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Housing and Equipment for Growing and Finishing Hogs

By D. G. Jedgele
Assistant Professor of
Agricultural Engineering



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UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS

BASICALLY, THERE ARE TWO SYSTEMS of finishing hogs for market. One is feeding on pasture, using movable houses and shades, and the other is feeding in drylot, using either movable or permanent houses. With adequate facilities and careful management, either system is satisfactory.

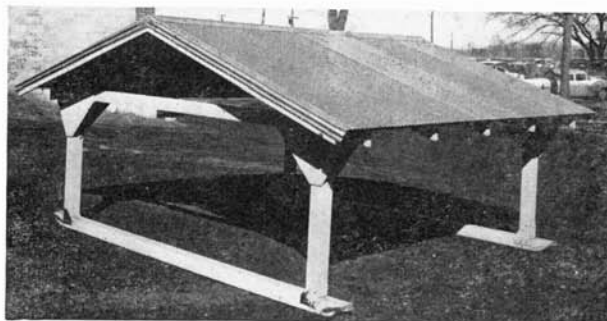
MOVABLE HOUSING

Movable houses for hogs may be built or purchased in many shapes and sizes. The selection of one style or another is usually based on personal preference or experience in a community. The important thing is to provide adequate space per hog (see table, page 3) and sufficient ventilation, particularly in hot weather.



Movable shelters for pasture feeding. Shade area could be increased and ventilation improved by hinging the low wall. (Photo courtesy Doane Agricultural Service)

(Fig. 1)



A movable shade. No cross-ties are needed at ground level because of rigidity of glued plywood gussets at corners. Midwest Plan No. 72690

(Fig. 2)

Shelters

Although individual farrowing houses have frequently doubled as finishing shelters, a separate shelter completely open on one side is more convenient. The only limitation on the size of this type of shelter is whether it can be readily moved with the farm tractor. Practical dimensions are 8 to 10 feet wide by 20 feet long.

Movable units of this type may be used for shelter on pasture or drylot. They may be lined up end to end to form a long open-front shed, or they can be pulled together (see Fig. 1) to provide greater protection in cold weather.

Shades

For late spring and summer finishing, a simple shade is probably all the shelter required. The movable shade shown in Fig. 2 should have a long



The straw shade shown above is simple and effective but difficult to move.

(Fig. 3)

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A prefabricated steel summer shade and winter shelter.
(Fig. 4)



life because of its rigid construction. A simpler and more economical shade is shown in Fig. 3. One disadvantage of the straw shade is that it must be completely dismantled before it can be moved.

Each hog should have about 10 square feet of shade. The shade should be a minimum of 4 feet high to provide adequate circulation. But research has shown that hogs are more comfortable under somewhat higher shades, a height of 8 feet being a practical limit.

Much of the ground beneath a low shade either remains in shadow or is exposed to sunlight for a very short time. Under a higher shade, the shadow moves more, exposing a larger area to sunlight for a longer period of time. As a result, the ground dries more quickly and is more sanitary than the area beneath a lower shade. The size of shadow cast by a shade remains the same regardless of the height of the shade.

Combination Shelters

A combination winter-and-summer shelter for finishing hogs can be a movable building with one side completely open and the other side hinged for opening in the summer. Although these combination shelters are somewhat difficult to make completely tight in winter, they eliminate the necessity for two types of shelters. The prefabricated steel shelter shown in Fig. 4 is a combination shed-shade.

PERMANENT HOUSING

Functional Planning

Intensified hog-feeding programs have resulted in an interest in drylot feeding and permanent buildings.

Space Needs of Growing-Finishing Swine

	Weaning to 75 pounds	75-125 pounds	125 pounds to market
Sleeping space or shelter per pig, square feet.....	4	6	8
Space per pig in concrete lot, square feet.....	6	8	10
Pigs per linear foot of self-feeder space (or per hole)			
On drylot.....	4	3	3
On pasture.....	4-5	3-4	3-4
For hand-feeding or hand-watering, linear feet of trough per pig.....	¾	1	1¼
Percent of feeder space for protein supplement			
On drylot.....	25	20	15
On pasture.....	20-25	15-20	10-15
Number of pigs per automatic watering cup.....	20-25	20-25	20-25

The finishing building is a relatively simple structure. Yet it is difficult to plan because the number and size of pens, equipment arrangement, and other factors must be geared to a management system.

If you are thinking of drylot feeding, you are also probably thinking of multiple farrowing and larger volume to justify the investment in permanent facilities. Before planning your building needs, you should decide on your "timetable" of production.

Let's consider an example. It is not unreasonable to expect to raise a pig from birth to market weight in 5½ months. It takes approximately 70 days to get to 50 pounds, the weight at which pigs enter the growing-finishing area. Then they will be on feed for about 94 days, of which 47 days will be used to increase their weight from 50 to 115 pounds, and another 47 days from 115 to 200

pounds. If you were willing to feed pigs in two lots sorted according to these weights, and you were farrowing a group of sows every two months, your timetable would be as follows:

Group	Day	Finishing Building		
		50 pounds (day number)	115 pounds (day number)	200 pounds (day number)
1	1	70	117	164
2	61	130	177	224
3	121	190	237	284
4	181	251	298	345

In studying this timetable or in working out your own, allow some leeway. Remember — not all the pigs in a lot will reach any given weight on the same day. In the above schedule you will see that two farrowing groups will be on the finishing floor at the same time. After group 1 has been marketed, group 2 is moved into the vacated pens, and group 3 is moved into the pens formerly occupied by group 2. This system gives you about 26 days to clean the facilities, finish out the “slow doers,” and move pigs into the proper pens.

In the above example, it appears that two pens are all that are required. In practice, you would probably want extra pens so that you would have a place for “slow doers.” If your volume is sufficiently large, you may need even more pens to keep the maximum to about 75 hogs per pen.

After you have decided on the farrowing schedule and the number of pigs to be farrowed in each group, you are in a position to know how many pigs will be on the feeding floor at one time. Then you can refer to the table on page 3 for the space requirements and plan the over-all size of the layout. It would be unwise to start construction before going through this procedure. If you already have a shed, you can use the same procedure to determine how it can best be adapted to make maximum use of the available space.

Open Sheds

The simplest permanent shelter for finishing hogs is an open-front shed with concrete lot. The shed should preferably open to the south, but it may open east or even west if it is well protected from northwest winds by other buildings.

To be relatively draft-free, an open shed should be at least 24 feet wide. This width also makes it more adaptable for other classes of livestock. There

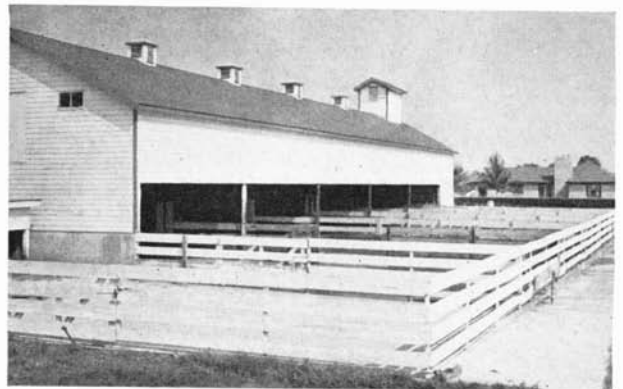
should be a minimum of 8 feet of head-room for tractor cleaning. The length of the shed can vary, depending on the number of hogs to be housed. (See the table on page 3 for the space needs of growing-finishing swine.)

Adequate ventilation is essential even in an open shed. In the winter, moisture-laden air must be removed through gable louvers or roof ventilators to reduce condensation on the underside of the roof. If the building is over 60 feet long, louvers should be supplemented with ridge ventilators about every 30 feet. In the summer, windows or doors in the rear wall may be opened to increase circulation through the shed.

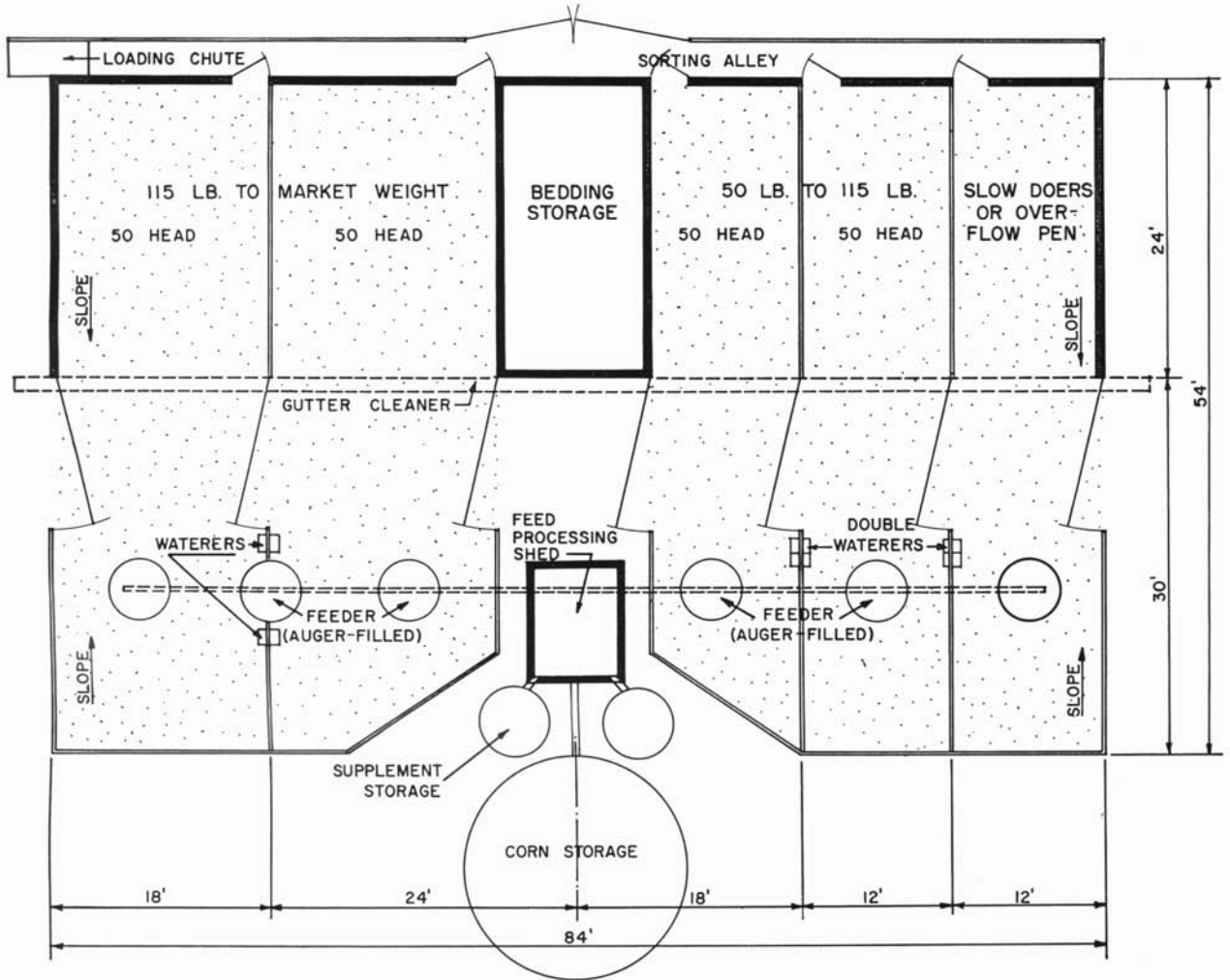
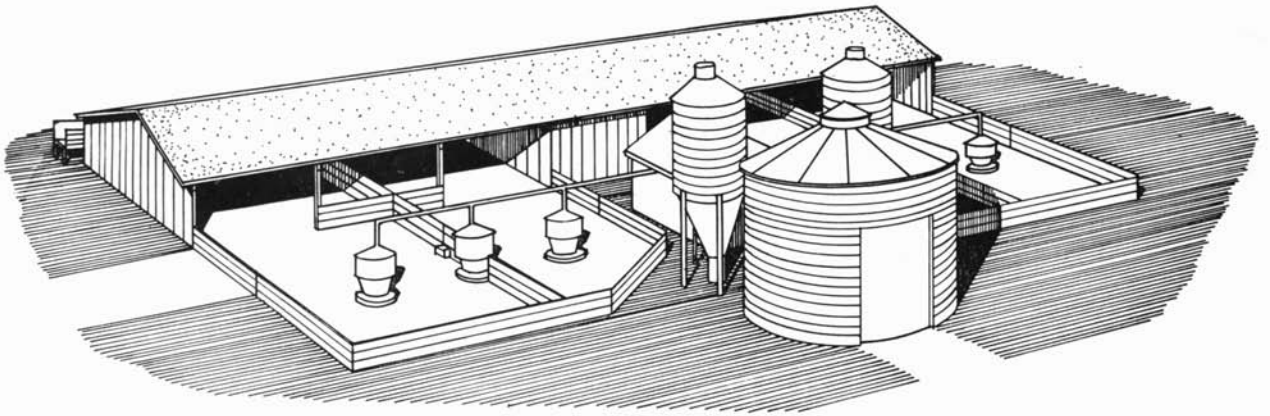
An open-sided building for growing-finishing hogs is shown in Fig. 5. This particular shed has overhead feed storage with a feed-processing unit at the far end. Figs. 6 and 7 show one-story clear-span sheds with feed storage and processing in separate buildings. Figs. 6, 7, 10, and 11 present workable ideas, any one of which might be adapted to another arrangement.

Complete Confinement

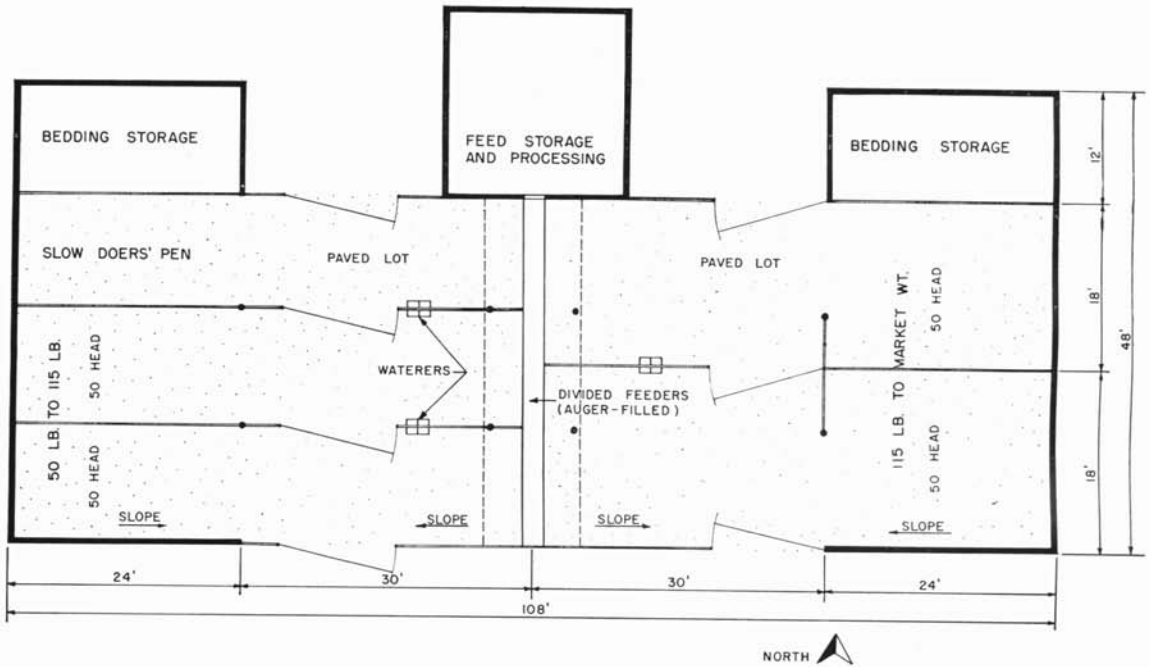
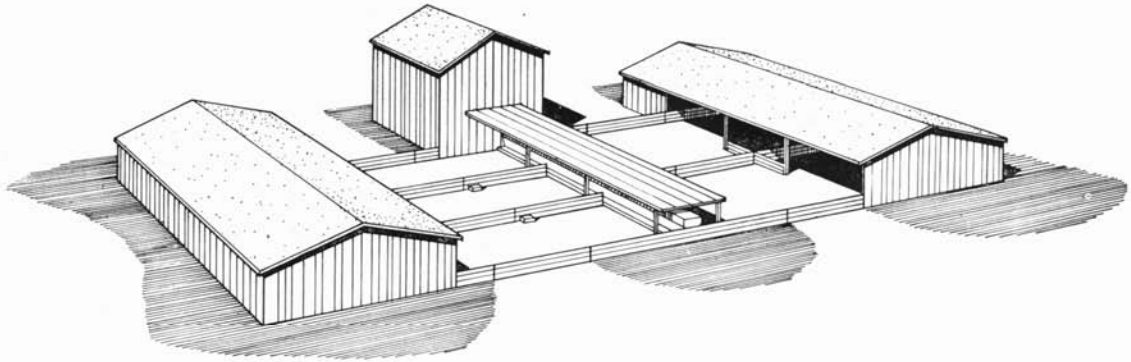
Some hog raisers who started with open sheds and lots have later felt that a covered lot would have been better, particularly in a rainy season. Fig. 8 shows the exterior and Fig. 9 the interior of a building designed for specialized hog feeding. This unit has a continuous feeder through the center of the building with pens on both sides. The feeder is filled by means of a permanently installed auger. Feed is processed in one end of the build-



Open-front building for finishing hogs with clearance for tractor cleaning. Self-feeders are set in pen divisions inside building and filled from overhead feed storage. (Fig. 5)



This "idea" plan shows an open shed for the bedded area with feeders and waterers on the outside. Pigs can easily be transferred from one pen to another through the alley at the rear of the shed. Feeders are filled with augers directly from the processing unit. (Fig. 6)



This compact arrangement requires a good windbreak to protect the shed open to the west. The feeder dividing the lots has a partition so that different rations may be fed to separate lots. The feed storage and processing unit could consist of several ground-level bins and a small grinding shed instead of the overhead storage shown. (Fig. 7)

ing. Mechanization of feeding and manure removal is quite efficient, but hogs must cross the sleeping area to go from the feeder to the waterer.

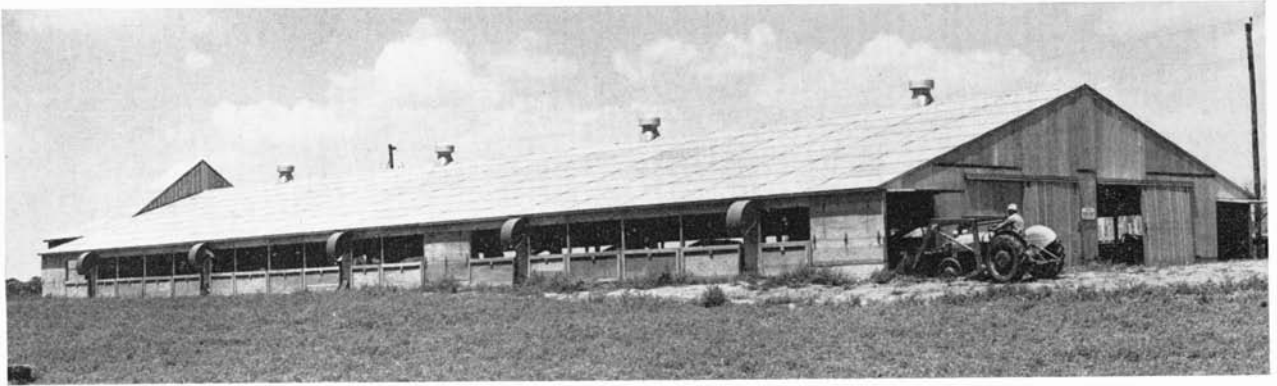
Two other possible arrangements for complete confinement are shown in Figs. 10 and 11. These arrangements isolate the sleeping area from the feeding, watering, and dunging area.

Remodeled Barns

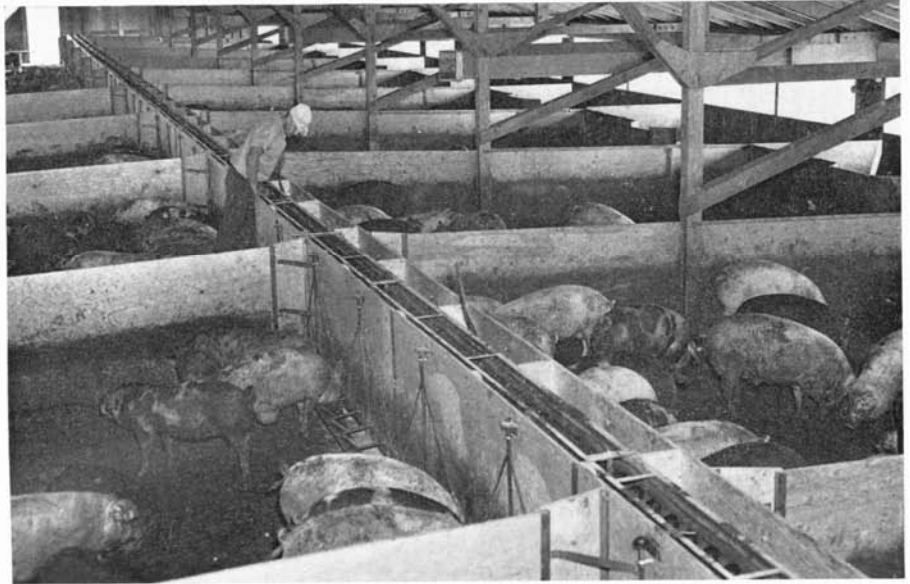
Old stall barns can sometimes be profitably remodeled into finishing sheds for hogs. This remodeling involves removal of all non-supporting posts and the opening of one side or end to permit

mechanical cleaning. In most instances a new concrete floor is also required. The hay loft can be used for bedding storage, but any plans to convert it to feed storage should be evaluated carefully. Usually it is just as economical to build a new ground-level feed storage as to strengthen the floor and build bins in the loft.

Careful estimates should be made of the cost of remodeling. After evaluating the expected additional life of the old barn, the costs can be compared to the cost of a new one-story shed. In making this comparison, you should also place some value on labor efficiency in the two buildings.



Finishing building with no outside pens. Note tractor with wide scoop for cleaning "dunging alley." Doors in sidewall may be closed for winter feeding. (Photo courtesy Douglas Fir Plywood Association) (Fig. 8)



Inside view of finishing building shown in Fig. 8. Auger housing has gates in bottom so that each 16-foot section of feeder may be charged with different ration. (Photo courtesy Douglas Fir Plywood Association) (Fig. 9)

Construction

As mentioned previously, the shelter is a relatively simple structure. Since you are not interested in providing a warm building but merely a warm, dry bed in a relatively draft-free space, many combinations of building materials can be used.

Clear-span roof construction is recommended. Because of the greater flexibility of this type of construction, the building can not only be used for the swine enterprise but can also be converted to other uses.

Precise details of construction are so well presented in plans available from the University of Illinois (see page 12) and other sources that they will not be covered here. By following a plan, you will gain the advantages of careful design and new construction techniques.

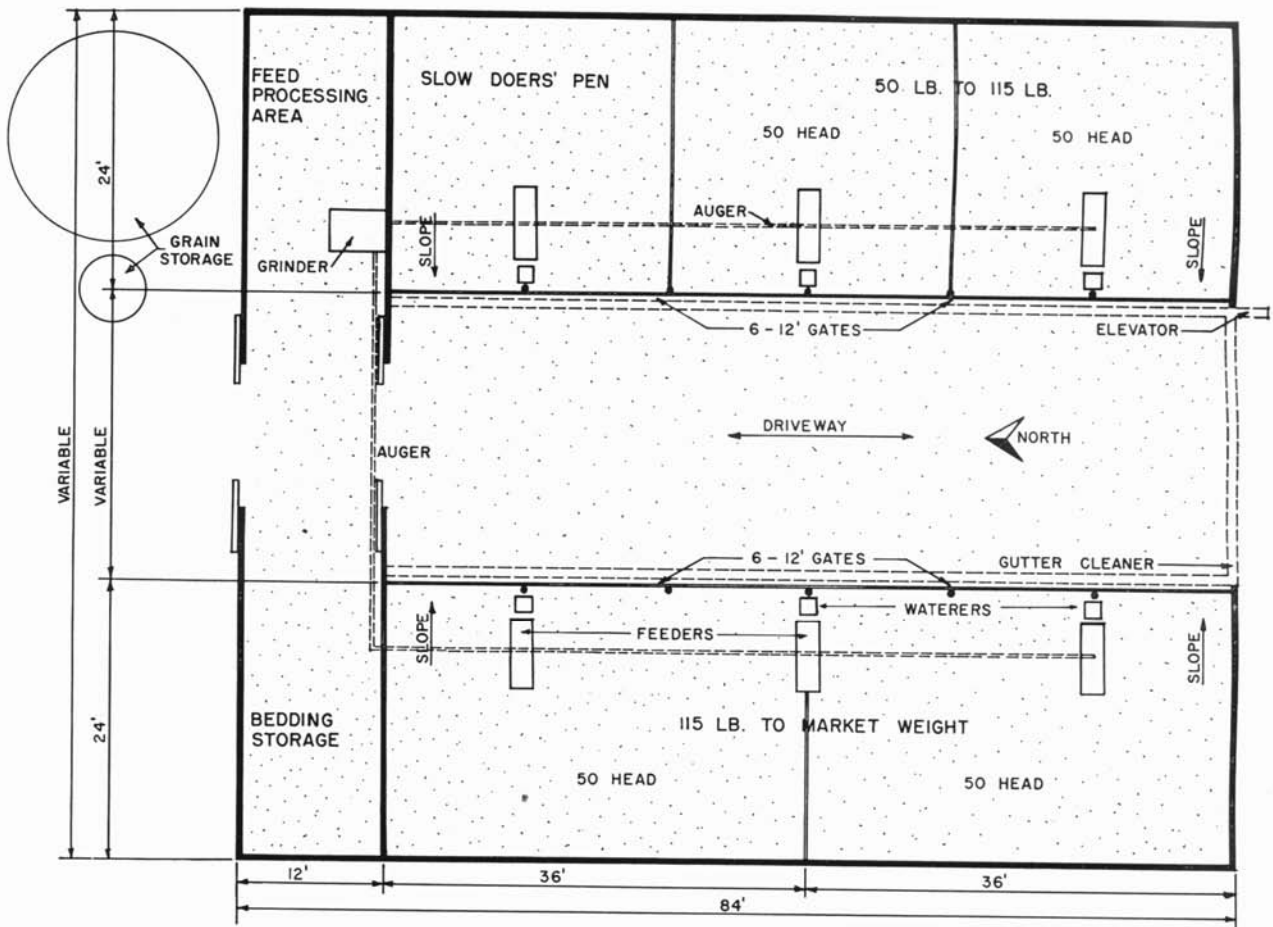
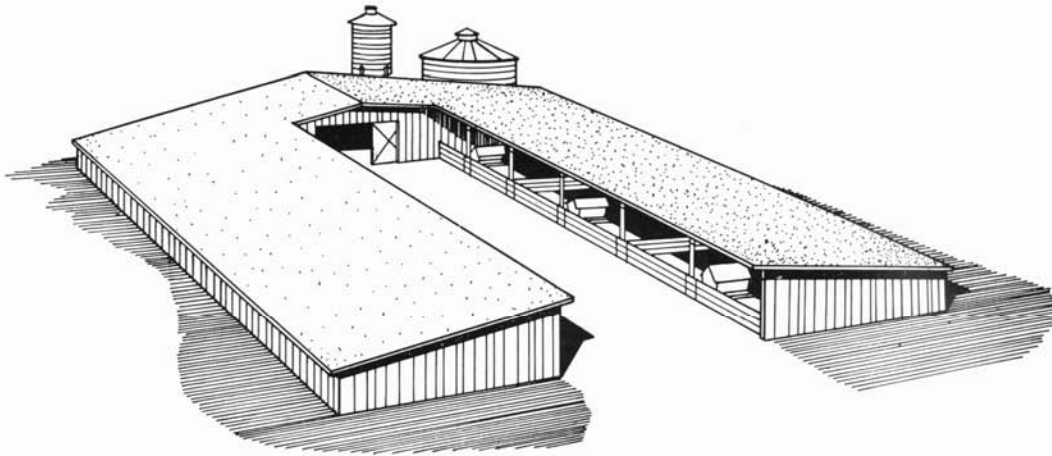
Prefabricated buildings can also be fitted into a drylot feeding arrangement. Most of these have

the advantage of being engineered clear-span structures that are sold as a package.

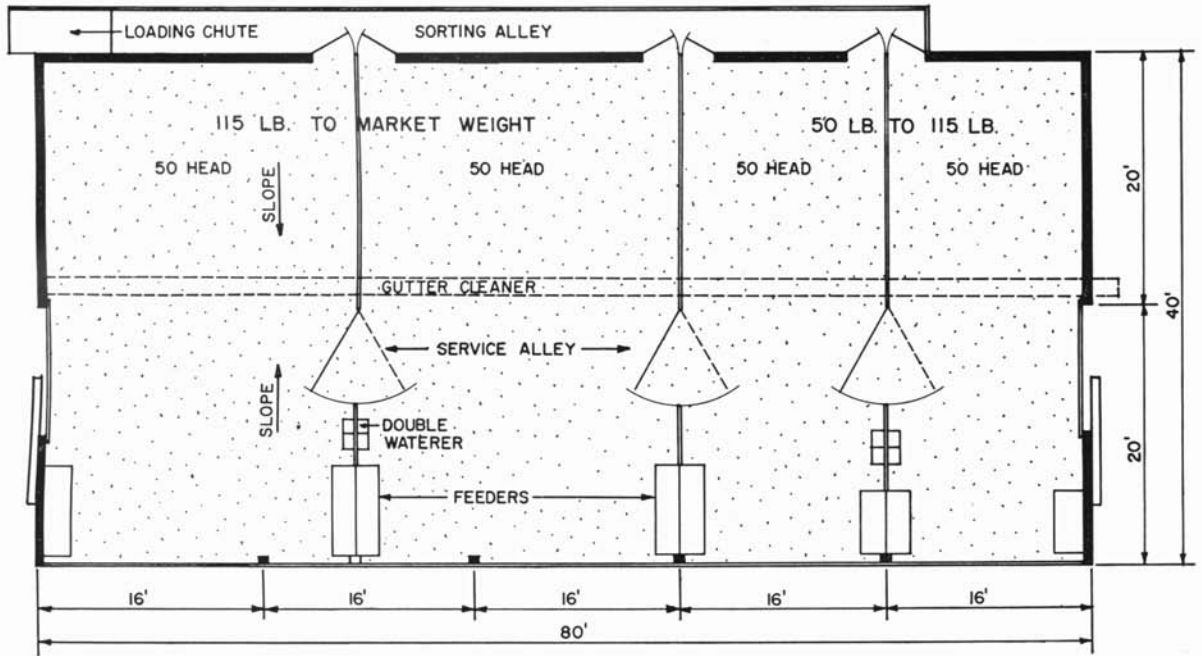
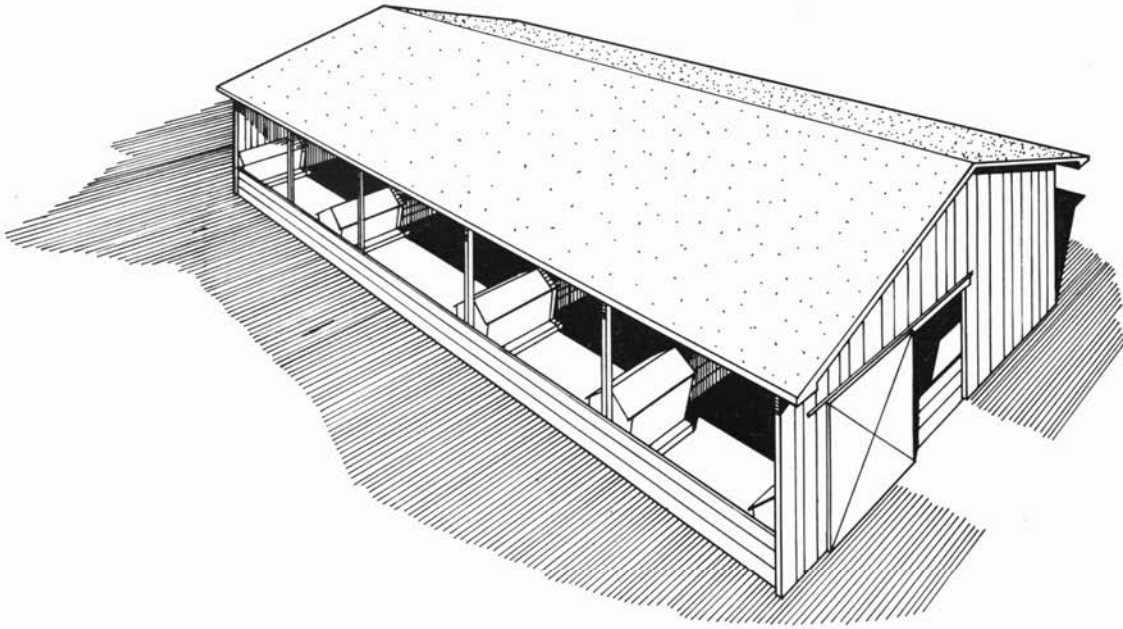
Floor Construction

The lots, as well as the floors inside the shelter, must be of dense concrete. They should slope a minimum of $\frac{1}{4}$ inch per foot towards a gutter or drainageway. A floor that slopes only one way is the easiest to form and place. But if your feeders are located along the outside edge of the lot, it will be necessary to slope the floor in two directions — away from the shelter and away from the feeders.

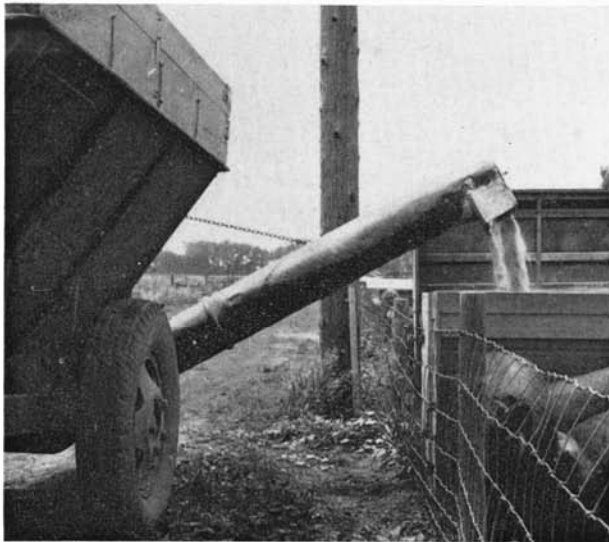
The advantage of the one-slope floor is that the drainage can be collected in a gutter outside the lot fence, and consequently, drainage and manure do not pass from one pen to another. But since hogs carry their manure only 10 to 15 feet after leaving their bed, the largest accumulation of manure will



This U-shaped arrangement permits complete servicing of pens, with feed, bedding, and manure removal from the central alley. The alley also serves as a buffer zone between different lots of pigs. Feed storage and processing can be conveniently located at the north end and serves as a windbreak. (Fig. 10)



An arrangement for a single line of pens for complete confinement. With feeders located in the partitions, it may be necessary to have divided feeders so that different rations can be fed to each lot. This requirement may be offset by the simplified manure removal possible with the wide space between feeders. (Fig. 11)



A feeder being filled from a self-unloading wagon.
(Fig. 12)

be near the front of the shelter. So it is just as logical to have the floor slope to this area except for the fact that drainage will then have to move from pen to pen with a potential increase in the hazard of spreading disease.

The floors should be placed on firm earth that is free of organic matter or on a well-tamped gravel or crushed-rock fill. They should be 4 inches thick for normal usage, and 6 inches thick where heavy wheel traffic is expected. If you buy ready-mixed concrete, be sure that you get a 6-bag mix.

If the concrete is job-mixed, measure the amounts of cement and water accurately, and use sand and gravel as needed to get the desired workability. Not more than 6 gallons of water should be used for each sack of cement. When sand of average wetness is used, add only 5 gallons of water at the mixer—the sand alone will contain about 1 gallon. With average aggregates, the proportions of materials in the mix should be approximately as follows:

- 1 part portland cement
- $\frac{2}{3}$ part water
- $2\frac{1}{4}$ parts sand
- 3 parts coarse aggregate

If this mix does not produce satisfactory workability, change the proportions of sand and coarse aggregate; never change the water and cement proportions.

MANURE DISPOSAL

Manure from hogs in drylot may be disposed of in two ways. First, it may be handled as a solid. This method requires scraping the manure from the pens by hand or with a garden tractor into a gutter or manure storage pit where it can be picked up by a tractor loader. Straw or ground corn cobs can be used to absorb the liquids so that they can be handled by a tractor loader and conventional manure spreader.

The second method is to install a liquid manure-handling system. With this method, the pens are either scraped daily and washed with water once a week, or washed daily, thus eliminating the scraping. The material is collected in a storage tank and later pumped out and distributed. The storage tank or tanks should hold at least a week's accumulation, figured on the basis of 2 gallons of liquid manure a day from each hog. Additional allowance should be made for rain water if you have an outside lot.

In most cases, the liquid from the storage tank will have to be pumped into a tank wagon and spread on the field. A three-inch diaphragm pump that delivers 175 to 450 gallons per minute, depending on lift, will do the job. There is also some evidence that an inclined auger may be a satisfactory pump.

FEEDERS AND FEED-HANDLING

Self-feeders are the most common units in use for hog feeding. You can either buy manufactured units or build your own from plans available from the University of Illinois (see page 12). The feeders should have means for agitating the feed to keep it from bridging and adjustable throats for controlling the rate of flow.

Since finishing hogs requires large volumes of feed, it's desirable to distribute this feed mechanically. Self-feeders can be filled with a self-unloading wagon (Fig. 12), an auger, or a blower. Feed can be successfully blown 200 to 300 feet from the feed-processing center (Fig. 13). Ground feed can be augered up to 100 feet in a single run, and can be carried a much greater distance by arranging several augers in series (Fig. 14).

But automation in the feed lot is progressing beyond a mechanized system of filling self-feeders.



Distributing feed to hog self-feeders with a blower. Note dust collectors at three discharge points. (Fig. 13)

In fact, the large holding capacity of self-feeders is a disadvantage in handling the quickly perishable feed taken from air-tight storages.

Automatic hog-feeding systems can now be planned around commercially available equipment. Fig. 15 shows a step in this direction — using hoppers to supply ingredients to blenders built into an automatic, electrically-powered hammer mill. In this instance the ground feed is being loaded into an unloading wagon. But this system could easily be carried a step further by augering the ground feed directly to a low storage-capacity feeder (see Fig. 9). The feeder could be equipped with electric pressure switches that would stop the grinder when the feeder was full and start it again when the feeder was empty.

WATERERS AND WATER DISTRIBUTION

A pressure water system is the most desirable type for the hog enterprise. Water under pressure can be used to good advantage to clean buildings and feeding floors. To insure an adequate water supply for hogs on full feed, you need automatic, non-siphoning, easily cleaned waterers like the one shown in Fig. 16. These waterers should have automatic heating units to prevent freezing in the winter. If the heating units are electrically controlled,

they should be properly installed and grounded to prevent electrocution.

Copper, steel, or plastic pipe can be used for your water-distribution systems. For carrying water to field-feeding setups, plastic pipe probably has an advantage over other pipes because it can be quickly rolled out in long lengths either on top of the ground or in a trench. The approximate number of gallons of water per hour delivered by various sizes of tubing and pipe are shown below.

Pipe Length (feet)	Tubing (inches)		Pipe (nominal) (inches)				
	¼	½	½	¾	1	1¼	1½
100	8.8	135	525	1,100
200	6.0	95	370	770	1,600
500	3.3	54	210	450	950	1,850	...
1,000	2.0	37	140	310	650	1,250	1,950

COOLING EQUIPMENT

Hog wallows may be either movable or fixed. For sanitary reasons, they should be easy to drain and flush.

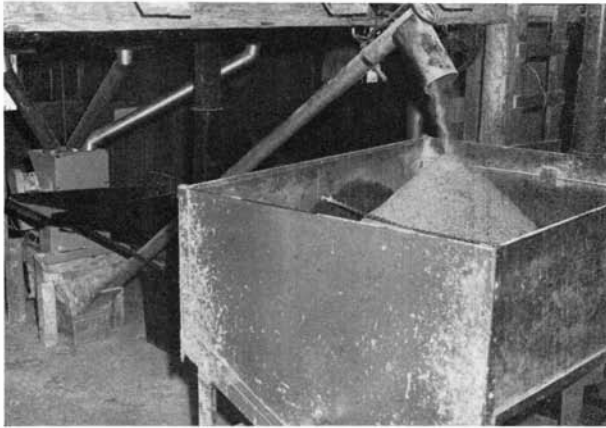
Spray cooling systems should be limited to concrete lots or sandy soils where mud holes do not develop. Nozzles from weed-spraying equipment will work satisfactorily on the line pressure of the farm water system.



Two augers in series transferring processed feed from one building to another. Box on pole houses ¼-horsepower motor to power one of the augers. (Fig. 14)

SORTING AND LOADING

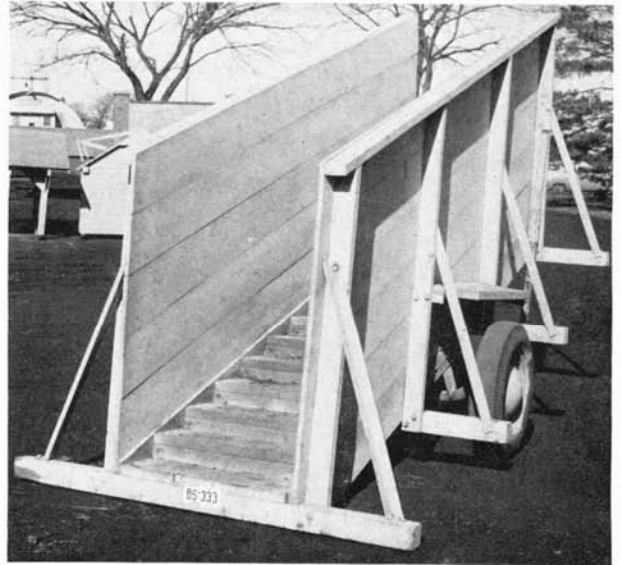
A sturdy, permanent loading chute is a valuable piece of equipment on the specialized hog farm. Although slightly more expensive to build, a stair-step loading chute is preferable to the ramp-and-cleat type. Hogs find the steps easier to ascend, and will go up more willingly and with less chance of injury. The stairstep chute can also be built as a portable chute (see Fig. 17). Ramp-type chutes are still the most prevalent, but their only apparent advantage is a slightly lower initial cost. Plans for building both types of chutes may be obtained from the College of Agriculture, University of Illinois (see list on this page).



Automatic mixer-grinder discharging into self-unloading wagon that will deliver feed to hog self-feeders. (Fig. 15)



Automatic watering cup provides clean, fresh water at all times. (Fig. 16)



Portable stairstep loading chute. Stairsteps are safer and are preferred by hogs. Midwest Plan No. 87341 (Fig. 17)

PARTIAL LIST OF AVAILABLE PLANS

The following plans for the swine buildings and equipment described in this circular may be obtained from the College of Agriculture, University of Illinois. Ask your farm adviser for further information about these plans.

Plan No.	Description
72649	Combination shed-shade
72632	Movable house (7 by 8 feet) with sides hinged to provide summer shade
72663	Movable houses along concrete feeding floor with permanent feed-storage building adjacent
72669	Pole-frame general-purpose hog house showing feeding floor and feed storage
72403	Open-front shed 24 feet wide, concrete foundation
72408	Open front shed 24 feet wide, pole frame
72050	Pole shed, 28 or 42 feet wide
72051	Frame or masonry shed 24, 30 or 36 feet wide
72690	Movable sunshade with gable roof
429	Movable sunshade with shed roof
87341	Stairstep loading chute
423	Loading chute with adjustable ramp