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Michigan State University

Cooperative Extension Service

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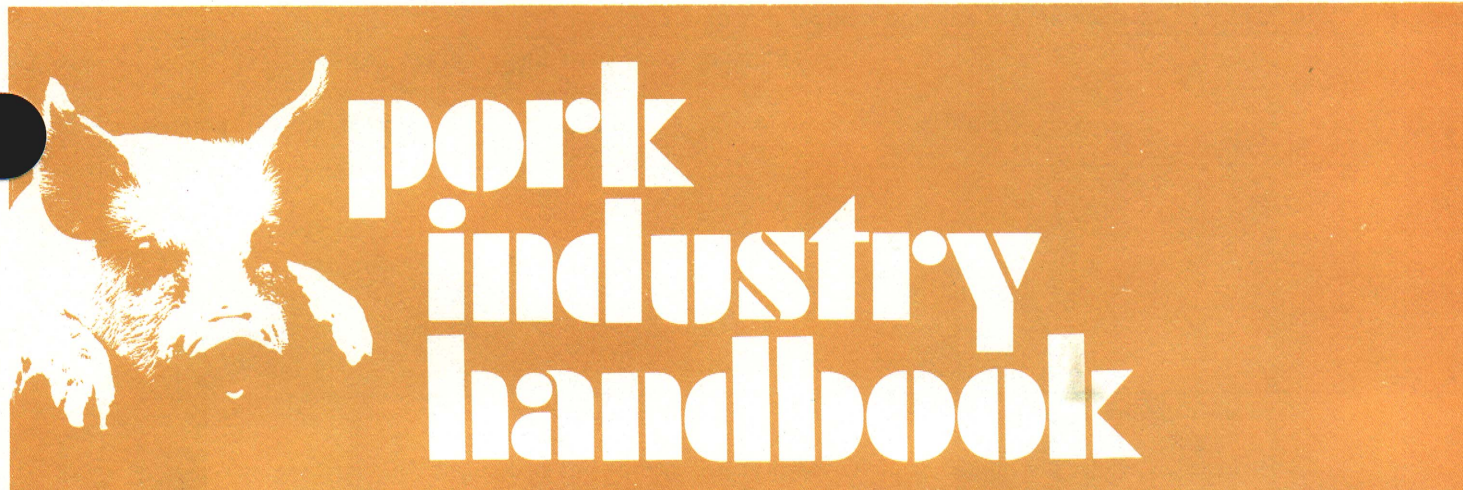
Ken VanGilst, Oskaloosa, Iowa

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COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

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A major concern in a swine production system is proper management of the pregnant sow. In the past, sows usually have been sheltered in open-front buildings, barns or portable houses on pasture or dry lot. Only a relatively small percentage of breeding herds have been continuously confined.

Recently, however, high land values, environmental problems, and efficiency in handling and managing the breeding herd have stimulated considerable interest in confining the breeding herd. Producers who are farrowing large numbers of sows are attempting to solve some of these problems by turning to a confinement system of housing. The type of housing and management system that is best for this phase of swine production, however, depends on each manager's skill and ability and on financial considerations.

Some advantages of confinement sow housing are: (1) better control of mud, dust and manure, (2) reduced labor for feeding, breeding and moving to farrowing house, (3) improved control of internal and external parasites, (4) smaller land requirements, (5) better supervision of herd at breeding time, (6) use of existing buildings, (7) improved operator comfort and convenience, (8) opportunities for better all-around management.

Some disadvantages of confinement sow housing are: (1) higher initial investment, (2) possible delayed sexual maturity and breeding age, lower conception rates in gilts and lower rebreeding efficiency in sows, (3) requirement of better management and daily attention to details, and (4) increase in feet and leg problems.

The major disadvantage to confined sow housing is the higher initial capital investment in buildings and equipment. Material, labor and equipment costs can vary tremendously, depending on locality and building design. Because of the initial capital investment, many producers prefer to remodel existing out-of-date farm structures for

sow confinement rather than build new ones. In either case, the basic principles of design must be followed. Some old buildings, however, are totally unsuitable for renovation.

Investment for a new facility can run between \$75 and \$200 per sow, or even up to \$300 or higher for the more sophisticated systems. Assuming an annual cost of 15%, gestation building costs can easily add \$1 per pig for total production costs. Therefore, any confined sow housing system, to be economically feasible, must either provide production cost savings and efficiencies (feed, bedding, labor, etc.), result in improved reproductive efficiency (higher conception rates, larger litters, etc.), or make total management of a large number of sows easier.

Design and construction of confinement housing for gestating sows and boars *must* be very precise and detailed if they are to be successful. The facility must provide (1) a suitable environment for the animal, (2) minimal requirements for routine labor, and (3) a comfortable environment and convenient arrangements for the herdsman. Table 1 provides recommended space requirements.

Suggested Housing Systems

Confinement sow gestation and boar housing units in use today can be divided into several definite patterns, with possible variations in feeding methods, breeding methods, and number grouped together.

System 1 Solid concrete floor with individual free stalls. This very simple but very effective structure (Fig. 1) is usually used by small producers. It is convenient in that sows are individually fed in stalls. The transfer to boars in breeding pens requires only one man. With the boars adjacent to the sow pens, sows in heat can be easily detected. Hand-mating is practiced.

Table 1. Floor space per animal unit and number of animals per pen.*

Animal unit	Weight lb.	Minimum space per animal unit (sq. ft.)			No. animals per pen
		Solid floor	Partially slotted floor	Totally slotted floor	
Boars	-----	70	50	50	1-2
Breeding females					
Gilt	250-300	15	15	15	6-12
Sow	300-500	18	18	18	6-12
Gestating females†					
Gilt	250-300	17	14	14	6-12
Sow	300-500	18	15	15	6-12

*Recommendations based on research results and management observations of intensive swine-rearing programs.

†Individual stalls should be about 22 in. wide and 6 ft. long for gilts and 24 in. wide and 7 ft. long for sows. Tethered animals require essentially the same amount of space.

System 2 Open-front shed with an outside run. This popular unit (Fig. 2) is offered by some commercial firms; often an existing building is utilized rather than constructing a new one. Bedding is used inside the building in cold weather, and the exercise area must be scraped frequently. Manure may be handled as a solid with conventional equipment, but a gutter must be used to intercept any liquid runoff. The liquid runoff from rainfall contributes considerably to the waste load. About 8-10 sq. ft. of housing area is allowed per sow, plus an equal or larger concrete exercise area outside. Up to 15-20 sows can be grouped together. Slope the floor inside the building $\frac{1}{2}$ in./ft.; the concrete exercise area, $\frac{1}{2}$ - $\frac{3}{4}$ in./ft.

Pen-breeding may be used in this arrangement. If hand-mating is desired, Figure 2 shows the location of boar pens between the sow pens, to aid in determining when the sows are in heat.

Feeding can be handled several ways: (1) floor-feeding under the roofed area to help keep the upper portion of the floor clean; (2) feeding stalls, as indicated in Figure 2, or (3) locating a self-feeder so any group of sows can have access every third day.

System 3 Open-front, partially slotted-floor building (Fig. 3). Allow about 15 sq. ft. per sow, grouping 10-15 sows per pen. Approximately one-third of the floor is slotted, with the solid portion sloping about $\frac{1}{2}$ in./ft. into the pit under the slotted area.

Floor feeding can be done by hand and cart, using a limit feeder or providing individual feeding stalls (Fig. 3). Since the 12 feeding stalls reach across 3 pens, various groups of sows would be turned into the same feeding stalls at different times of the day. Another alternative is the use of a self-feeder for every third day, or twice a week feeding (Fig. 3, pens 1, 2, and 3).

The boars can be held in pens 4 ft. wide at the end of the building, or in pens scattered between the pens of sows to be bred. Since only 15 sq. ft. per sow is allowed, hand-breeding is recommended. The concrete slab outside the building is optional; but where gilts are housed or where breeding problems have occurred inside, breeding on this paved outdoor surface may improve the situation.

This building is designed for natural ventilation. It should be faced to the south or east, for minimum winter exposure. Provide continuous doors, windows, or plastic curtains equal to one-third of the wall area along the back (north or west) wall for increased air movement during hot weather. A small continuous opening (2-3 in.) at the ridge also helps insure roof space ventilation. Placing division walls at intervals equal to twice the building width reduces

longitudinal drafts during cold, windy weather. These walls should be removable or constructed so they can be opened to allow maximal air movement during hot weather. A majority of the open-front may be covered with plastic or with doors during cold, windy weather, making sure to leave some opening at the top for adequate, natural ventilation.

System 4 Totally enclosed partially slotted-floor building with a separate breeding area. Most of these buildings (Fig. 4) have side doors that open up for natural ventilation during hot weather. Fans, foggers, evaporative coolers or air-conditioning should be used in the separate breeding room during the warm seasons.

The building is fully insulated. Fan ventilation must be provided in the winter when the side doors are closed.

Sows are brought into the breeding room after the pigs are weaned. This area can have either feeding stalls with sows grouped together or individual confinement stalls. Hand-breeding is normally used. The group arrangement with boar pens adjacent makes the job of detecting heat easier. The boar pens in this system will require hand-cleaning.

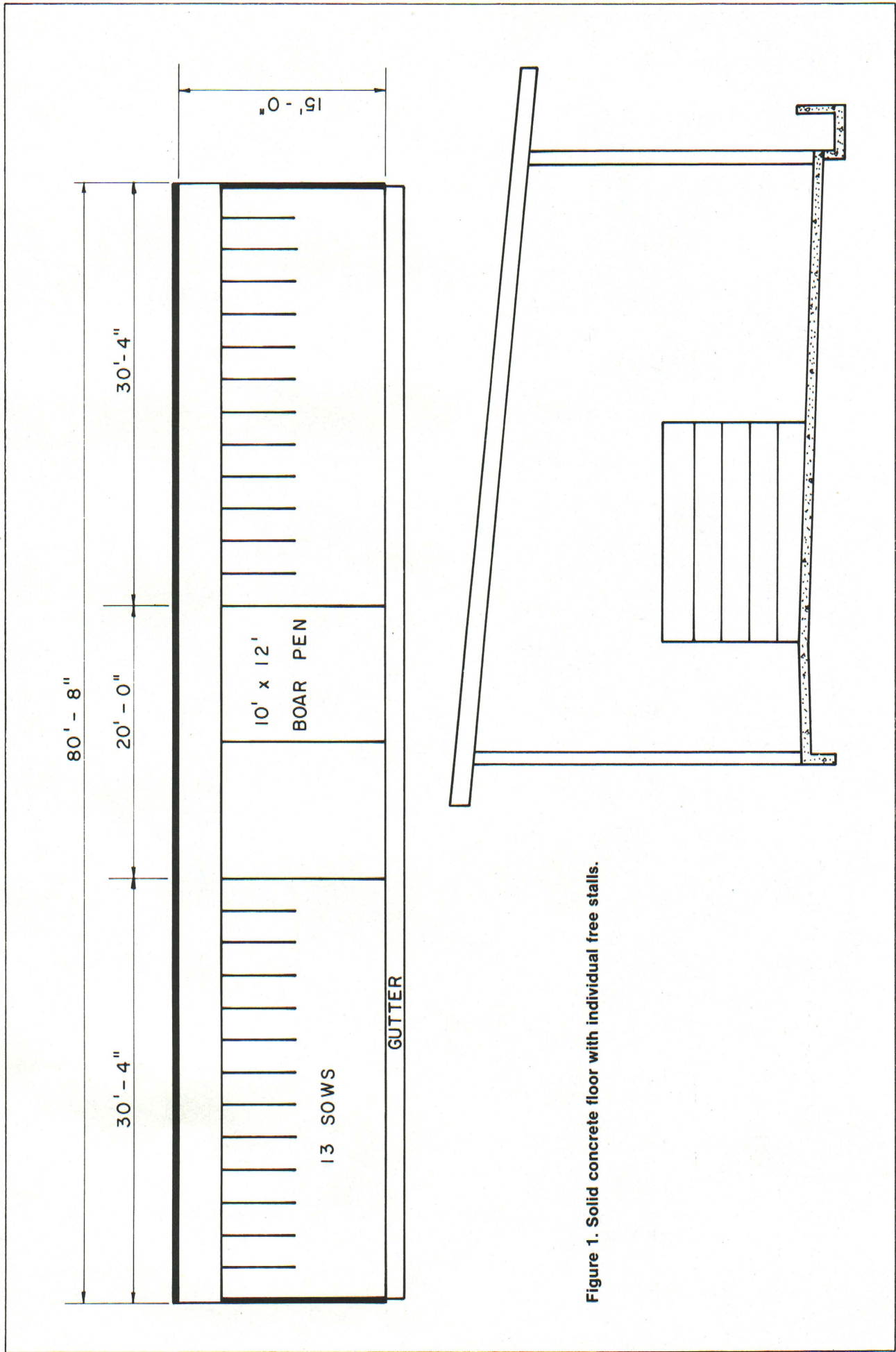
After breeding, sows are moved to the partially slotted-floor gestation pens. Feeding may be done on the floor or in a trough, by hand or with a mechanical feeder. A common feed and water trough may also be used.

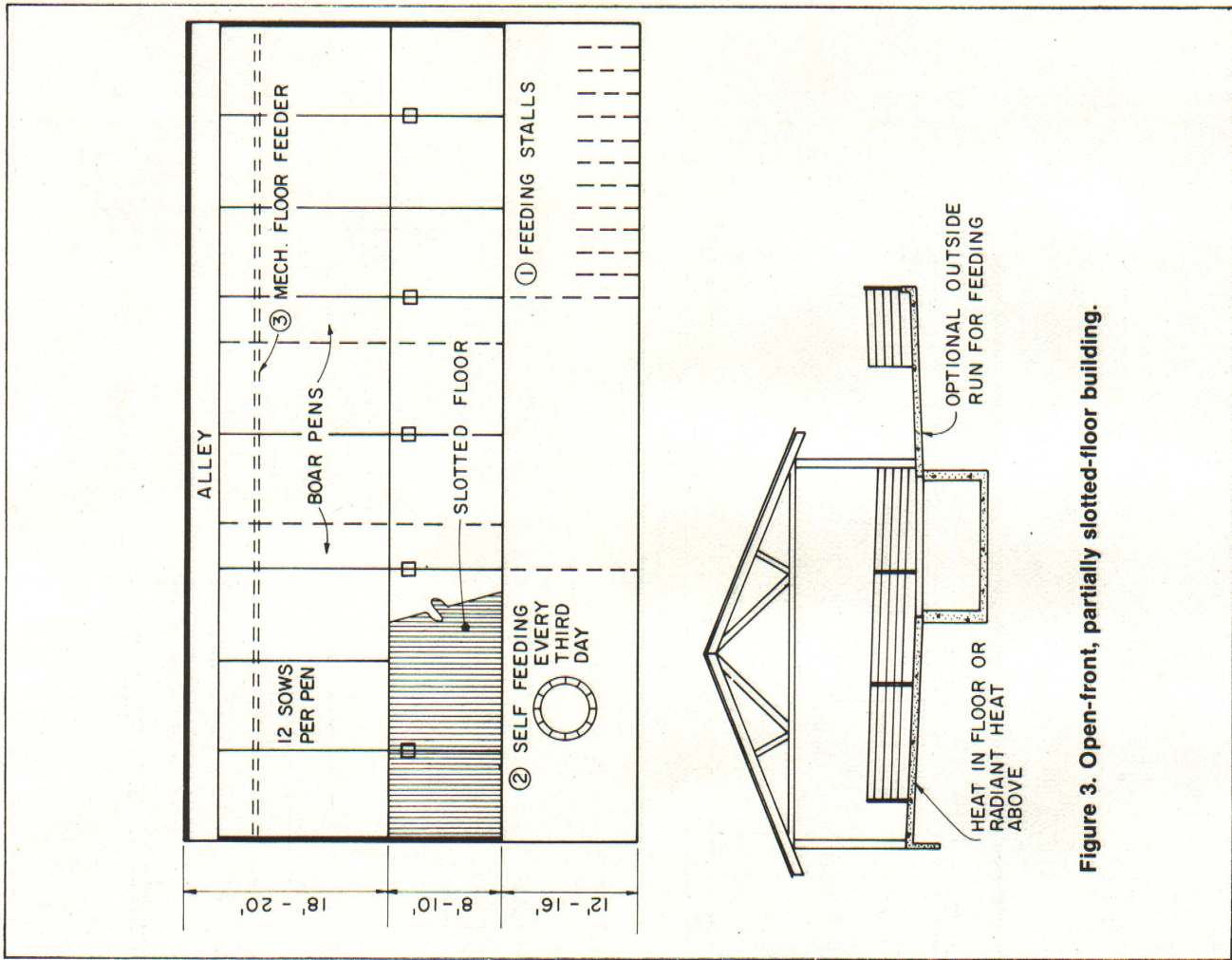
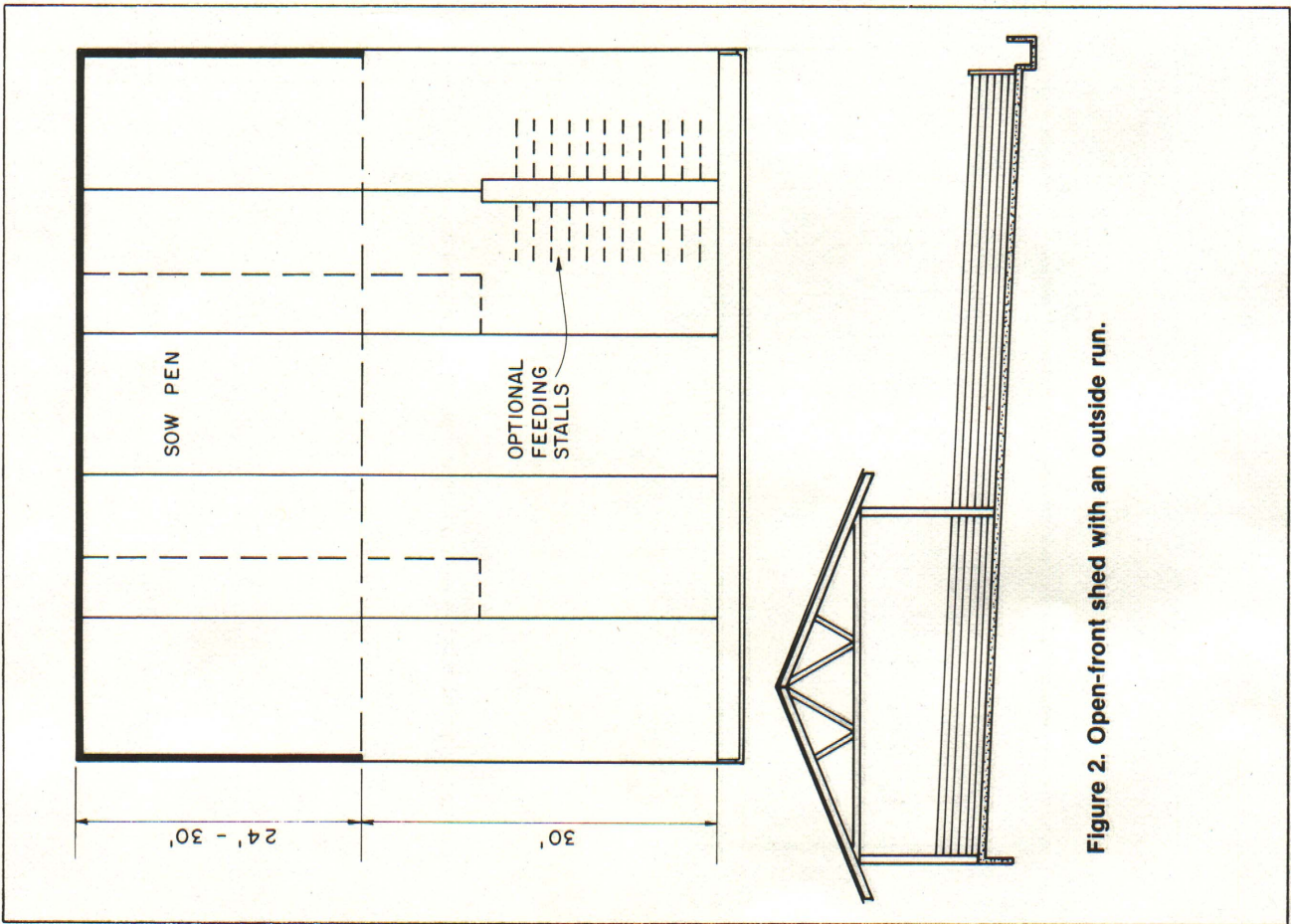
System 5 Partially slotted-floor building. This housing system is very flexible in that it may be used as:

a. A gestation building with curtain sidewalls (Fig. 5). Normally, 6-8 sows are grouped in an open pen or a pen with free-choice stalls. The open pen will accommodate more sows per pen, but the pens may become dirtier. Pens equipped with stalls maintain sow orientation and thus all feces and urine are deposited on the slats. Curtain or hinged panel sidewalls allow for natural ventilation except during the hottest season when fans or other cooling methods are also required. Partial slats permit floor feeding.

b. A combination gestation and breeding building with curtain sidewalls (Fig. 6). On one end of this building a separate breeding area is provided. Boars are kept individually in 5x10-ft. pens with sows grouped 6-8 per pen. By increasing the width of the aisle to 5 ft., the center aisle becomes the breeding pens. Separate breeding pens on the end or between the breeding and gestation sections may be preferred, though.

Upon breeding, the sows are moved to the attached gestation section of the building which is constructed as outlined in (a) above.





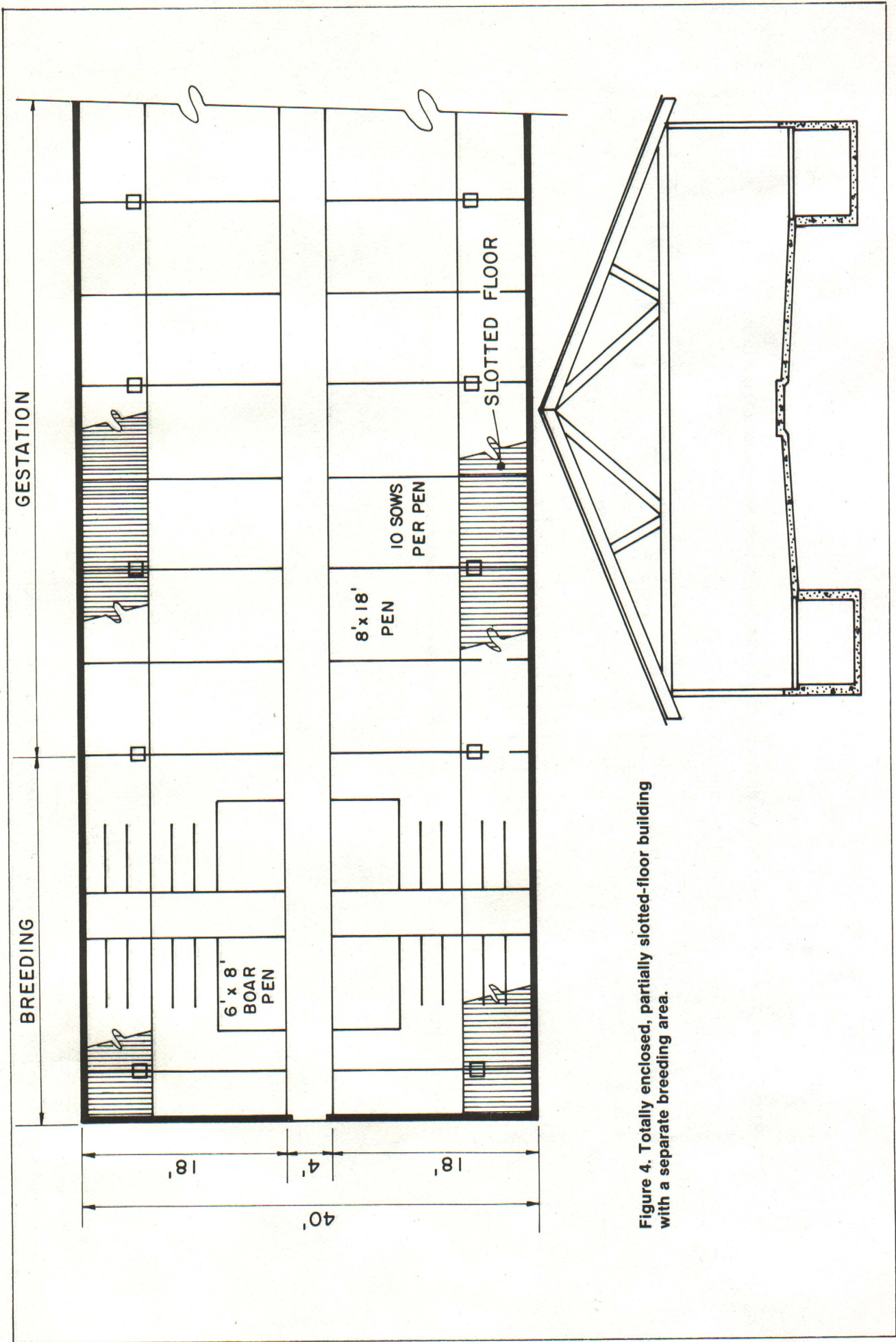


Figure 4. Totally enclosed, partially slotted-floor building with a separate breeding area.

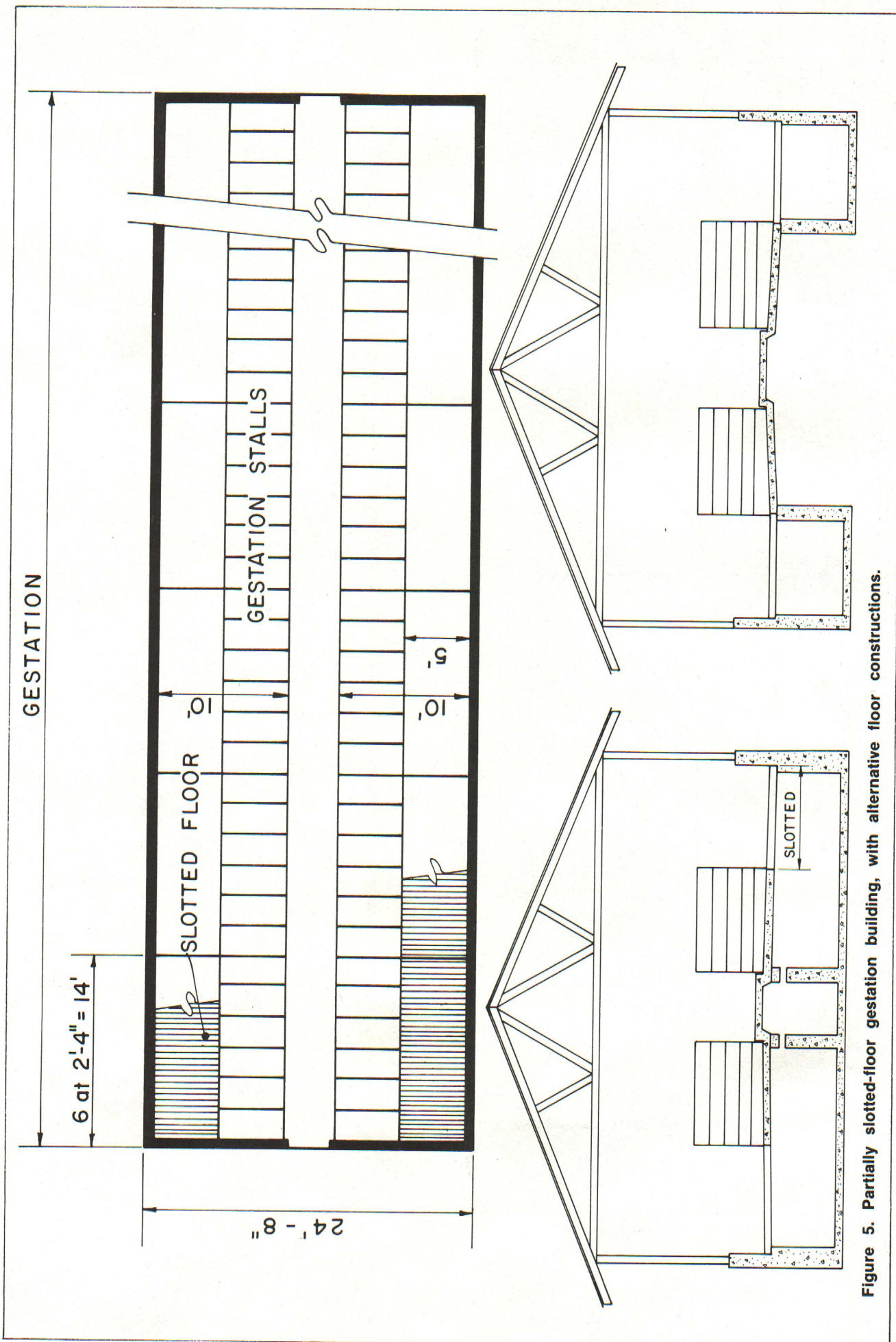


Figure 5. Partially slotted-floor gestation building, with alternative floor constructions.

c. A totally enclosed breeding barn with separate breeding pens. The basic floor plan remains the same as (b) above, but the sidewalls are enclosed and mechanical ventilation or air-conditioning become integral components of the system. Fan ventilation is sufficient with temperatures below 80 F. Above this temperature, air-conditioning or evaporative cooling is provided which will minimize the higher ambient temperature effects that impair reproductive performance.

Separate breeding pens would be provided in an air-conditioned room at one end in which the temperature can be maintained about 70 F. during mating.

System 6 All slotted-floor gestation building (Fig. 7). A major advantage of this building has to be ease of handling and management for each individual sow. A disadvantage is high initial cost. Many producers hand-feed from a cart. This system also lends itself to a common feed and water trough. Feed is dropped into water once a day.

Usually, a narrow building with 2 rows of pens or a wide building with 4 rows of pens is provided with individual feeding stalls so all the sows can eat at one time.

A separate breeding area must be provided.

Summary

The sow gestation and boar housing systems presented here are in use on swine farms throughout the United States, but comparative studies have not been made. The degree of individual management and the amount of environmental control vary considerably from one system to another. Usually the more control on individual management and of the environment, the higher the cost of the system described.

No one of the systems presented would fit the needs of all swine producers. Parts of one confinement system might be combined with parts of another system. The systems presented vary from minimal control of individual sow management and environment at the lowest cost per sow (System 1) to a maximum of control at the highest cost per sow (System 5 or 6).

Insulation or ventilation details are not presented in any of the drawings. To determine this information and to obtain plans for confinement gestation and boar housing systems, consult your county Extension agent, or the Extension agricultural engineer at your land-grant university.

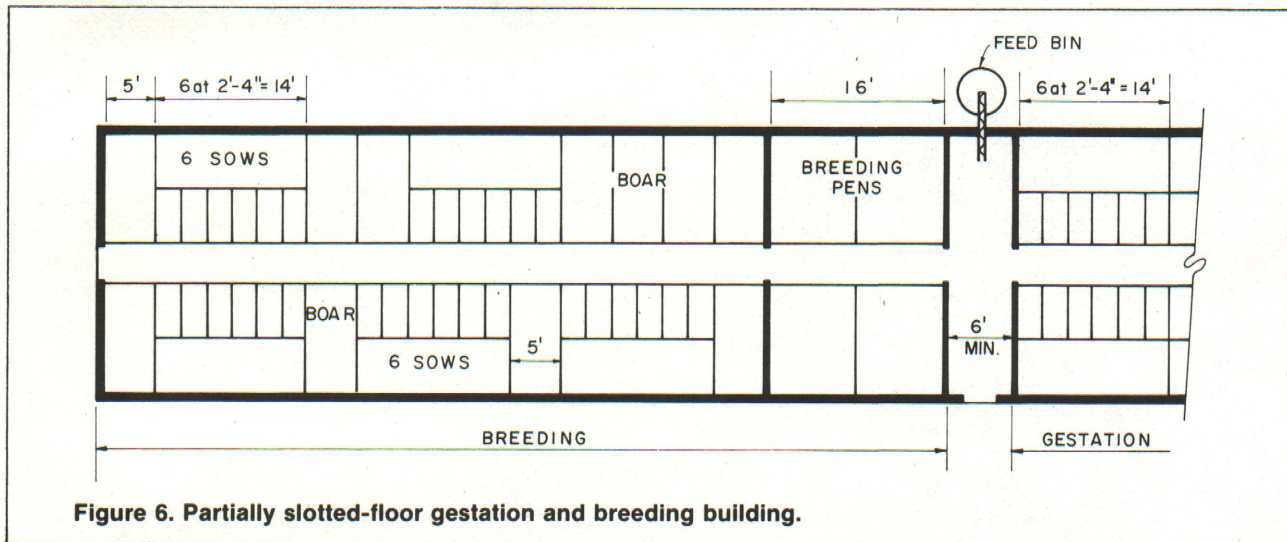


Figure 6. Partially slotted-floor gestation and breeding building.

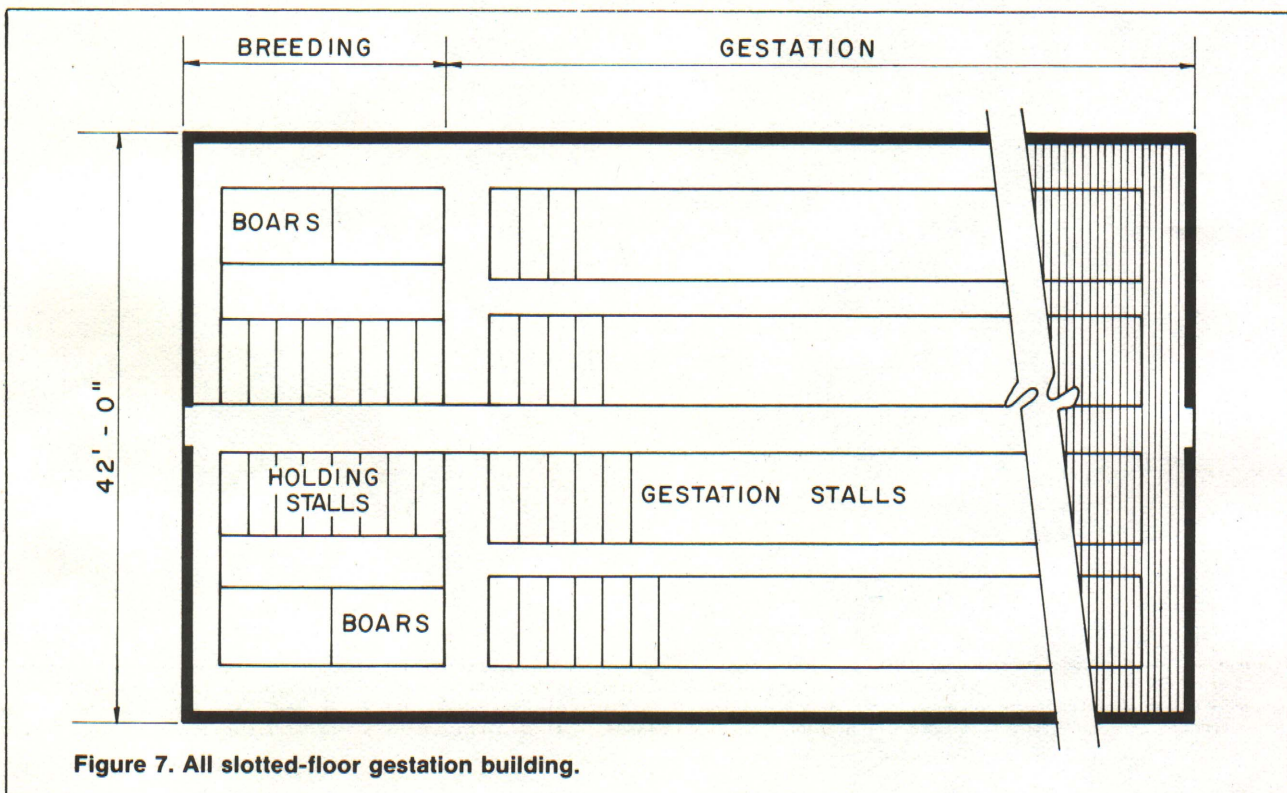


Figure 7. All slotted-floor gestation building.

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