



SELECTING AN ENVIRONMENT FOR SWINE

Shall I build my new swine nursery with ventilation doors that can be opened during the summer, or depend on fan ventilation?

Should I install floor heat in my new finishing house?

Will air conditioning pay in a farrowing house?

The temperature in my finishing house is so warm, the pigs dung all over the floor. How can I make it more comfortable for them?

These are a few typical questions producers ask about environmental factors that affect pork production.

Briefly discussed here are important environmental considerations that should help you better understand the principles for selecting and operating different systems for modifying swine environment.

Environmental Factors

Factors that most affect pig performance involve temperature of the pig's environment such as air temperature, building surface temperature, and air velocity.

Baby Pigs. Newborn pigs are most comfortable in an environment of at least 80°F. Many producers keep the air temperature for newborn pigs as high as 95°F.

The most comfortable air temperature for sows in a farrowing house is 50° to 60°F. Sows begin to show signs of severe heat stress at air temperatures above 75°F. There is a difference of at least 20 degrees between ideal temperatures for sows and for pigs.

Prepared by Larry Van Fossen, extension agricultural engineer.

Baby pigs must be kept dry. Wet bedding or wet floors will result in wet baby pigs. As moisture evaporates from a pig's body, it lowers the skin temperature and causes chilling—one of the major causes of baby pig deaths.

Baby pigs cannot tolerate drafts. The maximum air velocity to which baby pigs should be exposed is 30 feet per minute (approximately 1/3 mph).

Weaned Pigs. The environment is nearly as important for weaned pigs until they weigh about 50 pounds as for newborn pigs. About the only major difference in environmental needs for weaned pigs is a slightly lower comfortable air temperature—between 70° and 75°F.

Growing-Finishing Pigs. After a pig reaches about 50 pounds in weight, he can at least exist in adverse environmental conditions. Pigs in groups can adapt to cold temperatures without a great effect on their rate of gain. However, feed efficiency is lowered when pigs are housed in temperatures below the comfort range of approximately 50° to 70°F. It is important to avoid sudden and large fluctuations in temperatures that do not allow time for pigs to adjust.

In summary, pigs housed in temperature-controlled swine finishing facilities may have slightly better feed efficiency during winter than those in nontemperature-controlled facilities, but rate of gain should be about the same. Finishing pigs are uncomfortable when exposed to hot temperatures. For example, they will dung on the floor and lie in it to cool their bodies.

Breeding Herd. There is relatively little research work that evaluates the influence of temperature on the breeding herd. But high temperatures



generally are more harmful than low temperatures. This applies not only to the sow herd but perhaps even more importantly to the boar.

Environmental Control System

Following are suggested methods for environmental control for each type of swine building.

Farrowing House and Nursery. A tight, well-insulated building is necessary for both winter and summer environmental control.

In general, fan ventilation is recommended for both winter and summer. Electric controls (timers, thermostats, etc.) are quite reliable, and they relieve the producer of frequent and often inconvenient adjustments of manually adjusting ventilation doors. Fans with sufficient capacity for year-round ventilation need not be expensive; often they are less expensive than installing ventilation doors.

A fan ventilation system must not create drafts on the baby pigs.

A protected creep area must be provided for baby pigs to minimize the hazard of the sow's lying on them (the major cause of baby pig deaths). This area must be maintained at a comfortable temperature for the pigs or they will huddle next to the sow for warmth, thus increasing their chances of being crushed.



Floor heat keeps these baby pigs comfortable.

Floor heat is an excellent and perhaps the best way to provide the warmer temperature zone that pigs need and still maintain a comfortable air temperature in the building for the sow. Bedding works well, particularly when used with heat lamps, but bedding is not compatible with liquid manure systems. Hanging radiant heaters are satisfactory for pigs in winter, but they add too much heat to the building air during summer. Floor heating systems installed in farrowing houses and nurseries should be operated in summer to provide needed baby pig comfort.

Floor heat does not provide enough space heat for adequate ventilation when outside air temperatures fall below 15° to 20°F in farrowing houses or nurseries. Supplemental space heat, usually pro-

vided by vented gas-fired heaters or furnaces, is needed.

Some method of cooling the sow, in addition to the ventilation system, may be beneficial during extreme summer heat or when the sow is farrowing. A stream of air directed at the sow's nose (but not toward baby pigs) helps. Mechanical cooling of air for the sow probably is not economically advantageous, but some producers like to use air-conditioned snout cooling. It might prevent a sow from dying because she's overheated.

If sows are farrowed in a pen or if sows and 1- to 2-week-old litters are moved together into a nursery pen, a water sprinkling system is an effective method of cooling the sows. The sprinkling system should be located over or near the dunging area in the pen.

A sprinkling system is most effective when operated for 2 to 5 minutes out of each hour when air temperatures are above 70° to 75°F. The sprinkling system can be automatically turned on and off with a solenoid valve that is controlled with a thermostat and timer wired in series. The sprinkling system will also help cool the small pigs in the nursery.

When cooling swine with water, use a heavy spray to wet the animal's body. Do not use a fine mist or fog.

Growing-Finishing. There are many kinds of satisfactory swine finishing facilities. Pigs will perform nearly as well in open-front, nontemperature-controlled facilities as in totally enclosed, temperature-controlled finishing houses.

In colder areas such as Iowa, where snow and below-freezing temperatures are frequent, totally roofed swine finishing facilities are recommended. They provide greater convenience to the producer during winter because he doesn't have to fight accumulated snow and manure. In addition, totally roofed facilities can be built for a per-pig initial cost similar to finishing facilities with large outside concrete lot space because the pigs can be more closely confined. Eight to 10 square feet per pig is normal for totally roofed facilities. Up to twice this space is used for outside lots.

There is some research evidence that pigs housed in totally roofed facilities will outperform those on outside concrete.

Both totally roofed and outside concrete lot swine facilities can utilize either the higher-initial-cost but more convenient liquid manure systems, or the more conventional, lower-initial-cost manure scraping systems.

Probably the main reason many producers erect nontemperature-controlled swine finishing facilities is a slightly lower initial cost.

A temperature-controlled facility normally provides more convenience because there will not be problems such as frozen manure or water pipes. The pigs' feed efficiency should be a little better during the winter. And the producer can work in shirt-sleeve comfort.

If a temperature-controlled finishing facility is built, a building that can be opened for natural summer ventilation is normally more satisfactory than one using summer fan ventilation.

Regardless of the type of confinement finishing facility, a temperature- and timer-controlled water sprinkling system is recommended for cooling the animals.

In open-front, nontemperature-controlled finishing facilities, either bedding or overhead radiant heat will improve pig comfort and performance. Bedding is more logical for manure scraping systems, and heaters are better for liquid manure handling systems.

Floor heat has been used in some open-front finishing facilities with varying degrees of success. It is not as effective as bedding or overhead radiant heat, but a hover over the heated floor to better confine the heat may be more satisfactory.

Breeding Herd. Since neither research nor producer experience provides a strong basis for specific suggestions on environmental features for confinement facilities for the breeding herd, logic says to select environmental control features similar to those for finishing.

An exception might be the use of mechanically cooled housing for actively breeding boars.



A sprinkler is effective in keeping hogs cool in hot weather.

Fan Ventilation Systems

Satisfactory selection, installation, and operation of fan ventilation systems are not complicated. There are many good ventilation systems available.

To help you judge the effectiveness of a ventilation system, look for three basic features:

Adequate fan capacity—Greater fan capacity is needed for summer ventilation than for winter ventilation. At least three to five times greater fan capacity is needed. The larger the pigs, the greater the fan capacity needed.

Numerous references are available that give minimum suggested fan capacities for summer and winter ventilation rates for different size pigs.

Uniform air distribution—Providing sufficient air in a building is only a start. Ventilation air must

be uniformly distributed throughout the building to be effective.

Cold outside winter air is not difficult to distribute uniformly, but the cold air must not be allowed to drop directly onto any animals and cause drafts, particularly on baby pigs.

To achieve better distribution of summer ventilating air, several means are successfully employed. One is to greatly increase (as much as five or more times) the summer ventilation rate, which has the effect of increasing turbulence or air mixing.

Another means is to install relatively inexpensive hanging, nonpressure, circulating fans in the building to mix the air. This is an approach similar to putting a circulating fan in the living room during hot weather.

Correctly adjusted electrical control system—Several kinds of electric controls are used—thermostats, cycle timers, and solid state controllers. They each have the same basic function—to adjust the amount of fan operation according to the ventilation needs of the animal.

The control system is involved in many problems that occur with ventilation systems. The problems are generally in one of two categories: the control malfunctions or the controls are improperly used.

Trouble-shooting ventilation systems. The operator of a swine facility with a temperature-controlled environmental system does everyone (himself, the supplier, etc.) a favor if he calls for help if he initially has problems in operating the system. Frequently the problem is a result of a defective or incorrectly adjusted control.

Experience is the best teacher for trouble-shooting controls. A problem completely frustrating to a novice can be very simple to an experienced person.

Other Features

Many related features not discussed in this publication are important to evaluate when developing a satisfactory swine production facility. Foremost among these are selection of the most appropriate arrangement within the building and the desired manure management system.

Both can greatly affect the environment. For example, do the gases coming from an exposed liquid manure pit affect the pigs' performance and if so, to what extent? It seems probable that gases do adversely affect the pigs. Thus, future swine production facilities may commonly incorporate manure handling systems that rapidly remove the manure from the building by hydraulic flushing, frequent scraping, etc.

Two basic features are almost always present in successful swine confinement rearing facilities:

First, the facility provides an environment that is comfortable to the pig so he performs efficiently.

Second, the facility minimizes menial labor chores and encourages excellent swine management practices.



List of Publications

Following is a list of publications available from Iowa State University that pertain to swine environment. Unless otherwise noted, they are free and available at all Iowa county extension offices or by writing directly to Publications Distribution, Printing and Publications Building, Iowa State University, Ames, Iowa 50010.

1. Pm-394 Ventilate your farrowing house.
2. Pm-443 (Rev.) Ventilate your swine finishing house.
3. Pm-500 Open-front swine facilities.
4. Pm-501 Hot water floor heating systems.
5. Pm-502 Electric floor heat for swine.
6. Pm-503 Evaporative cooling for swine.
7. Pm-504 Ventilating air intakes for swine housing.
8. Pm-532 Spray cooling of swine.
9. Pm-576 Gas infrared heating for swine.
10. MWPS-8 Swine Handbook, Housing and Equipment. (None free—\$2.00 per copy. Available from Agricultural Engineering Extension, 200 Ag. Engineering Bldg., Iowa State University, Ames, Iowa 50010; or from county extension offices.)

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

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