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Winter Operation of the Slotted Floor, Open-front, Finishing Building

Charles K. Spillman

Interest in environmentally-controlled facilities for swine has been increasing recently. Farrowing in such a facility can be justified for producers who plan to be producing pork for some time. However, many producers, with good justification, prefer open-front buildings for finishing pigs.

The growing and finishing unit at the Kansas Agricultural Experiment Station is an open-front building facing south, with all pen floors slotted and a liquid-manure, oxidation ditch beneath. It is two wings connected by a storage and service area. Each wing is a metal-sided, clear-span structure containing 16 pens, 6 x 15 ft with a 6 ft alley on the south side. The roof is insulated with an exposed, one-inch blanket faced with a plastic vapor barrier; outside walls have sprayed-on insulation approximately one inch thick.

Originally we planned to operate the building with an open front year-round, but 30 days after December 19, 1968, average daily gain of pigs weighing about 80 lbs was 0.25 lb and several pigs died. Freezing caused the oxidation ditch to malfunction, so we closed the open front with 6-mil polyethylene. That improved environmental conditions inside so the pigs performed nearly as well as expected; however, water in the oxidation ditch still froze.

The next year (1969) we enclosed the open front with 3/4" plywood and 6-mil, clear polyethylene. The temporary closure was designed to be installed in the fall and removed in the spring. Gas-fired catalytic heaters were installed over the animals' sleeping area with two exhaust fans in the back wall. The heaters in each unit were thermostatically controlled. Research during the winter of 1970-71 was conducted to evaluate the thermal environment in the building and compare animal performance then with other periods.

Animal Performance. Since 1969 animal performance has been representative of what would be expected, as shown by data in Table 11.1. Less-than-extensive experience to date indicates that a slotted floor, open-front building should be enclosed with some type of temporary closure during Kansas winters.

Table 11.1. Animal Performance Data from Temporarily Enclosed, Open-front Pig Shelter

Time	Average weight during trial (lbs)	Length of trial (days)	Gain per day (lb/day)	Feed/gain ratio
Winter 1968-69	123	92	1.41	3.20
Winter 1969-70	141	72	1.69	3.09
11/25/70 to 1/13/71	133	66	1.58	3.10
1/18/71 to 3/24/71	163	63	1.70	3.42
Summer	143	70	1.67	2.90

Environmental Data. Temperature and humidity data in Table 11.2. were collected during times indicated (Table 11.1.) during the 1970-71 winter. The data are averages of all observations. Numbers in parentheses are high and low daily averages (average during a one-day period but not necessarily the same day). They indicate the range of conditions that occurred during the two periods.

Table 11.2. Average Data for Winter Tests, 1970-71

Temperature (F) or relative humidity (%)	Experiment 1 11/25/70 to 1/13/71	Experiment 2 1/18/71 to 3/24/71
Outside air (F)	31 (6, 59)	37 (21, 63)
Inside air (F)	49 (35, 68)	59 (52, 68)
Black globe (F)	59 (42, 75)	72 (64, 79)
Floor (F)	47 (29, 67)	57 (45, 72)
Ditch liquid (F)	53 (45, 62)	55 (50, 62)
Relative humidity (%)	71 (56, 84)	52 (34, 80)

The environmental and animal performance data show that over-all environment in the building was satisfactory. Black globe temperatures were several degrees above air temperatures, so the thermal environment was improved by the infrared heaters. Temperature of liquids in the oxidation-ditch were several degrees above freezing at all times, so it might be possible to operate with less heat. However, on at least one day floor temperature dropped to 29°F so heated waterers and protected water pipes still would be required.

Plan Before Building. Pigs grown in open-front buildings with solid concrete floors and no bedding do perform less well than those with access to bedding. Purdue Agricultural Experiment Station workers have shown that, with bedding, radiant heat can be used to bring performance up to expectations. The environment in a slotted floor unit is severer than in a conventional unit, so more precautions are required.

Producers considering a slotted floor, open-front, finishing building should study their plans before building. In general, slotted floor, open-front buildings give summer results similar to those from solid concrete floors. During winter, however, pigs in open-front shelters require more protection.

A system should be planned so a temporary winter closure can be placed on the open south wall. During four winters at Manhattan, clear 6-mil polyethylene supported at 4-foot intervals, vertically and horizontally, has been satisfactory. Lath and 4-penny, ring-shank nails were used to fasten the edges. Water condensing on the plastic drains to the outside.

With an enclosed front, the remaining walls and ceiling must be insulated to prevent condensation. A one-inch-fiber-glass batt, or equivalent, protected with a vapor barrier should be adequate. An infrared heater is needed for extremely cold periods and to prevent sudden temperature changes on animals moved from warm facilities. Installing heaters to provide around 400 Btu per pig per hour should be adequate for Kansas. LP-gas-fired units should have a safety shut off and a valve for decreasing or increasing output.