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EC68-773 New Features, New Ideas : Planning New Swine Buildings?

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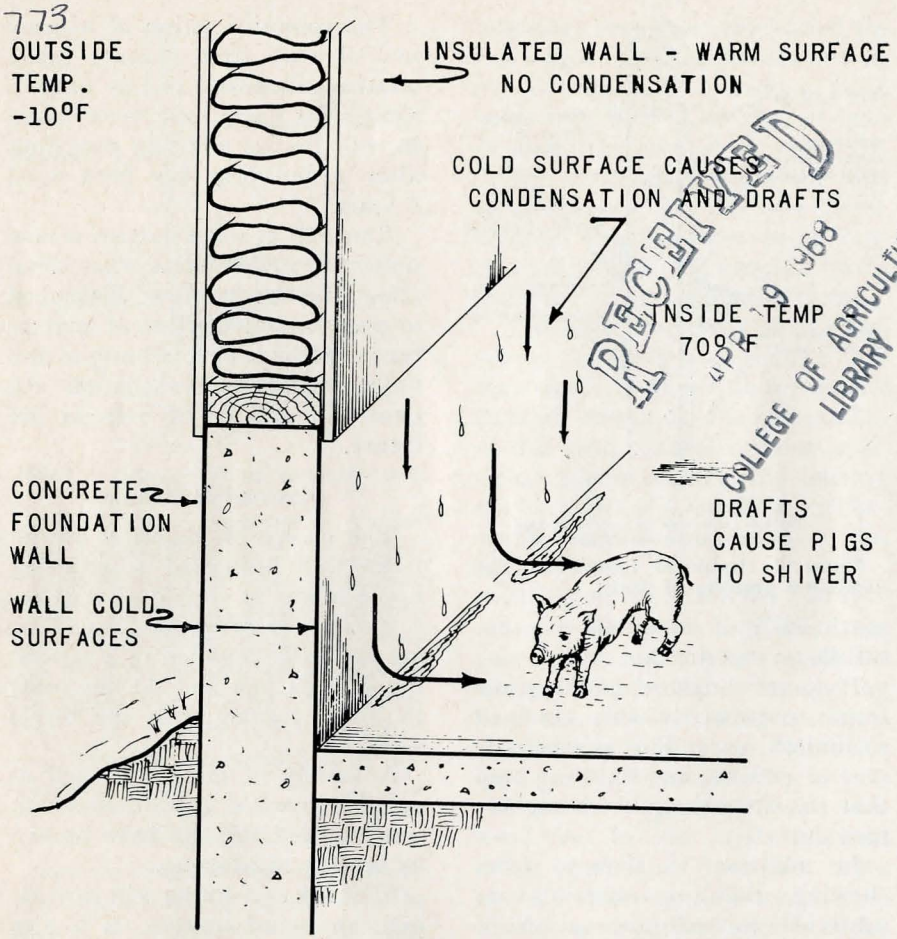

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Figure 1. Avoid cold foundation walls in a farrowing house.

New Features, New Ideas

Planning New Swine Buildings?

By E. A. Olson
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Department of Agricultural Engineering

Several important decisions need to be made before you start building a new farrowing house or remodeling other swine production facilities.

These include several items such as building construction costs, labor available, intensity of use, materials, durability and your system of management.

Other items such as expansion possibilities and problems of modernizing (keeping a new building up to date) will need your careful study and attention to help assure that your business will be productive and profitable. After the building has been completed, changes or additions are costly and often impractical.

The first and most important job is overall planning, before investing in any new facility. Not only is it vital for you to know where you are going in your farming but also you will find that an overall plan makes it easier to reach goals with fewer problems as the plan proceeds.

Your overall plan helps you to identify the management and engineering problems that will come up in your farmstead system.

Your first step should be a careful evaluation of what you now have—considered side by side with what you want to build and the resources you have available or will need to do the job.

Make a list of your decisions on the number of hogs you plan to raise or feed out annually, the number of farrowings per year and the present and future size of breeding herd planned.

Don't forget to include your feeding program, your resources in available capital, labor, feed supply, etc. Talk to your county Extension agent or a person trained in farm management.

Farrowing House

If you need a new farrowing house, let's consider the number of farrowings per year.

If you farrow only twice each year, your building usage will be minimum. Consequently you cannot justify many modern features —such as slotted floors, floor heat, supplemental heat, ventilation system, manure handling—that have the eye of many producers.

While two farrowings per year may fit your farming program, chances are that your litter size for one farrowing may be below average—much to your disappointment—probably because of inadequate facilities.

On the other hand, if you had better farrowing quarters and good management, chances are that you might increase the number of pigs raised per litter by 2, or perhaps 4.

If your labor is available for farrowing four or more times per year, perhaps you need to consider more adequate facilities. This will cost more but the cost per pig may be reduced through greater usage and improved management.

Keep in mind that good facilities alone cannot guarantee results.

Prevent Chilling

Chilled pigs are a frequent problem because of a cold farrowing area.

According to reports, 20% of baby pigs die during the first few hours or days due to chilling or crushing.

Guard rails and farrowing stalls have helped reduce losses due to crushing.

During the first few hours and up to two days of age the baby pigs are in the process of developing their body temperature mech-

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Swine Buildings

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anism that will allow them to adjust to different environmental temperatures. Unless they are kept at a temperature of between 90° and 95° F and free of drafts, they will begin to shiver.

Any drafts at temperatures below 90° will have an injurious effect on the pig and will cause chilling and shivering.

Uninsulated concrete foundation walls, single pane windows, a poorly designed ventilation system, cracks around doors, uninsulated doors and air currents from furnaces or supplemental heaters are the primary causes of drafts. An adequately insulated building (with 2½ to 3 inches of insulation in the walls and 3 to 4 inches in the ceiling) will help reduce drafts.

Cold Foundation Walls

Concrete foundation walls frequently extend 1 to 2 feet above the floor. Since concrete is a poor insulator, heat loss through the foundation wall will be very high. This causes a lower temperature near the foundation wall, thereby creating drafts. These drafts cause air currents to flow downward along the foundation wall to the floor where they move along the floor causing the baby pig to be chilled (Figure 1).

When the baby pig is close to the cold wall, his body will lose heat to the cold wall surface. If you stand near a single pane window on a real cold day, you will experience the same sensation.

If the foundation wall was insulated and warm, the problem of drafts would be eliminated (Figure 2).

Windows are also a frequent cause of drafts. This is one reason most farrowing houses are now built without windows.

Costs of Materials

Every swine producer is interested in holding building costs to a minimum. In planning a new facility it should be remembered that first costs can be misleading,

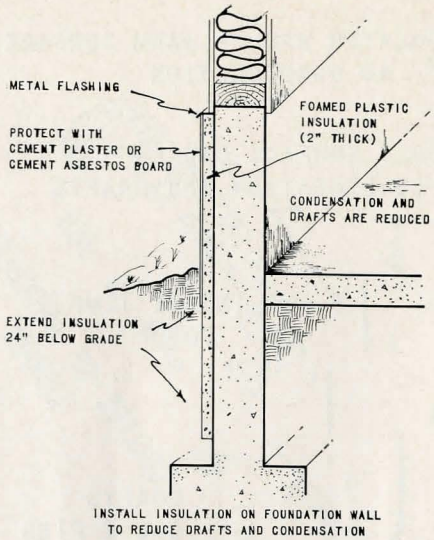


Figure 2. Insulated foundation wall eliminates problem of drafts.

particularly if materials are not satisfactory or durable.

Hogs are rough on building materials, particularly when confined to limited space. This is especially true of growing and finishing hogs that try their sharp teeth on any restraints.

In addition to damage from chewing, building materials are subjected to corrosive action of gasses from manure pits that will attack metals and, in some cases, turn white paint black.

There is considerable evidence that these metal interior linings, in many cases at the best, are short-lived (Figure 3).

The corrosive action of manure and of acids from manure fumes attacks galvanized metals and in some cases holes have been found in wall linings and pen partitions after a building has been used 4 years.

Research at some stations is now underway to determine what metal alloys can be used or developed to resist corrosive action of manure fumes. Perhaps new techniques and improvements in ventilation systems will also be of help in the future.

Plywood Is Strong

The choice of materials for interior wall linings of a farrowing house is not as critical as it is for a nursery or finishing unit. Sows are normally confined in a farrowing stall or pen and do not come in direct contact with the inside wall.

A variety of materials, such as exterior plywood, galvanized metal, concrete and shiplap, have proven to be very satisfactory.

Plywood as a lining will provide excellent wind bracing. It is also a good choice for ceilings because it has excellent structural strength that improves the rigidity of the structure. In choosing plywood, exterior grade "C-C," the least costly, will be very satisfactory. For finishing the plywood, a white stain

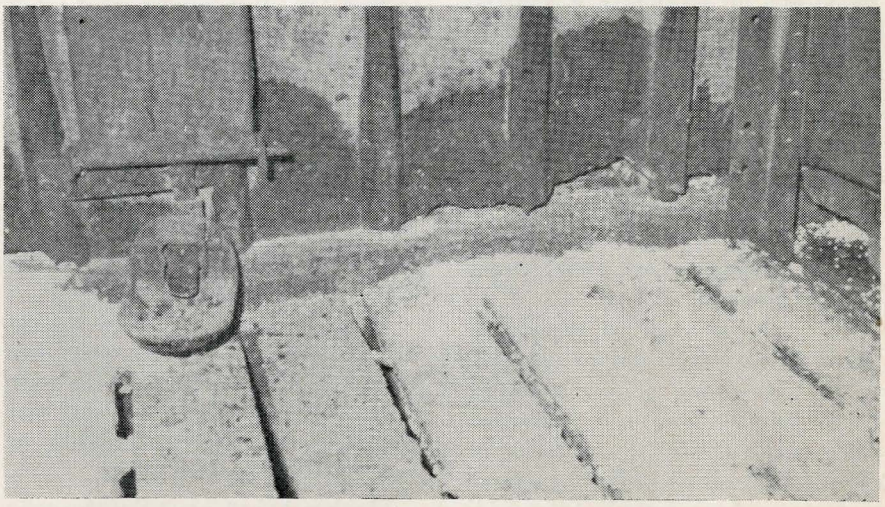


Figure 3. Interior galvanized metal wall lining of a controlled environment swine finishing building after 4 years of use. Note damage to wall lining and metal pen partitions, due to contact with manure and to fumes from manure gases. White material is foamed plastic insulation which rodents have damaged and worked loose from inside walls.

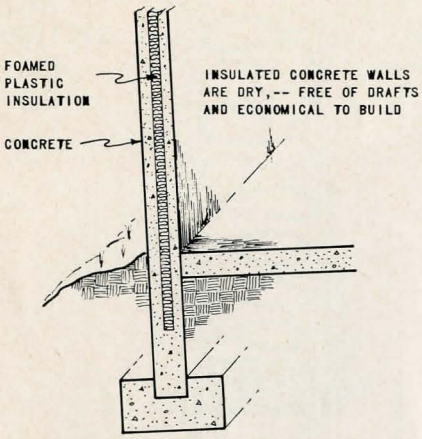


Figure 4. Concrete tilt-up sandwich wall.

—two coats—is preferred rather than a conventional oil base paint.

Varieties of light colored composition boards with attached vapor barrier are also available. They can be used on the ceiling and on the upper part of the walls. However, they do not have the structural strength or durability of plywood.

Tilt-Up Concrete

For growing and finishing buildings, the durability of the interior lining is of primary importance. It should be "pig-proof."

There are two types of wall construction, with desired insulating qualities, that will meet this challenge. These are concrete tilt-up sandwich walls or a concrete block cavity wall (Figure 4).

The tilt-up wall has been tried and proven; it is being accepted by more swine producers as their choice. It is durable, requiring little or no maintenance. It is resistant to damage from the sharp teeth of the hog and it is reasonable or competitive in cost with conventional types of construction.

Concrete is also fireproof and provides excellent positive protection of insulation from rodents. When available, mice and rats prefer an insulated wall nest with plenty of feed, water and warmth such as is found in a swine building. These inviting features, however, are denied in concrete tilt-up sandwich wall panels.

Walls Improved

Since concrete tilt-up swine buildings were first constructed six years ago, many improvements in the construction technique have been developed. This type of construction, because of its many desirable characteristics and low cost, is being used for the new swine research complex now being constructed at the University Northeast Station at Concord, Nebraska.

If you are interested in concrete tilt-up construction, chances are that someone within a reasonable distance from you has a building of this type. Several of your questions can be answered by looking over an existing building and becoming acquainted with this new technique.

Additional information and construction plans are available from your county extension agent or from the Agricultural Engineering Extension Office, College of Agriculture, University of Nebraska, Lincoln, Nebraska, 68503.

Concrete block cavity walls with insulation in the cavity are not being used since they are more costly. When two inches of insulation is used in the space between concrete blocks, they will provide an excellent insulating quality.

Ventilation—A Must

Much progress in providing satisfactory ventilation systems for swine housing is being made. More is needed and expected in the future. Adequate ventilation is an essential for success with controlled environmental swine production.

Don't neglect to include it in your plan with exact details and dimensions of air inlet openings, fan sizes and locations, and other features. This will save both time and money, which for most of us are limited. While a ventilation system may cost more for installation than you may anticipate, it is a must to insure dry, warm, comfortable conditions for swine production.

Plans for Construction

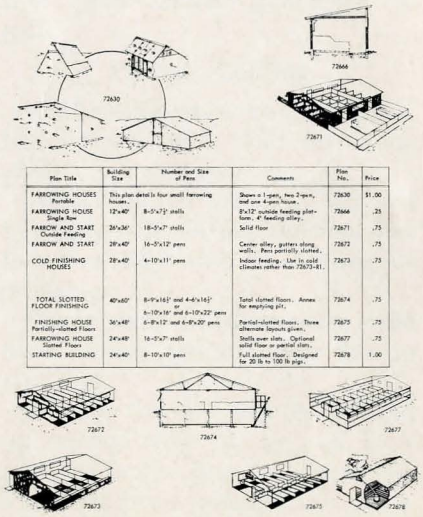
We have tried in this short article to point up just a few of the many details and considerations involved in planning modern swine housing. While you will want to develop plans to fit your particular management system, you may be interested in a series of new swine housing plans recently released by the Agricultural Engineering Extension Office (Figure 5).

These plans include building layouts, construction details and insulation and ventilation recommendations. Such recent developments as totally slotted floors for the farrowing house and liquid manure storage systems are included in the revised plan series.

These plans are prepared by the Midwest Plan Service made up of Extension and Research Agricultural Engineers from the thirteen north central state land grant universities. Through this service, research findings and field experiences are applied to swine building plans such as those described and illustrated.

The competency and talent available for the development of such plans is not available in any other part of the country. Your inspection and use of these plans may help you develop a more efficient, less expensive and more successful swine enterprise.

You may see the plans at your county extension office, at many lumber dealers, or you may write directly to the Agricultural Engineering Extension Office, College of Agriculture, University of Nebraska, Lincoln, 68503.



Plan Title	Building Size	Number and Size of Pens	Comments	Plan No.	Price
FARROWING HOUSES Portable	This plan detail in four small farrowing houses.		Shown a 1-pen, two 2-pen, and one 4-pen house.	72630	$1.00
FARROWING HOUSE Single Row	12'x40'	8-5'x7½' stalls	8'x12' outside feeding platform. 4' feeding alley.	72666	.25
FARROW AND START Outside Feeding	26'x36'	18-5'x7' stalls	Solid floor	72671	.75
FARROW AND START	28'x40'	16-5'x12' pens	Center alley, gutters along walls. Pens partially slotted.	72672	.75
COLD FINISHING HOUSES	28'x40'	4-10'x11' pens	Indoor feeding. Use in cold climates rather than 72673-81.	72673	.75
TOTAL SLOTTED FLOOR FINISHING	40'x80'	8-9'x16½' and 4-6'x16½' or 6-10'x16' and 6-10'x22' pens	Total slotted floors. Annex for emptying pit.	72674	.75
FINISHING HOUSE Partially-slotted Floors	36'x48'	6-8'x12' and 6-8'x20' pens	Partial-slotted floors. Three alternate layouts given.	72675	.75
FARROWING HOUSE Slotted Floors	24'x48'	16-5'x7' stalls	Stalls over slats. Optional solid floor or partial slats.	72677	.75
STARTING BUILDING	24'x40'	8-10'x10' pens	Full slotted floor. Designed for 20 lb to 100 lb pigs.	72678	1.00

Figure 5. Plans are available.