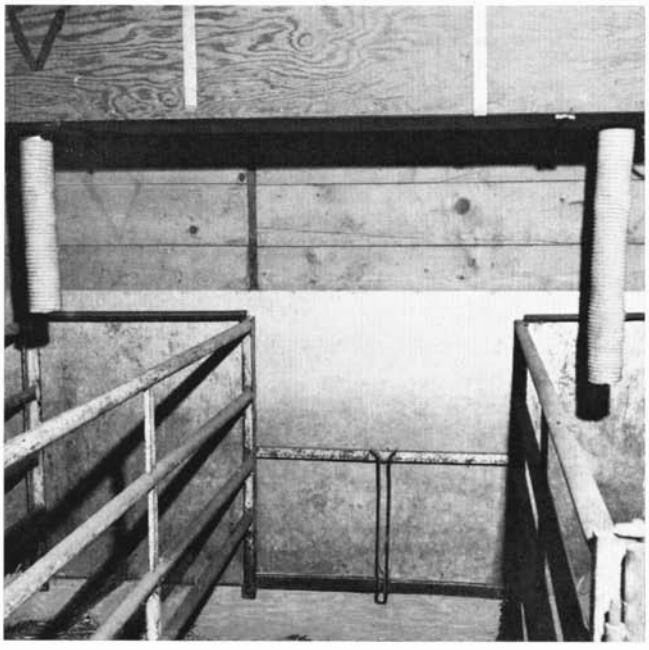


Fig. 28. Piping refrigerated air to each sow during hot weather.

to maintain room temperature near 80° F. in totally slotted units. Use heat lamps or some sort of isolated gas heat at farrowing and for a day or two later to dry off the pigs and attract them away from the sow.

Mechanical Cooling

Mechanically cooling the entire farrowing house does not seem economically feasible since air conditioning costs too much. In addition, it may not be best for the small pigs since the best temperature for small pigs is different from that of the sows. A system that works well is to pipe refrigerated air to each sow (Fig. 28). Much of the sow's cooling results from breathing. If she can breathe cool air during extremely hot weather, much of her heat stress can be relieved. Use a minimum of 1 ton (12,000 B.t.u.'s per hour) of air conditioning per 10 sows — a little bit more is even better. Insulate the ducts for most efficient operation and to control condensation. Discharge the air just above the sow's head. Do not extend the duct within reach of the sow or she will chew on it.

REMODELING EXISTING FACILITIES

You can remodel existing buildings into modern farrowing facilities. General purpose barns, poultry houses, and older farrowing houses are often very useful when you remodel them.

Insulation and Ventilation

The first requirement normally is to insulate the building properly and add the necessary mechanical ventilation. These older buildings usually have no insulation. If the walls and ceiling are of frame construction with framing members spaced every 2 feet, it is easy to install batt insulation between the framing members, put on a vapor barrier, and then apply a suitable wall and ceiling lining. If the building is pole framed or the framing trusses are more than 2 feet apart, you have to nail on 2- by 4-inch nailers, 2 feet apart across the existing framing and then add the insulation, vapor barrier and lining. In a building with a ceiling 9 feet or over it is best to lower the ceiling to 6½ to 7 feet and then insulate it. If remodeling a general purpose barn with a mow overhead, 3 to 4 feet of hay or straw in the mow can serve as good ceiling insulation.

When a building is closed tightly, add adequate mechanical ventilation. Install enough fans to meet the ventilation requirements shown on page 11. If you use an exhaust system (fans blowing out), you can make a good inlet in the conventional two-story barn with a mow by opening a narrow slot (¾ to 1 inch wide) along the ceiling on the side opposite from the fans to draw air from the mow.

Floor Modifications

The first decision about the floor is whether to use a solid or slotted floor. For a solid floor you may still need

to place some concrete over the existing floor to provide adequate slope for drainage. The recommendations for solid-floor construction on page 3 apply here. Place a minimum of 2 inches of new concrete on an existing floor.

The decision to use slotted floors still leaves several choices on how to proceed. The most satisfactory method is to dig pits 8 feet wide through the entire length of the building. You may need to use an air hammer to break up the existing concrete floor. Make the pit at least 3 feet deep. This method may involve more expense than the two methods described below, but is usually the best solution.

A second method of installing slotted floors in remodeled buildings is to use concrete blocks and build on top of the existing floor. The ceiling height will determine the depth of the collection pit. You will need a platform or ramp to get the sows in and out of the crates. The major problem with this arrangement is the difficulty of sealing the joint where the concrete block wall sits on the existing floor so liquid manure does not leak out. As a precaution against leakage, round the inside corner joints with cement mortar and then plaster liberally with black roofing mastic to provide a positive seal.

The third solution requires the minimum investment and probably is the least satisfactory, but still has many advantages over solid floors. Support the farrowing crates on concrete blocks as shown in Fig. 29. Liquids drain off as they did before remodeling and solids fall on the floor where you handle them as a solid when cleaning under the crates. Some producers clean once a week, but many clean only between farrowings. You may need to clean more frequently during the summer to reduce odors that occur in warm weather. It is good to have a small off-set or gutter at the alleyway so the drainage cannot run across the alleyway. Sows can step up 1 foot, but you will need a ramp or platform to get the sows in and out of the crates that are more than 1 foot above the floor.

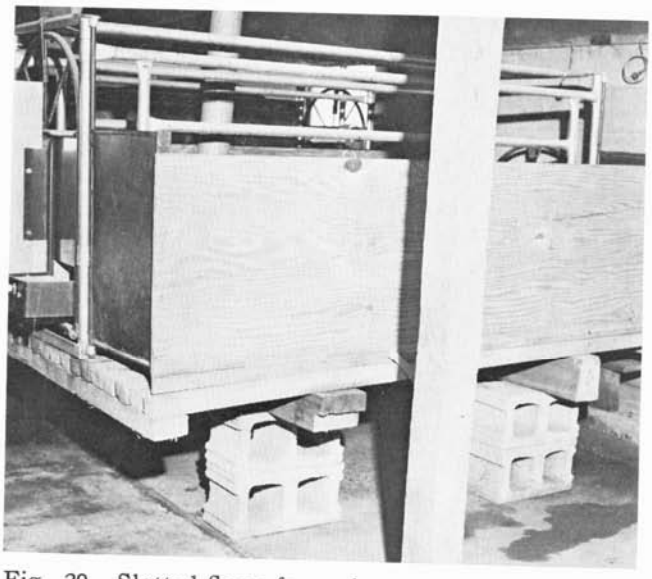


Fig. 29. Slotted-floor farrowing crates supported on concrete blocks in a converted barn.

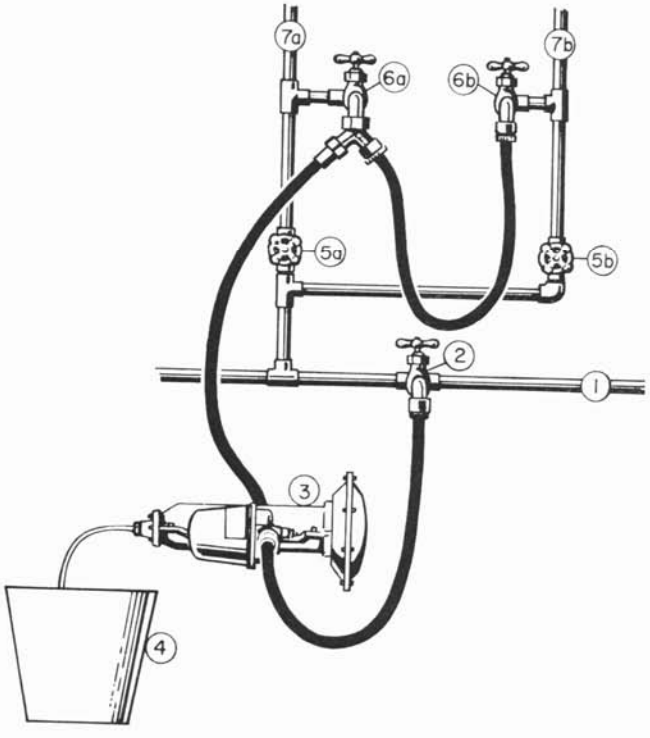


Fig. 30. The water to two rows of crates can be medicated in either row or in both at the same time with this commercial medicator. Water enters through main water line (1). When the medicating unit is not being used, faucet (2) is closed and valves (5a) and (5b) are open, so water flows through water lines (7a) and (7b) to farrowing crates on both sides of the house. To use the medicating unit (3), first close valves (5a) and (5b) and open faucets (6a) and (6b). Then open faucet (2) and water passes through the medicating unit (3) where it mixes with medication drawn from container (4). The medicated water flows from the medicating unit (3) through faucets (6a) and (6b) and through water lines (7a) and (7b) to the farrowing crates on each side of the house. To medicate only the water in line (7a), leave valve (5b) open and faucet (6b) closed. Untreated water will then flow through line (7b), while treated water flows through line (7a).

EQUIPMENT FOR FARROWING HOUSES

Farrowing Crates

Use sturdy farrowing crates, because sows will damage crates that are structurally weak or of poor design. You can buy crates commercially or build them on the farm. If the bottom rails are adjustable, you can use the crates for farrowing gilts and sows, and then remove the rails to turn the crates into nursery pens. It is handy if both the front and back gates are hinged, as shown in Fig. 13.

Feeders and Waterers

Good feeders with close adjustments that adequately restrict the flow of feed will reduce feed wastage. This is particularly true in buildings with slotted floors where the feed can fall through the slats. Good waterers with valves that do not leak reduce leakage that can add to the total amount of liquid manure. A number of leaking waterers can soon double the amount of liquid manure you must haul.

Space Heaters

Farrowing houses used year-round in Illinois should have electric, oil, or gas-fired space heaters that are controlled with a thermostat. Vent permanent oil- and gas-fired heaters to the outside.

Office and Equipment Areas

Provide a storage area for supplies. It is convenient to have a refrigerator for some cold storage. A water heater will provide hot water for cleaning the house and equipment and for washing sows. Some method of medicating the water is important. You can use the medicator shown in Fig. 30 to treat either row in the farrowing house or both rows at the same time. For instructions, see the legend to Fig. 30.

Sow Wash Facilities

A good sanitation practice is to wash each sow thoroughly before you put her in her crate. Thorough washing is most easily done if you provide a definite area for washing and have warm water.

Feed Storage and Handling

The easiest means of storing feed is to use a hopper-bottomed bulk storage bin (Fig. 9) located outside the farrowing house with an auger delivering feed to the inside. Many producers use a small feed cart when they hand-feed sows.

NURSERY BUILDINGS

The nursery unit can be a separate building or, more commonly, a part of or attached to the farrowing house. You can use the nursery unit for sows and litters or only for weaned pigs. Never group more than three sows and litters together. When you place only weaned pigs in a nursery, allow 4 square feet per pig when pigs weigh 40 to 100 pounds. Try not to put more than 25 pigs in a pen. Some of the first slotted-floor nursery pens were partially slotted and were large enough for one sow and litter, as shown in Fig. 7, or for two to three sows and litters.

The small pig probably does the poorest job of keeping his pen clean. So it is best to use a totally slotted pen for nursery. If the pen is full of pigs and the floor totally slotted, the floor will remain clean and the pigs will be clean and dry (Fig. 31).

For nursery pens, use a ¾-inch, 9-11 gage flattened expanded metal or some type of slat. For concrete or wood slats, use a 4- to 5-inch surface with a 1-inch spacing. Any pig over 2 weeks old should be able to do well on slats spaced 1 inch if they have a 4- to 5-inch surface to stand on. The 1-inch spacing insures clean floors as the pigs get older.

Use a good feeder with an exact adjustment when

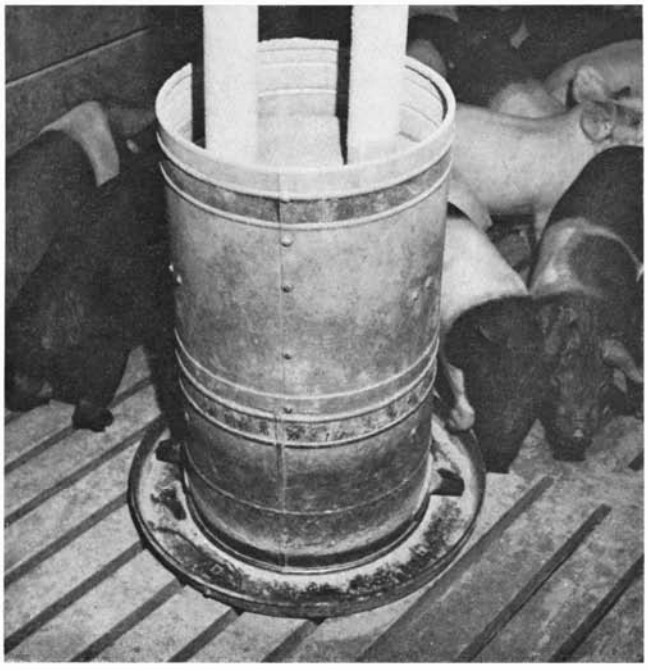


Fig. 31. Totally slotted floors work best for small pigs. Note the 4-inch concrete slat with 1-inch spacing and close feeder adjustment to reduce wastage.

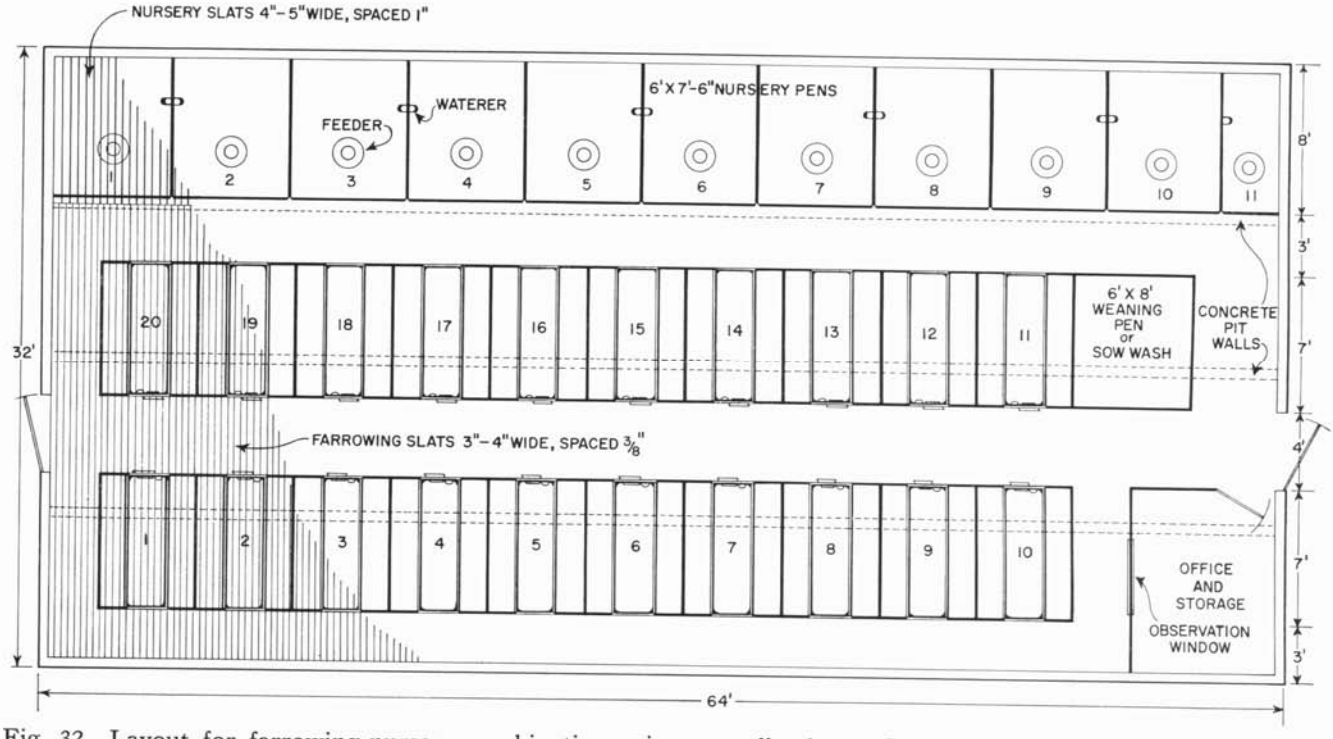


Fig. 32. Layout for farrowing-nursery combination using a totally slotted floor with the nursery on one side.

feeding on totally slotted floors. Very little feed should show in the trough (Fig. 31). A divider ring on the feed trough further reduces feed wastage.

Remember to provide adequate insulation and ventilation in the nursery building. Space heat is absolutely necessary at times in Illinois. Provide a space heater that furnishes about 200 B.t.u.'s per hour for each pig. Maintain a warmer air temperature when using totally slotted floors (about 65° to 75° F. depending on the size of the pigs) than normally maintained with solid floors. Look at the pigs, as well as the thermometer. If they pile up or have rough coats, provide more heat for them.

A nursery unit on one side of the farrowing house (Fig. 32) or attached to one end (Fig. 33) works well. A well-designed unit enables the operator to practice selective weaning from the farrowing crate, based on the weight of the pigs. As the pigs reach a certain weight (at least 15 pounds on most farms) wean them and put them in the nursery. This removes the bigger pigs from the sow, allowing the smaller pigs more milk. Weaning based on weight is a good method of evening up the size of a group of pigs. Many of the small pigs will soon catch up with the bigger pigs if they have a larger supply of their mothers' milk.

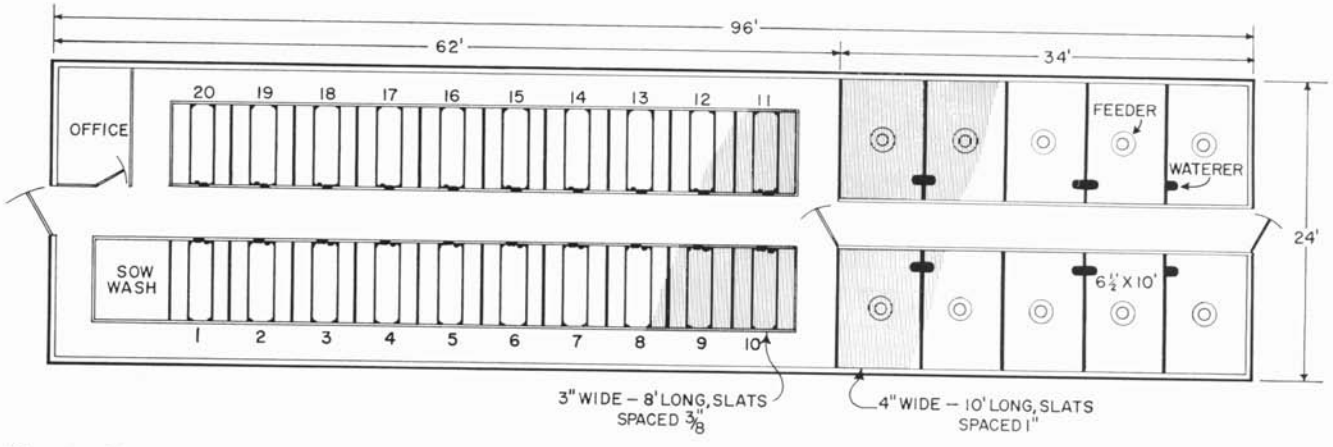


Fig. 33. Layout for farrowing-nursery combination with nursery on one end.

MANAGEMENT OF THE FARROWING HOUSE AND NURSERY

The farrowing building requires the highest level of management of all buildings used for swine production. The most important aspects of good management are those that provide for the highest possible level of sanitation. If you want to keep disease problems under control, you will need to use better management in an intensively used central farrowing house than in portable houses.

The following guidelines will contribute to good herd health and farrowing house management:

1. Make the farrowing house "off limits" to visitors. Enforce this rule particularly when the house contains new-born pigs and during winter months.

2. Keep a disinfectant foot bath at the door of the farrowing house and be sure it is used. Replenish the disinfectant frequently.

3. Try to maintain dry conditions in the farrowing house and nursery. Avoid using water for day-to-day cleaning or using sprays for cooling in the summer months.

4. Use enough supplementary heat during cool periods to keep pigs comfortable. Look at the pigs, as well as the thermometer, to see if more heat is needed. If pigs are piling up, shivering, and have rough hair coats, the building needs more heat. Supplementary heat provided by space heaters also helps keep the building dry.

5. Clean, disinfect, and fumigate the farrowing house between farrowings. Illinois Extension Circular 910, "Preventing Swine Disease Buildup," gives detailed instructions on how to do this. This circular is available at extension advisers' offices or from the Agricultural Publications Office, College of Agriculture, University of Illinois, Urbana 61801.

6. Try to schedule breeding seasons so that the farrowing house can be empty at least a week between farrowings. There tends to be a buildup of disease potential in farrowing houses that are used continuously.

7. Clean the sow before she is placed in the farrowing crate. (a) Worm two to four weeks before farrowing, using wormers suitable for bred sows. (b) Use soap and water to wash at least the feet, legs, and udder of the sow. (c) Spray her with malathion to get rid of any lice or mange she may be carrying.

8. Try to follow a schedule of baby-pig management similar to the one below:

a. **First day.** Ear notch (especially gilts in big litters), clip needle teeth, dip navel in iodine (2-percent iodine in 40- to 70-percent alcohol solution). If pigs are finished to market in confinement, dock their tails.

b. **Third day.** Give iron shots or start oral iron treatment.

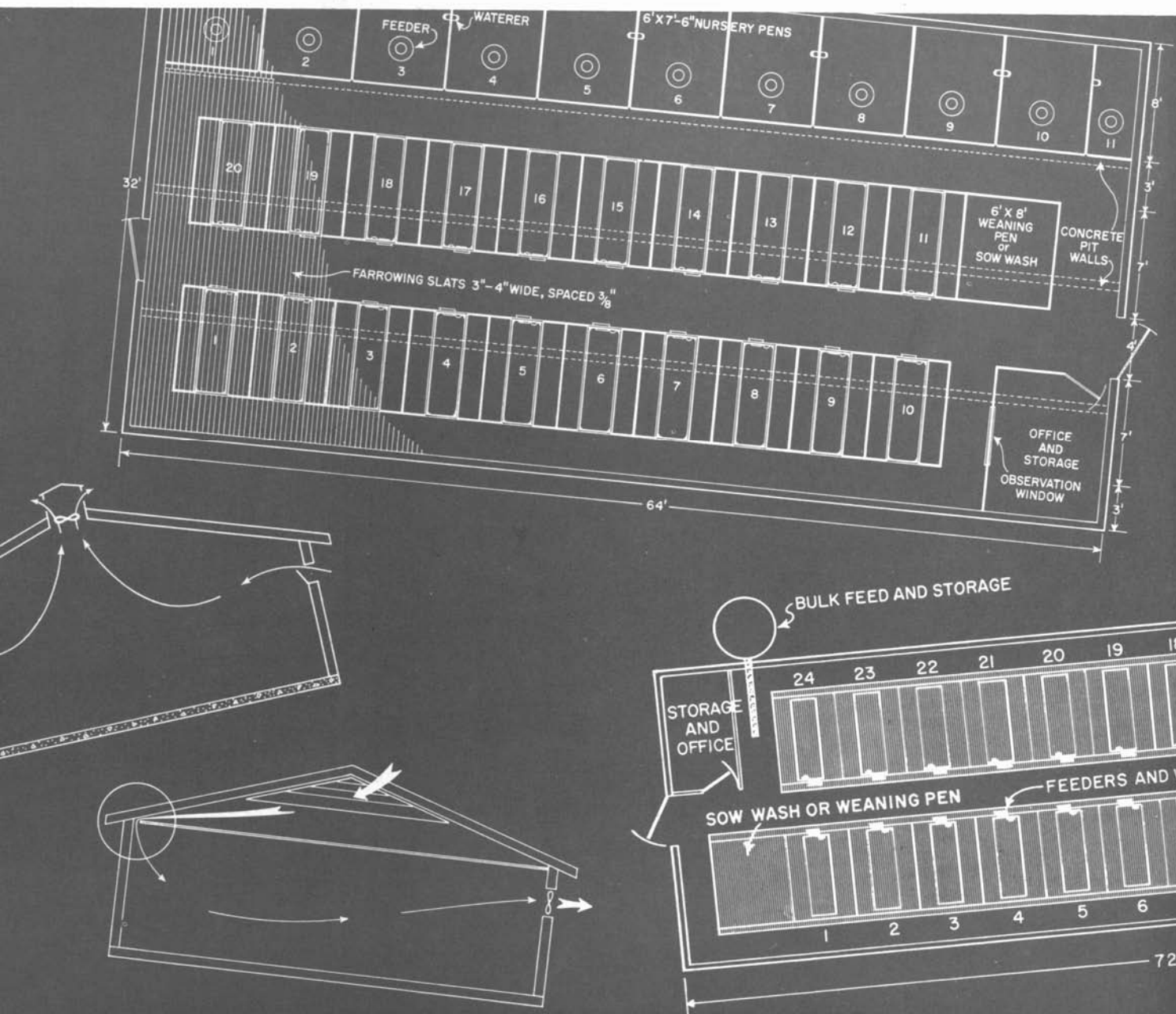
c. **One week to 10 days.** Offer creep feed. Pigs on sows with plenty of milk may not eat quite this early.

d. **Two weeks.** Castrate boar pigs. It is best to do this as early as possible.

e. **Four to eight weeks.** Weaning time depends on pig size rather than age, on how well pigs are eating, and on the kind of facilities available for weaned pigs. Pigs on most farms should weigh at least 15 pounds at weaning. Pigs weaned at 15 pounds need a warm, dry, well-ventilated and insulated house. If you have a good nursery, practice selective weaning, removing big pigs from a litter and either leaving small pigs on the sow another week or putting small pigs from two or three litters on one sow with plenty of milk.

f. Recommendations for **hog cholera vaccination** will change as progress is made in hog cholera eradication. Your veterinarian can keep you informed of changes and make recommendations.

If you want more detailed information on these management practices, you can get a copy of AS 377a, "Hog Business Management Suggestions," from your extension adviser.


FEEDER
WATERER
6'X7'-6" NURSERY PENS
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3
4
5
6
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10
11
32'
20
19
18
17
16
15
14
13
12
11
6'X 8' WEANING PEN or SOW WASH
CONCRETE PIT WALLS
8'
3'
7'
4'
7'
3'
FARROWING SLATS 3"-4" WIDE, SPACED 3/8"
1
2
3
4
5
6
7
8
9
10
OFFICE AND STORAGE
OBSERVATION WINDOW
64'
BULK FEED AND STORAGE
STORAGE AND OFFICE
24
23
22
21
20
19
SOW WASH OR WEANING PEN
FEEDERS AND
1
2
3
4
5
6
72