Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 634

1995

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Recommended Citation

Murphy, James P. and Harner, Joseph P. (1995) "Buildings for early-weaned pigs," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 10. https://doi.org/10.4148/2378-5977.6474

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Abstract

Buildings for early-weaned pigs present several challenges to designers and building/equipment manufacturers, but the ability to provide the optimum environmental conditions for the small pig is within the reach of today's technology.; Swine Day, Manhattan, KS, November 16, 1995

Keywords

Swine day, 1995; Kansas Agricultural Experiment Station contribution; no. 96-140-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 746; Swine; Segregated early weaning; Buildings; Engineering

BUILDINGS FOR EARLY-WEANED PIGS

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Summary

Buildings for early-weaned pigs present several challenges to designers and building/equipment manufacturers, but the ability to provide the optimum environmental conditions for the small pig is within the reach of today's technology.

(Key Words: Segregated Early Weaning, Buildings, Engineering.)

Introduction

Buildings for early-weaned pigs are probably the most crucial design challenges of any swine buildings because of the age and size of the pigs. In order to successfully design such a building, the special requirements of the small pig must be analyzed. The building and equipment are key factors for a successful venture with early weaning. Nutrition, sanitation, management, and pig health are also factors that must be considered to bring about a successful building for a segregated early weaning (SEW) operation.

One of the first questions to ask is "How early is early?" The answer to this question may not yet be known, but will be discovered through research and commercial operations. Presently, at university facilities with 200-head rooms, pigs can be weaned as early as 5 days of age and exhibit good growth and continued survival. Many commercial operations are weaning at 14 days. In expectation of future developments, designing an SEW facility for the week-old pig would seem prudent.

The next question is "At what age/size should the pig leave the SEW facility?" This question should consider the quality of the next housing of the pig and the total pig flow capability of the production unit. Most SEW buildings would probably house a pig for at least 3 weeks, because of the labor required to move the pigs and clean/sanitize the room. A time period longer than 8 weeks does not appear to be feasible simply because of the change in physical dimensions of pigs, which causes problems with feeder openings, slatted floor cleaning, ventilation requirements, and pen space. The growth rate in SEW facilities does not appear to be slower than comparable growth on the sow, and may even be accelerated.

The required time period in the SEW facility may be dictated by a specific health problem to be controlled in an operation. Remember, compared to the initial weight, the greatest percentage change of weight per unit of time occurs in SEW rooms than any other swine buildings. A pig initially weighing 5 lb can exit the room in 7 weeks weighing 40 lb — an 800% increase in weight and a considerable increase in physical dimensions and survivability.

Site Considerations

The SEW building should be protected from cross-contamination from other pigs, both from workers moving room to room and from air supply that is contaminated by exhaust air from other buildings. The recommendation of 1/2-mile separation from other buildings is suggested to minimize their

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effects. Success is reported with building distances as little as 200 feet, if location of the building minimizes air contamination from other buildings, i.e., by not being in the prevailing wind direction of other buildings and exhaust fans or not being downhill from other swine buildings. Multiple room construction under a common roof appears possible, but special attention is required to prevent cross-contamination between rooms. Rodent control within and between buildings is critical. Manure drain systems should be trapped to prevent air transfer from building to building through the drain lines.

Walls/Ceiling

Materials used in the construction of the interior walls and ceiling should be chosen to withstand frequent high-pressure washing and to minimize the amount of waste material to which the pig is exposed during daily use. A common wall/ceiling combination involves use of 1/4-in plastic sheets over 1/2-in plywood on the lower 4 ft of the wall and enamelled steel or aluminum on the upper 4 ft of the wall and the ceiling.

Because of the high temperature (90°F+) requirement, insulation is necessary to maintain uniform room temperatures and to reduce heating costs and condensation. Propane heated buildings normally are insulated with R-values of 19 in the walls and 24 in the ceiling. A vapor retarder is necessary on the interior walls and ceiling.

Manure Management

Because of the frequent turnover of pig groups through an SEW facility and the required sanitation, most SEW units are planned to allow removal of manure between each group by draining shallow pits or by flushing manure daily. A common practice is to have a shallow tank to hold 12 to 16 in of liquid. Prior to cleaning the room, the tank is drained. Then, during initial room cleaning, a high pressure washer removes the remaining solids from the floor of the tank. The tank is plugged, and 3 in of water accumulates in the shallow tank as a result of final cleaning prior to the next group of pigs.

Flooring

The largest size opening in a floor should be 3/8 in. Many totally slatted floors (usually plastic and galvanized metal) suitable for farrowing are useable in an SEW building. Producers in the northern United States and areas of Canada are experimenting with a solid portion of flooring for a sleeping area that is heated with hot water or radiant heat (usually in combination with a hover) to reduce whole-room heating costs. Floors should stay clean and dry to maintain high sanitation standards for the pig without daily attention. Ease of cleaning of all floor equipment should be considered, because the pig comes in contact with the floor more than any other area.

Penning/Pen Size

The most common number of pigs per pen is 20, with a maximum of 25 pigs per pen. One-litter pens are used if specific litter growth or health data are important. Within the room, provision should be made for 5% of the pigs to be housed separately, or in reduced numbers, to accommodate problem pigs. The largest opening of the penning and gate hinges should be 1-1/2 in to keep small pigs from becoming entangled in the penning. Vertical rods are recommended to keep pigs from climbing. Allow 1 square foot of floor area for each 10 lb of pig up to 30 lb. The maximum size and number of pigs in the pen will determine the square ft of the pen. Pen width less than 4 ft wide will cause pen circulation (free movement of pigs) problems with pigs above 25 lb. Pigs above 35 lb require a minimum pen width of 5 feet to allow adequate circulation if the feeder normally projects 1 foot into the pen.

Feeders

Feeder spaces should allow at least half of the pigs to eat at one time. The size of the feeder tray opening is controlled by the size of the largest pig in the pen. To eliminate the potential of small pigs becoming trapped in the feeder tray, a tray divider may be needed. Producers usually partially fill feeders or separate pans by hand for the first

week to get pigs eating. Feeders should be located along walkways for ease of filling and management. Removable feeders can be inverted for thorough washing and drying.

Waterers

Nipple waterers are mounted at the height of the pig's back. Waterers need to be adjustable in height if pigs are staying in the room longer than 3 weeks. Water pressure on the nipple, depending on orifice size, should be limited to 20 psi so that the pig can suck/drink water without getting squirted. The mouth size on the pigs makes mini-size nipples a good investment. Nipples that can be adjusted to drip for the first week are also a good investment.

Ventilation/Heating

Because of the small size of the pig, the small amount of air exchange required, and the cost of heating, the ventilating and heating system has very important functions of admitting, distributing, and exhausting air. The air velocity at pig level should be between 5 to 20 ft per minute at normal operation temperature. For pigs up to 30 lb, the ventilation system should provide each pig 2 cubic ft per minute in cold weather and be able to increase to 25 cubic ft per minute during summer. Preheating of air in a hallway can aid distribution of inlet air, but automatic inlets can admit outside air directly (usually from the attic space). Heat exchangers can be used, but they have to be the correct size and need a distribution device (perforated plastic tube) on the incoming air to avoid excessive air velocities at pig level. Furnaces should be located to promote equal air temperature throughout the room. In many situations, placing the furnace with deflectors (to split the hot air into two different directions) near the center of the room helps distribute the heat and provides a good location for thermostat sensing.

Negative pressure systems (a fan exhausting air from room) with automatic adjusting inlets on the ceiling are used commonly. Figure 1 displays a system that distributes both inlet and exhaust air. All of the exhaust air is removed through the floor with the walkway duct system. In buildings without under-floor duct systems, the minimum ventilation fan should be mounted low in the building to remove stale, cool air. Small adjustments in airflow and air temperature are necessary, which make electronic control systems for variable speed fans and heaters popular. Week old pigs are started at 90°F at floor level. After the fifth day, the temperature is decreased about 1°F each day until 75°F is reached. By utilizing hovers/localized heat to obtain the above temperatures in the pig area, the room temperature can be lowered 10 to 15°F. Weekly manual adjustment of the minimum airflow is necessary as the pigs increase in weight.

In an SEW building, a plan is necessary when, not if, temperature control and interruption of electrical service problems arise. The shutters on the minimum fan can be removed and the automatic inlets can be blocked open to have more time before room ventilation problems occur during electrical power outages. Because most SEW buildings are located at a remote site, an alarm system should be considered for both power failure and temperature control problems.

Biosecurity

Figure 1 shows the location of a feed storage room and personnel shower/pathway at one end of the building. Enough sacked feed for a set of pigs normally is stored in this area prior to receiving the pigs to eliminate opening the outside feed door once pigs are in the building. Workers can enter the personnel door to change boots and clothing and shower, as required. Pigs enter the pens through the feed room to minimize the number of doors. Some health problems may require the pigs to be washed and treated prior to placement in the pens. Rules and procedures concerning personnel, boots, clothing, and equipment entering the SEW building should be discussed with the appropriate workers. Reminder/warning signs can help maintain the biosecurity of the building for regular and relief workers. An outside

window to view the pigs and a large, interior thermometer can save unnecessary trips into the building.

In conclusion, SEW buildings present several challenges to designers and building/equipment manufacturers, but the ability to provide the optimum environmental conditions for the small pig is within the reach of today's technology.

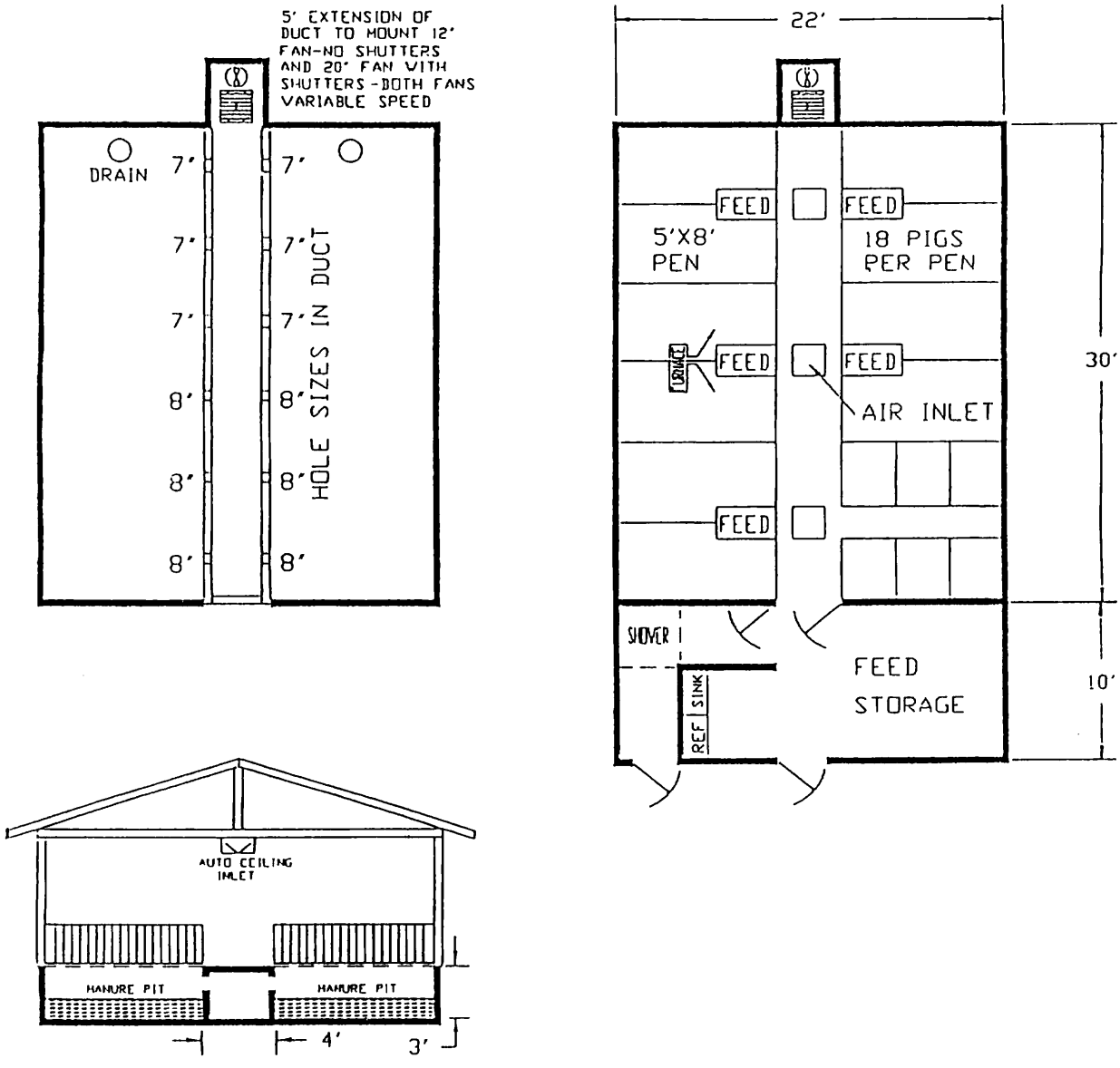

Figure 1. Building for Early-Weaned Pigs.