Swine Confinement Growing-Finishing Units

Michigan State University
Cooperative Extension Service

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pork industry handbook

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

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Pork production systems have changed significantly in recent years, reflecting the evolution in agriculture. Advances in swine housing systems certainly parallel other advances in agribiologics. Pasture and drylot production is still an important part of many systems. However, as expansion takes place, confinement production will become a necessity for many.

For purposes of common understanding the growing period is generally understood to begin at 40 lb. and conclude at 120 lb. The finishing period includes that phase of the life cycle from 121 to 220 lb. or market weight.

Building Type

There are numerous types or styles of growing-finishing (G-F) confinement buildings. However, they usually can be identified as one of three general types: (1) totally enclosed or environmentally controlled, (2) modified open front, and (3) open front-outside apron. Examples of the three types are shown in Figures 1 through 6. The environmentally controlled (EC) building is usually conceded to be the most expensive G-F building. Perhaps its greatest advantage over the other two types lies in its ability to give more positive and automatic control over the components of the environment that may restrict performance of pigs. Because temperature and humidity may be more controllable in the EC building, smaller or younger pigs are often started in it. The EC style building prevents fly and bird problems as well. Odor level within the EC building during any given time of the year may be as high or higher than in the other two types of G-F buildings.

Figure 1 shows a floor plan of an EC building with a 100% slotted floor and a center aisle. Studies have shown that partial slats, at least during the winter in the Midwest, resulted in better feed efficiency than total slats. However, in EC buildings with a center alley it is often difficult to control those components of the environment that influence dunging patterns. Therefore, even though construction costs increase with increased slotted area, some producers provide a totally slotted floor in this type of building because no scraping of pens is required, and more waste storage is easily acquired. The current practice of using wider slats (e.g., 8″) may reduce or eliminate the effect of amount of slotted area on performance. This may further enhance the use of totally slotted floors in EC buildings. Assuming a partially slotted floor, the following list provides construction-management guidelines that may be important in controlling dunging patterns in any partially slotted floor building.

Pen-training Pigs on Partly Slotted Floors

Planning and Management Guide

1. Use a solid pen partition over the solid floor area.
2. Provide a mesh pen partition over the slotted area.
3. Place feeder in sleeping area.
   Use pen-line feeder as part of the pen partition at the back of the pen.
   Place round feeder near the middle of the solid floor area.
4. Locate waterer over the slotted area.
5. Use zonal or floor heating in sleeping area during cold temperatures when pigs are small.
6. Provide a 1-2-in. step-down from solid area to slats.
7. Prevent drafts from moving from ceiling to floor in sleeping area.
8. Wet slotted area immediately before putting pigs in pen.
9. Feed on floor in sleeping area for the first few days.
10. Provide the correct amount of area per pig.
11. Try switching to a different pen, if available, and start over if above procedures do not work.
12. In cold regions during winter, provide adjustable or removable hovers over the sleeping area.

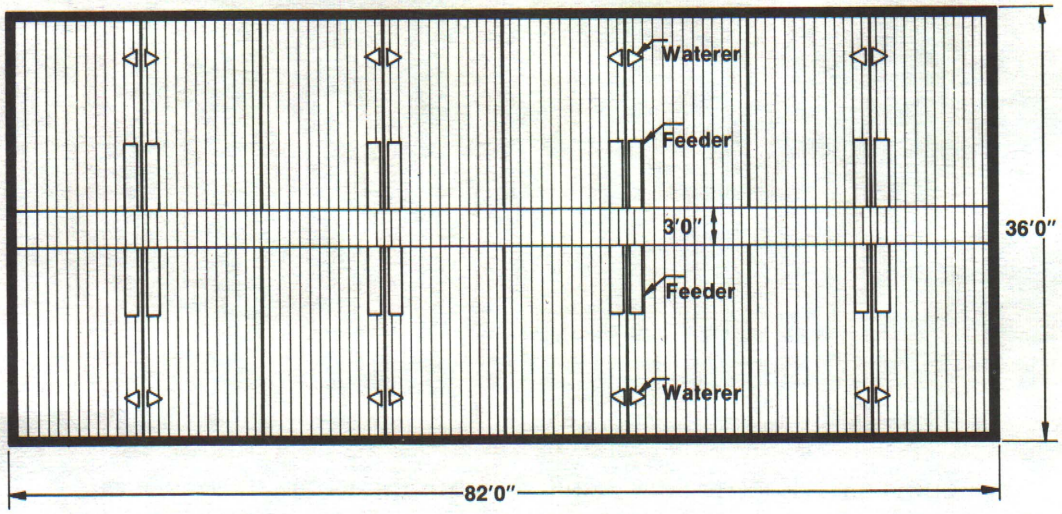

Figure 1. Totally slotted environmentally controlled building with center alley. An offset alley with small grower pens on one side of the alley may result in greater total economy of space utilization.

Items 1 through 6 must receive attention before construction begins. Items 6 through 12 are ongoing management details.

It is often observed that in pens with a center slotted area and equal or nearly equal areas of solid floor in pens on both sides, dunging patterns are very difficult to control. Thus, this style of floor arrangement generally results in messy pens. At about 100 lb. pigs require 4 sq.ft. each, while at market weight they require about 9 sq.ft. Therefore pigs at 40 lb. that are placed in pens with adequate area to accommodate them to market weight are not utilizing pen space efficiently until they reach about 100-120 lb. Then too, dunging patterns are best controlled at the optimal stocking rates.

A greater economy of space utilization can be achieved by having two different sized pens. This is especially true of the EC and modified open front (MOF) style confinement buildings. In practice many producers provide pens 6 ft. wide for the growing phase and 10 ft. wide for finishing.

Figure 2 shows an EC building with an alley along one side and the pens in a continuous row. This arrangement is less common but appears to work equally well under proper management. Often pen-line feeders are used because they replace part of the cost of pen dividers for that section.

Ventilation is to the EC building what a motor is to an automobile—it runs it. Therefore, a ventilation system that is designed for the building and the pigs that are in it and is managed and serviced properly is pivotal to the success of the building.

The MOF building is generally of the two styles shown in Figures 3 and 4. The gable style roofed MOF is generally considered slightly more expensive to build than the single slope roof MOF. There is no research evidence to date to indicate a difference in pig performance between the two styles of roofs with the same floor plan. However, observations indicate that the single slope MOF is warmer in the winter than the gable style MOF. Studies have shown that on a year-round basis in the Midwest you can expect the same gain and feed efficiency in the MOF as in the EC building. Some producers do provide zone heat in the MOF for pigs during the early growing period. This, however,

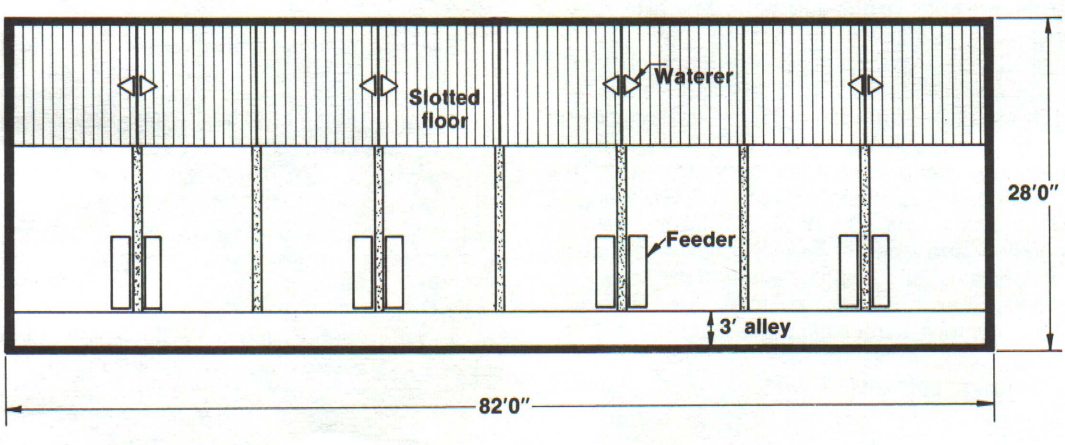

Figure 2. Environmentally controlled building with single row of pens.

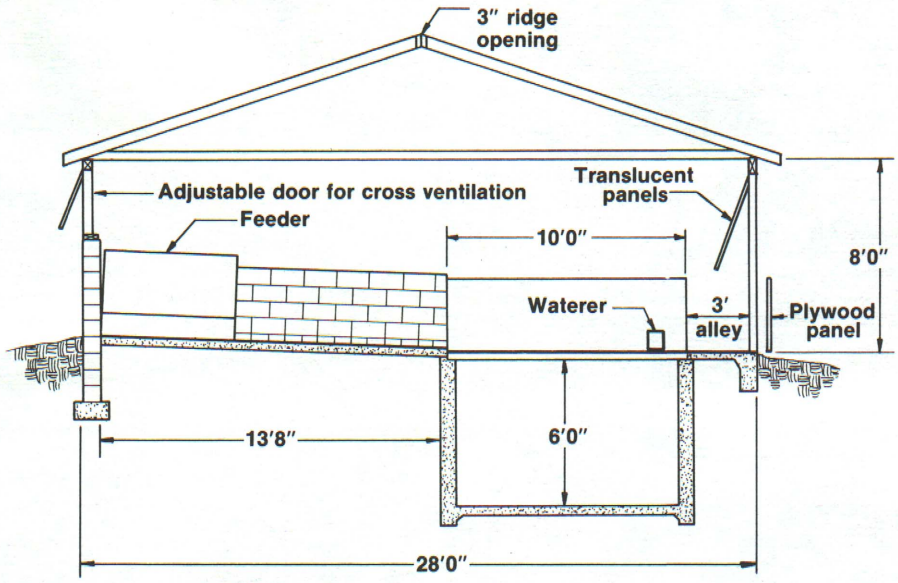

Figure 3. Modified open front, gable style roof. No insulation is indicated in any of the drawings. Insulation is recommended in most G-F buildings in most areas of the country. To determine the correct amount of insulation for your climate consult your County Extension Agent or Extension Agricultural Engineers.

represents no disadvantage compared to the EC building which also usually has supplemental heat for pigs of a comparable age during winter.

Generally, construction costs of the MOF range from 25 to 35% less than an EC building of the same pig capacity. The MOF is so named because one side, generally the south, may be completely opened during the summer or completely closed during the winter. Both types of MOF may be gravity-ventilated quite satisfactorily. That is, they do not require mechanical ventilation. In more temperate regions of the country such as the South, both sides of the building may be equally modifiable. Then, too, the direction of prevailing winds is important in deciding which direction to face the MOF since it is a naturally ventilated building.

The gable style roofed MOF may have the alley along the front or the rear of the pens. The advantages and disadvantages of one placement of the alley over the other tend to balance out. However, the primary advantage of the alley at the back of the pen, or along the sleeping area in colder regions, is that it acts as a buffer in keeping the pigs from the outside wall. It also puts the manager closer to the feeders and the pigs. An important advantage to placing the alley along the front of the slotted area is to make it more convenient for the manager to adjust the modifiable front of the building for ventilation.

It is generally recommended that it should be possible to open one-fourth to one-third of the back wall for summer ventilation. The modifiable open front may be handled a number of ways on the gable style building. Often producers use removable insulated plywood panels on the bottom and a curtain, translucent fiberglass panels, or acrylite panels or insulated doors on the top half. The curtain rolls up. The fiberglass or acrylite panels, framed with wood and hinged at the top, swing up or down to open or close. The curtain, while less expensive initially, lets in little direct light and therefore provides little solar heating during winter. The fabric curtains also are less durable.

The translucent panels allow some solar heating, are more durable, and provide more flexibility in winter ventilation but are more expensive than the curtains, initially. The clear acrylite panels allow maximum solar heating but are more expensive than the fiberglass panels.

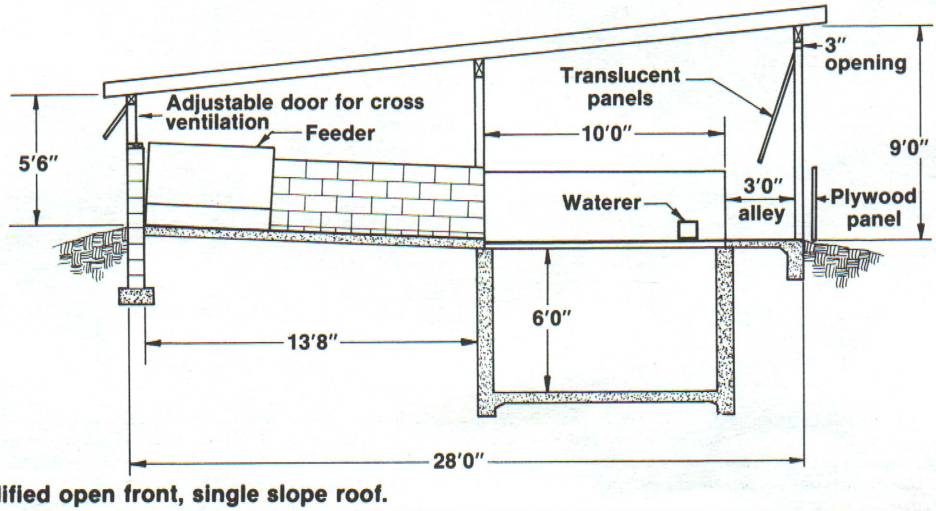

Figure 4. Modified open front, single slope roof.

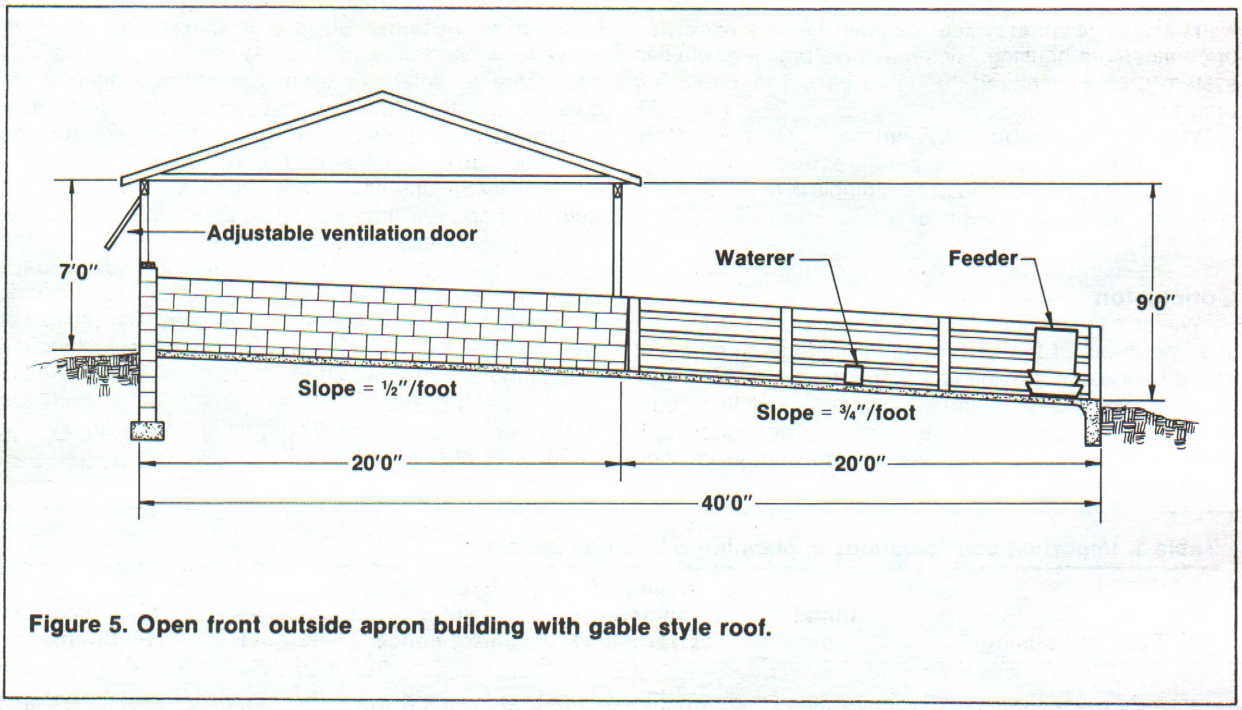

Figure 5. Open front outside apron building with gable style roof.

A capped ridge opening that allows 1 in. for every 10 ft. of building width is recommended. For example, a building 30 ft. wide would have a continuous ridge opening of 3 in. Both styles of MOF buildings should be fully insulated except for the modifiable open side.

The single slope MOF (Fig. 4) has the alley on the high side of the building or along the front of the slotted area in the Midwest where winter is the most production-limiting period of the year. In the South or Southwest where summer is the most production-limiting period of the year this arrangement can be reversed. The low ceiling, generally 5-6 ft. high over the sleeping area, provides for greater warmth in this area during cold weather.

The same arrangement for opening and closing the modifiable open side applies to the single slope MOF or the gable style. However, if a curtain is used it must be fastened tight at the top and lowered to close. In this manner the cold air is brought into the building nearer the floor and is allowed to warm more gradually. The air outlet in this style building is provided through a 3-4 in. opening directly below the ceiling on the high side. The opening should be continuous. A simple sliding plywood cover or baffle system should be installed to regulate the amount of air flow out of the outlet, depending on outside weather conditions or size and condition of the pigs in the pens.

The open front-outside apron building (Figs. 5 and 6) may cost slightly less to construct than the MOF building. It is generally conceded that while this style building functions satisfactorily for finishing pigs, growing phase pigs may not perform as well, particularly during winter. Perhaps the decisions resulting in this style building are more a function of how one wants to handle the manure than any other alternative. This may be the case since waste from the open front-outside apron building is handled and managed as a solid or semi-solid, and with the EC and MOF buildings it is handled as a liquid.

Winter maintenance requirements for pigs may be greater in some outside apron systems than in the EC or MOF buildings. Still, producers who use and manage bedding wisely during cold weather in the outside apron system are generally rewarded with quite satisfactory performance. A greater labor requirement is associated

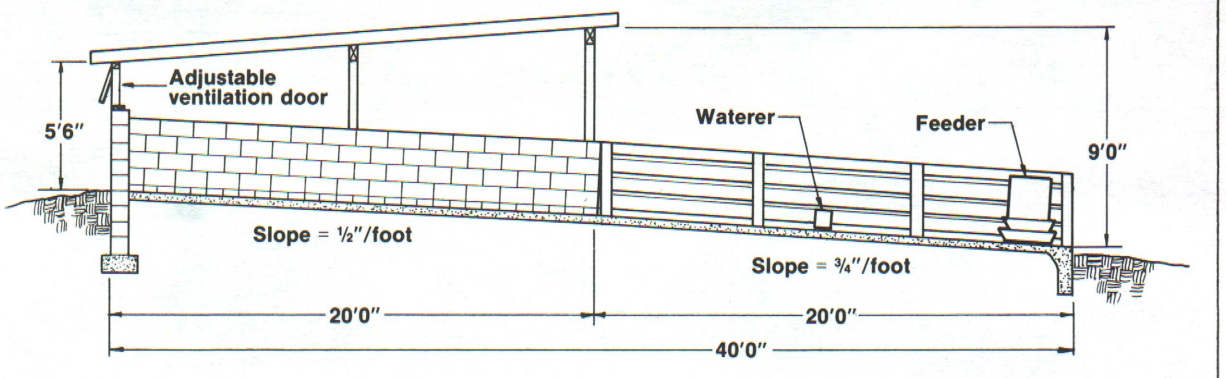

Figure 6. Open front outside apron building with single slope roof.

with the outside apron system than with the other two styles of confinement housing. Flies may be a problem with this system unless managed through a baiting and spraying program.

While the outside apron system may not be acceptable to many where cold winter temperatures are a problem, the outside apron system is quite acceptable in regions where winter temperatures are milder.

Conclusion

Winter is the most production-limiting period of the year in some areas of the United States, summer in others. It would be ideal to provide G-F pigs a building where they could perform as well on the worst day of the winter as they could on the best day of the summer. The "ideal" G-F building is one that provides an optimal production opportunity in terms of growth and feed utilization. However, when the ideal is economically impractical, it is necessary to determine what compromise alternatives give the greatest return for investment. Most swine G-F systems reflect a compromise among (1) pig performance, (2) labor management, and (3) economics.

The illustrations shown are intended as a guide. The authors recognize that regionally, depending on climate, variations of these plans may be better suited. For the producer planning confinement construction, several days spent on the road looking at facilities and asking questions of their operators is indeed time well spent. Regardless of type of G-F system used, the level of success is a function of management. Table 1 attempts in a general way to relate initial cost, expected summer performance, expected winter performance, operating cost and labor among the three types of G-F housing.

Table 1. Important considerations in planning a finishing building.

	Type of housing	Initial cost	Expected summer performance	Expected winter performance	Operating cost	Labor requirement
1	Environmentally controlled*	Greater than 2 or 3	About equal to 2 or 3	About equal to 2 and somewhat better than 3	Greater than 2 or 3	About equal to 2 but less than 3
2	Modified open front*	Less than 1 and about equal to 3	About equal to 1 or 3	About equal to 1 and better than 3	Less than 1 and same as 3	About equal to 1 but less than 3
3	Open front-outside apron	Less than 1 or 2	About equal to 1 or 2	Less than 1 or 2	Less than 1 and same as 2	Greater than 1 or 2

*Assuming equal slotted area within each system.

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