



## Ventilating and Heating Small Livestock Rooms



### VENTILATING AND HEATING SMALL LIVESTOCK ROOMS

COMPLETE INSTRUCTIONS

NEW 88-09

G.R. Bayne, C.M. Gorman, D.E. Darby, J.E. Turnbull

Modern livestock facilities frequently include one or several small rooms to house the young, more-sensitive animals. Examples of small rooms with critical ventilation problems include pig facilities like multi-room, all-in/all-out farrowing and nursery rooms, dairy calf nurseries designed to isolate young calves from the adult dairy herd, and small poultry buildings. In all these examples, the smallest available farm-grade exhaust fans are vastly oversized for winter ventilation.

A small livestock room is hard to ventilate. The small volume of air in the room is very sensitive to changes in ventilation rate, heat supply and drafts due to uncontrolled air distribution. These problems are made more critical by the lack of fans and heaters small enough.

Another complicating factor is that many small rooms house young animals that produce only a small part of the required winter heat. Therefore, using thermostats to control ventilation rate is not as easy as it is in buildings housing more and larger animals, making interaction with the heating controls more critical.

Consider, for example, the typical nursery room for weanling pigs. A group of 50-60 young pigs, average weight 7 kg, is weaned and moved to a freshly-cleaned nursery room in January. Referring to Plan M-9700, the minimum (step 1) winter ventilation rate for this group is only 50 pigs  $\times$  0.4 L/s = 20 L/s (or 43 cfm). However, the same room in July must be able to handle 50-60 pigs approaching 25 kg average weight. These require a maximum ventilation rate of 50 pigs  $\times$  16 L/s = 800 L/s (or 1700 cfm). This is 40 times the 'step 1' winter rate!

The summer ventilation is easy—most manufacturers can supply a fan to exhaust around 800 L/s. But there are few, if any, heavy-duty farm fans small enough to deliver a reliable 20 L/s.

Another problem is that conventional air inlets do not work well in the winter. The small flow of cold, fresh air lacks the momentum to properly mix and circulate with the room air. Instead, this cold, denser air sinks to the floor, displaces the warm inside air upwards, and chills the young animals.

The ideal ventilation and heating system for small rooms such as calf nurseries, swine farrowing rooms and weanling rooms should have the following features:

- A continuous 'step 1' ventilation for cold weather, with a manual adjustment for the operator to fine-tune this minimum rate according to animal population, odors and humidity;
- Automatic control of the intermediate ventilation rates (steps 2 and 3) based on room temperature, and preferably interlocked with the heating (see Plan M-9701);
- A high-capacity, two-speed summer fan (steps 4 and 5), controlled by thermostat;
- A fresh air inlet integrated with a ducted recirculation fan, to ensure uniform distribution and adequate mixing of the fresh air; and
- A compatible system for supplemental heating, interlocked with the intermediate ventilation steps 2 and 3 so that heating is reduced as ventilation is increased. This is especially important in small rooms such as weanling pig nurseries where the animals produce a very small part of the necessary heat.

DEVELOPED BY CANADA PLAN SERVICE

**Agricultural Building Systems Handbook**

B.C. MINISTRY OF AGRICULTURE AND FISHERIES

A small livestock room is hard to ventilate. The small volume of air in the room is very sensitive to changes in ventilation rate, heat supply and drafts due to uncontrolled air distribution. These problems are made more critical by the lack of fans and heaters small enough. This leaflet ponders the dilemmas associated with ventilating and heating small livestock rooms and offers some possible solutions. To obtain a copy, contact:

**CANADA PLAN SERVICE**

Website: <http://www.cps.gov.on.ca>