Air Conditioning for Farrowing Houses

Cooperative Extension South Dakota State University

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For farrowing houses . . .

air conditioning

Cooperative Extension Service
South Dakota State University, Brookings
U. S. Department of Agriculture
Multiple farrowing schedules and systems adopted by many swine producers to "stretch" the season have increased the need for improved environmental control in the farrowing house. Maintaining temperatures near the best performance range of both sows and baby pigs has proven highly profitable. Desirable temperatures for sows and baby pigs differ greatly with the sow performing best at approximately 85-90 degrees (F.) while newborn pigs are most comfortable and healthy at 65-70 degrees (F.). Sow and pigs will produce best if these environmental temperatures are maintained for both summer and winter operation. Suggestions and floor plans for winter heating and summer cooling are included in this publication.

During cold weather the farrowing house temperature is commonly maintained at the comfort level of the sow and the creep area is kept at 85-90 degrees using supplemental heating systems. Summer farrowing has traditionally been a period of moderate to severe heat stress for the sow, since usually little or no effort has been made to mechanically reduce temperatures to her comfort level. Being confined to a pen or crate she has no opportunity to seek a cooler environment by walking or being active. Consequently, swine producers have encountered poor litter performance and increased mortality during periods of extreme heat stress. Producers using free stall systems may have the added problem of sows vacating their stalls for extended periods of time to seek temperature relief. Light weaning weight and early weaned pigs often are the result.

Studies by the Agricultural Experiment Station at SDSU have shown that a comfortable hot weather environment can be created for the sow by directing a stream of cooled air over her snout and head (Figure 1) without materially affecting temperatures in the creep area, if standard methods of maintaining desired temperatures in the pig creep areas are employed. The use of cooled air directed toward the heads of sows in free stalls has been profitable in terms of improved litter gains, sow comfort and increased stall occupancy. Similar results can be anticipated in systems using conventional farrowing crates or stalls.

**Equipment**

A heat pump or conventional air conditioner, either the window-type or central system, can be used for providing cooled air. It is very important that only fresh air be drawn past the cooling coil and directed toward the sows. If air from the farrowing building is recirculated, ammonia present in the swine building will combine with water condensed on the cooling coil and cause excessive corrosion.

**System Design**

Adequate ventilation is as important for summer cooling as it is for winter operation. Air flow rates sufficient to remove moisture and odors must be provided. The exhaust system planned for normal winter operation will perform adequately with the cooling system. Plan to operate the exhaust fans at a rate of at least 50 cubic feet per minute (cfm) per sow and litter and set the thermostat to operate at 65 degrees.

Cooling rates recommended for use in a farrowing house are 1,500 Btu/hr or 5.2-ton refrigeration capacity per sow. The air conditioning fan (fresh air) is designed to operate continuously, but may be manually stopped in cool weather if a supplemental exhaust fan is used. The compressor is thermostatically controlled to provide cooling when farrowing house temperature exceeds 65 degrees. The air conditioning blower should have a delivery rate of at least 50 cfm per sow rated at 1/2-inch static pressure.

**Distribution Ducts**

Air distribution ducts (Figure 6) should be about one-foot square in cross section and constructed of 1/2-inch plywood or other suitable material. The duct may be suspended from the ceiling or placed on top of the farrowing stalls or crates. A flexible air tube (Figure 3) is located over each sow and should extend about 21/2 feet above the floor surface. An air flow adjustment is required to balance the flow rates throughout the structure and to prevent air delivery into empty stalls.

Farrowing house plans showing suggested air conditioner or heat pump installation and air delivery duct locations are shown in Figures 1, 2 and 3. A typical cross-section of a farrowing house showing air delivery ducts and flexible tubes is shown in Figure 7.

Figures 4 and 5 illustrate typical installations of air conditioning units in farrowing houses. Figure 4 is a package unit installation typical of a window-type air conditioner or heat pump. The duct work for the fresh air inlet may be constructed as shown. The cross-section dimensions of the duct should be equal to those of the air distribution duct. At least one filter is required and should be located where replacement or cleaning is convenient. The ventilation baffle is installed for heat pump use only and is used for cold weather operation. If the ventilation baffle is installed, the filter...
Table 1. Ratings and costs* of air conditioners for various numbers of sows

<table>
<thead>
<tr>
<th>Size</th>
<th>Tons</th>
<th>Blower Rating</th>
<th>CFM</th>
<th>Cost</th>
<th>No. of Sows</th>
</tr>
</thead>
<tbody>
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<td>2</td>
<td>64</td>
<td>1100</td>
<td>$483</td>
<td>16</td>
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</tr>
<tr>
<td>2½</td>
<td>65.5</td>
<td>1310 or more</td>
<td>588</td>
<td>20</td>
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<tr>
<td>3</td>
<td>54.6</td>
<td>1310 or more</td>
<td>731</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>46.8</td>
<td>1310 or more</td>
<td>895</td>
<td>28</td>
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</table>

*Cost estimates based on estimates provided by a/c dealers, August, 1972.

Table 2. Summary of farrowing house ventilation, heating and cooling requirements.

<table>
<thead>
<tr>
<th>Number of sows and litters</th>
<th>Normal winter ventilation cfm</th>
<th>Louver and inlet area sq. in.*</th>
<th>Supplemental Heat Btu per hour</th>
<th>Solid floor Btu per hour</th>
<th>Cooling capacity tons†</th>
<th>Fan size cfm</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>800</td>
<td>200</td>
<td>15,000</td>
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<td>1.25</td>
<td>500</td>
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<tr>
<td>12</td>
<td>960</td>
<td>240</td>
<td>18,000</td>
<td>24,000</td>
<td>1.50</td>
<td>600</td>
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<tr>
<td>14</td>
<td>1120</td>
<td>280</td>
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<td>800</td>
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<tr>
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<td>1600</td>
<td>400</td>
<td>30,000</td>
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<td>2.50</td>
<td>1000</td>
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<tr>
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<td>80,000</td>
<td>5.00</td>
<td>2000</td>
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</tbody>
</table>

*See Midwest Plan Service Equipment Book (MWPS 8) for ventilation inlet details.
†One ton of air conditioning capacity equals 12,000 Btu's per hour.
Compressor Unit

Air Conditioning Coil

3' Alley

2' Slats 3' Alley 2' Slats

Air Delivery Duct

Flexible Air Tubes

Figure 2—Farrowing Stall Barn—Face Out (8 Ft. Slotted Floor)

Compressor Unit

Air Conditioning Coil

2' Slats

3' Alley

6'

5' 5' 5'

Air Delivery Duct

Flexible Air Tubes

2' Slats

3' Alley

26'

Figure 3—Farrowing Stall Barn—Face In (Optional Slotted Floor)
Air conditioning supplement coil / heater (optional) A. Dr. D t/ r e 1very uc //

Figure 6:

Detail

Compressor ~
Flexible Air Tube

Filter and
Ventilation Baffle (optional)

Outside Air

Air Flow

Figure 4—Package Unit—Compressor and Air Conditioning Coil Together

Air distribution duct (at top) with flexible tubing leading into stalls.

Figure 5—Split Unit—Compressor Separate From Air Conditioning Coil

COVER—The end of the flexible tubing (shown at top) should be about 2½ feet above the stall floor.
Figure 6—Detail of Air Distribution Ducts

Figure 7