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SWINE HOUSING RESEARCH - SOUTHEAST EXPERIMENT FARM

R. W. Seerley, H. G. Young and J. F. Frederikson<sup>1</sup>

The development of the Southeastern Experimental Farm has created the opportunity for studies in swine housing management. Initial steps taken to develop a program were the construction of three temporary structures, which were described in the 1963 Animal Science Mimeo Series. Results of the first summer study (A.S. Mimeo 63-1) were reported. Daily gains and feed required per pound of gain were approximately the same among pigs on slotted floor, concrete floor with slotted dunging alley and concrete floor with bedding. More labor was required for the conventional concrete floor and sloping floor than was required for the completely slotted floor.

In 1963 all pigs were removed and the farm was repopulated with SPF (specific pathogen free) pigs. The uninsulated temporary house was moved to pasture for breeding animals, but the two insulated houses were used for growing-finishing pigs in the winter of 1963-64 and the summer of 1964.

New Swine Research Building

The swine research building recently completed should prove to be a valuable research and demonstration unit for hog feeders in the state. The structure was designed for the purpose of studying different floor management systems, liquid manure handling and waste disposal through use of a lagoon. These management practices are relatively new in South Dakota swine housing and each has created problems that require solution to increase their acceptance in the area.

The building was planned to conform as nearly as possible to accepted recommendations in swine house construction. The basic difference lies in the floor construction where four different floor types were installed.

The floor plan of the new research unit is shown on page 5. The building is 36' by 50' and includes an office and feed room as well as swine housing facilities. The pen area is 36' by 40' and contains 16 pens each 5' by 15' in size. The area is divided into four different floor types, each being 20' by 15' in size. Three of the floor types have slotted floor areas varying from 25 to 100 percent of the total floor area. The fourth section has a narrow gutter running across the lower end of the sloped concrete floor. Pit areas under the slotted floors are adequate to hold at least two weeks accumulation of manure.

The structure is of conventional frame construction with trussed rafters and clear span roof. The sheathing is 3/8" C-C exterior grade plywood. Insulation consists of a 2-inch fiberglass blanket with vapor barrier in the walls and a 3-inch blanket of similar material in the ceiling.

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Ventilation for the structure will be provided by four 16-inch fans, each having a capacity of approximately 2400 cubic feet per minute. The fans will be controlled in such a manner that the volume of ventilating air may be varied from a very small volume (as required in cold weather) to a maximum of 9600 cubic feet per minute for summer ventilation. The fans are also reversible and will exhaust air from the building in cold weather and will blow air into the structure in summer. Fresh air from the attic area will be drawn into the pen area through a ventilation duct running the length of the building.

The lagoon was designed to allow 40 square feet of surface area per animal and will be approximately five feet deep under normal operation. This design met standards that are currently accepted as adequate for a waste disposal lagoon. It is expected that the loading of the lagoon will be continuous during early periods of operation.

Briefly, the swine research and observations on the farm will include:

1. Initial building costs including the comparison of the four types of floors.
2. Growth and performance of swine at farrowing and during growing and finishing while on the four floor types.
3. Labor and other management needs in the building.
4. The cost of operating the building and cost of producing market hogs.
5. Management and nutrition studies with sows and growing-finishing pigs.
6. Maintaining SPF status of the herd.
7. Comparison of guard rail and farrowing crates at farrowing.

#### Research in Two Temporary Insulated Houses With Different Floor Designs

These houses were described in detail previously in A.S. Mimeo Series 63-1. Both houses were 22' by 22' in size and were partitioned through the center to give a total of four 11' by 22' pens. The houses were constructed of conventional wood framing and plywood sheathing. Insulation consisted of a two-inch fiberglass blanket with vapor barrier in the walls and a three-inch fiberglass blanket with vapor barrier in the roof. Ventilation fans of 800 cfm capacity controlled by a thermostat were installed in each house.

The floor systems were incorporated to study slotted floors, sloping floors with gutter and conventional concrete floor. Both pens in house number 1 had sloping floors with slotted areas at the lower end. The only difference was that the slotted area in pen 1 is four feet wide whereas it was 5' 3" wide in pen 2. Bedding was not used with this floor system. Pens were scraped as needed and waste collected in a small pit below the slats. Water and manure were flushed into a sanitary lagoon periodically. Pen 3 (house 2) was a concrete slotted floor design. A pit two feet deep under the slotted floor held the manure that accumulated throughout the entire feeding period. Bedding was not used in this system. Pen 4 (house 2) was a conventional concrete floor. Bedding was used in this pen during the winter trial only. Windows and doors were opened on both houses during the summer for good air circulation.

After a previous trial and prior to the trials reported here, the type of feeders were changed and small electrical heaters were installed. In the earlier trial, round feeders were placed in the end of sleeping areas. Invariably the pigs developed the habit of using the area behind the feeder for dunging. Removal of the round feeders and replacing them with square feeders across the end of the sleeping areas eliminated the problem. Electrical heaters were installed to maintain at least a minimum temperature of 55° F. in the houses during the winter. The body heat from 40 pigs was not sufficient to maintain a 55° F. temperature in the small housing units.

### Results

Winter Trial. The summary is shown in table 1. Pigs gained essentially the same and required approximately the same amount of feed per pound of gain in all lots. Pigs in lot 2 had a faster daily gain, but they had some advantage by finishing the test at a heavier average weight. Pens 1 and 2 were similar in design and the performance of pigs in these pens would be expected to be similar, so the observed difference in daily gains between these two lots was probably unimportant.

Table 1. Results of Winter Trial, 1963-64

House number	1		2	
	Concrete, with slotted dunging area <sup>a</sup>		Slotted	Concrete with bedding
Pen number	1	2	3	4
Number of pigs	20	20	20	20
Av. initial weight, lb.	99.3	96.6	101.0	99.7
Av. final weight, lb.	210.2	227.0	212.0	212.6
Av. daily gain, lb.	1.56	1.67	1.56	1.59
Av. daily feed, lb.	6.25	6.18	6.28	6.28
Feed per lb. gain, lb.	4.01	3.70	4.01	3.96

<sup>a</sup> Pens 1 and 2 are the same design, but pen 1 had a 4 foot slotted floor in the lower end of the sloping floor while pen 2 had a 5' 3" slotted floor in the lower end of the pen.

Pigs were clean and healthy in all pens throughout the trial. No serious feet and leg problems were associated with any of the floor designs. However, pigs on the slotted floor were reluctant to move around in the pen and two brought less on the market because of enlargements on their legs. Tail biting occurred occasionally, but a bitter tasting solution placed on the tail was sufficient to discourage the tail biter.

The labor required for cleaning the pens was lowest for the pen with the slotted floor. Pens with the sloping floor were partially scraped daily, but the labor required was only 3 to 4 minutes to clean each time. When the pigs required most of the floor space for sleeping near the end of the trial, they used the slotted area for body waste and kept the concrete floor area clean. The feeder which extended across one end of the pen was also used to control floor space for

the pigs. The feeder was moved about midway in the pen to start the trial and then moved back to provide more space as the pigs needed more area. The concrete floor with bedding required at least twice the labor as the other floors to keep the pen and pigs clean. The difference was due to cleaning out and adding fresh bedding daily. The bedding became wet every day because of the arrangement of the pen, crowded condition of the pigs and the lack of good habits by the pigs.

Summer Trial. The results are reported in table 2. There was a 7% range in daily gain between the treatment groups; but the fastest and slowest groups were in the same house with pens of similar design. If an average daily gain of pigs in lots 1 and 2 is used, pigs on the three floor designs gained nearly the same, which concurs with all of the previous trials in these houses.

Pigs on the slotted floor were more efficient in feed conversion, while pigs in the level concrete pen were rather inefficient. This is the first trial that an important difference in feed efficiency has occurred and the reason for the difference in this trial was unknown.

Table 2. Results of Summer Trial, 1964

House number	1		2	
	Concrete with slotted dunging area <sup>a</sup>		Slotted	Concrete without bedding
Pen number	1	2	3	4
Number of pigs	20	20	20	20
Av. initial weight, lb.	61.4	60.2	59.8	59.2
Av. final weight, lb.	222.6	221.7	211.4	212.0
Av. daily gain, lb.	1.78	1.66	1.68	1.70
Av. daily feed, lb.	6.60	6.07	5.58	6.46
Feed per lb. gain, lb.	3.71	3.65	3.31	3.80

<sup>a</sup> Pens 1 and 2 are the same design, but pen 1 had a 4 foot slotted floor in the lower end of the sloping floor while pen 2 had a 5' 3" slotted floor in the lower end of the pen.

Pigs were clean on the slotted floor throughout the trial, whereas pigs on the sloping floors in house 1 usually had some debris on them and pigs on the level concrete floor were usually filthy dirty. The level floor was cleaned daily, but it was wet throughout the trial.

Tail biting occurred among pigs on the slotted floor near the end of the trial, but treatment quickly eliminated the problem.

SWINE RESEARCH UNIT  
FLOOR PLAN

