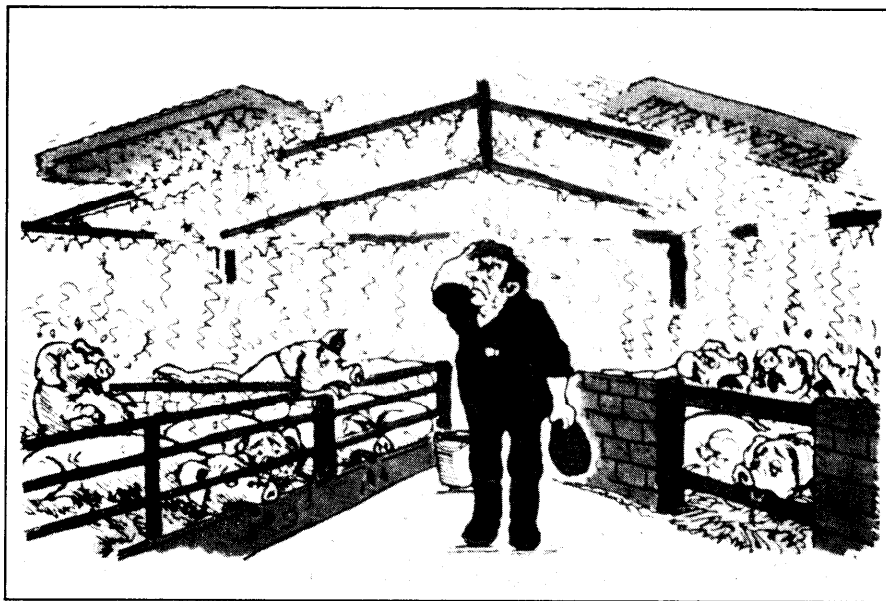


# TROUBLESHOOTING LIVESTOCK AND POULTRY VENTILATION PROBLEMS

COMPLETE INSTRUCTIONS



NEW 87:11

H.E. Huffman

The ventilation system is one of the most important, yet least understood components in a livestock or poultry barn. Its main functions are to remove respired moisture, excess heat, gases, odors and dust while maintaining a comfortable, draft-free environment.

This environment should provide comfort for the animals - not just for the operator. The behavior and productivity of animals are the best clues to ventilation performance; if they are comfortable, they will look and act comfortable. For example, huddling and panting are common animal reactions to temperature extremes (too cold or too hot respectively).

The troubleshooting tables in this leaflet describe some of the problems that occur in livestock and poultry buildings, list the possible causes and suggest remedies.

One must also appreciate that ventilation problems tend to be interrelated - one problem often causes another. For example, consider the situation where a crossflow air inlet is open too wide. The main problem will be poor air distribution within the barn, but several other related problems will develop. Colder incoming air will fall to the floor very quickly, creating drafts. Temperatures may not be uniform throughout the barn and the air will become damp because the respired moisture is not being adequately mixed and exhausted through the fans. By reducing the size of the air inlet, the incoming air is jetted into the barn, creating better mixing and a good air circulation pattern. Not only has the air distribution problem been solved, but there is no longer a floor draft or uneven temperatures and more water vapor is being carried to the exhaust fan by the better mixed air. Sometimes such interrelationships can make the analysis of ventilation problems more difficult. Often you must make several changes to completely solve a problem.

#### WHO CAN HELP?

Ventilation is not a simple, exact science. Obviously, problem identification and problem solving became easier with time and experience.

If you have difficulty in solving a problem, contact someone with ventilation expertise. First try the equipment supplier, who should be able to correct any equipment malfunctions. Often the equipment is installed and/or wired incorrectly; contact your building contractor and/or electrician for these types of problems. Agricultural extension engineers and power company personnel can also help.

This leaflet also contains a "Ventilation Evaluation Form". Use it to record the details of the barn and its ventilation problem. This information will be essential for evaluating a particular case - especially if the ventilation consultant is not able to make an on-site inspection. You can cut this form from the leaflet and mail it to your ventilation consultant.

ADDITIONAL INFORMATION can be found in other Canada Plan Service plans in the 9700 series and in Agriculture Canada Publication 1799/E, *Good Energy Management in Farm Livestock Housing*.

**TABLE 1 TROUBLESHOOTING WINTER VENTILATION PROBLEMS**

Problem	Possible causes)	Remedies
Bad air throughout building	Insufficient or intermittent ventilation	Check fan louvres for free movement Install smaller step 1 exhaust fans to allow continuous minimum ventilation If animals can tolerate cold, reduce thermostat setpoints to increase ventilation rate
	Thermostatic controls) of continuous fans not located, set, or wired properly	Check control location for drafts or dead air pocket Check calibration (setting), using a thermometer Check that two-speed fans are switching to low speed (not high) when temperature falls
	Insufficient heat to force continuous ventilation while maintaining building temperature	Add supplemental heat to maintain temperature
Bad air in localized areas within building	Exhaust fans not protected from outside wind pressure	Install proper fan hoods, to maintain an output in spite of headwinds
	Fresh air not well distributed within building space	Adjust or add air inlet in building. This might take the form of recirculation equipment In older buildings, seal oversized cracks or holes wherever air is good

**TABLE 1 TROUBLESHOOTING WINTER VENTILATION PROBLEMS (CONT'D)**

Problem	Possible causes)	Remedies
Condensation on walls or ceiling of building	<p>Insufficient insulation</p> <p>Insufficient heat to provide moisture control at desired building temperature</p> <p>Nearly saturated air migrating to cooler building area</p>	<p>Add or replace insulation</p> <p>Lower building temperature and humidity by increasing exhaust rate, if animals can tolerate cooler conditions</p> <p>Add supplemental heat, particularly for young animals and poultry</p> <p>Relocate some mature animals to cooler area to raise the temperature</p> <p>Recirculate inside air to eliminate the temperature differential</p>
Large building temperature fluctuations, e.g., 5C every 10 minutes or so	<p>Excess ventilation:</p> <ul style="list-style-type: none"> <li>- exhaust fan capacity steps too large;</li> <li>- too much fan capacity per thermostat;</li> <li>- faulty (insensitive) thermostat;</li> <li>- thermostatic control not located to sense average room temperature</li> </ul> <p>Oversized heater</p>	<p>Isolate the problem area except when in use (e.g., cow holding area at milking parlor)</p> <p>Install lower-capacity fans)</p> <p>Install additional thermostatic control or switch off one fan during very cold weather</p> <p>Clean or replace thermostatic control</p> <p>Move thermostatic control away from draft or heat source affecting sensor</p>
Building too cold, air quality good	<p>Excess ventilation:</p> <ul style="list-style-type: none"> <li>- thermostatic control set too low;</li> <li>- exhaust rates too high</li> </ul> <p>Lack of insulation or heat:</p> <ul style="list-style-type: none"> <li>- over-ventilation is used to control condensation;</li> <li>- insufficient heat</li> </ul>	<p>Reduce firing rate or replace with smaller heater</p> <p>Readjust, clean, or replace thermostatic controls)</p> <p>Install one (or more) lower capacity exhaust fans</p> <p>Switch off one of two fans connected to one thermostatic control</p> <p>Calibrate thermostatic control with an accurate thermometer</p> <p>Step the thermostat settings to prevent over-ventilation in cold weather</p> <p>Insulate building to permit higher relative humidity without condensation</p> <p>Increase stocking density</p> <p>Consider conventional supplemental heating, heat exchangers, solar walls, etc.</p>

**TABLE 1 TROUBLESHOOTING WINTER VENTILATION PROBLEMS (CONT'D)**

Problem	Possible causes)	Remedies
Drafts	<p data-bbox="618 275 894 327">Air inlet opening too wide, causing cold air to fall</p> <p data-bbox="618 363 954 474">Obstruction on ceiling, causing cold air to fall (greatest effect in low airflow applications, e.g., furrowing and calf units)</p> <p data-bbox="618 653 935 705">Soffit air intake not hooded or protected from wind</p> <p data-bbox="618 915 935 1085">Leaky older building, poor fitting doors and windows Mechanical air recirculation (distribution) systems that are oversized, misplaced, or misdirected</p>	<p data-bbox="1079 275 1430 359">Reduce inlet opening to create air jetting and mixing above animals/birds</p> <p data-bbox="1079 363 1401 474">Remove obstruction or reduce effect, provide at least 1 m of smooth ceiling surface in front of air inlet</p> <p data-bbox="1079 478 1390 531">Suspend conduit farther from ceiling</p> <p data-bbox="1079 535 1406 619">Install corrugated metal ceiling in direction of airflow during construction</p> <p data-bbox="1079 623 1414 655">Preheat incoming air in hallway</p> <p data-bbox="1079 659 1386 690">Move soffit intake farther out from wall towards fascia board</p> <p data-bbox="1079 695 1398 821">Restrict (close down) external air intake for winter period using a hinged door or sliding panel</p> <p data-bbox="1079 825 1409 909">Draw air from attic during winter, if continuous ventilation is certain</p> <p data-bbox="1079 913 1398 945">Seal excess cracks and holes</p> <p data-bbox="1079 949 1382 980">Cover summer exhaust fans</p> <p data-bbox="1079 984 1386 1056">Consult the manufacturer's literature or contact representative for assistance</p>

**TABLE 2 TROUBLESHOOTING SUMMER VENTILATION PROBLEMS**

Problem	Possible causes)	Remedies
Air too hot throughout building, compared to outside temperature	<p>Insufficient air movement:</p> <ul style="list-style-type: none"> <li>- fan(s) not operating;</li> <li>- fan blades not set properly in orifice;</li> <li>- insufficient fan capacity;</li> <li>- fan hoods too small or obstructed;</li> <li>- opening to grouped fans too small for total air flow</li> </ul> <p>Restricted airflow from outside intake to inlets:</p> <ul style="list-style-type: none"> <li>- air intake not large enough;</li> <li>- warmed attic air drawn in because of insufficient air intake area</li> </ul> <p>Excess attic heat load to building:</p> <ul style="list-style-type: none"> <li>- insufficient attic insulation and/or ventilation;</li> <li>- dark (nonreflective) roof surface</li> </ul> <p>Excess animal density</p>	<p>Replace defective controls or motor</p> <p>Adjust fan on shaft for one-third protrusion</p> <p>Add high-capacity fans or open building completely by opening doors and windows</p> <p>Increase fan hood size to at least two times fan area</p> <p>Increase wall opening or move a fan from group to other wall</p> <p>Increase air intake area on outside of building</p> <p>Increase air intake area on outside of building and ensure vertical blocking is placed between trusses</p> <p>Reinsulate attic and ensure adequate eave inlet and ridge or gable opening areas</p> <p>Consider either painting the roof white to reflect the sunlight, or installing a new roof that has a solar-reflective surface</p> <p>Reduce animal/bird density during summer (if practical)</p>
Building air too hot in specific areas	<p>Air inlets open too far, causing short circuiting to exhaust fans) or concentrated air inlet</p> <p>Lack of fresh air</p>	<p>Reduce air inlet opening to cause jetting in all areas (close doors)</p> <p>Add continuous air inlet or air recirculation system</p>
Building air hotter than desirable for the animals/birds	<p>Ambient temperature too hot for animal or bird comfort:</p> <ul style="list-style-type: none"> <li>- Birds/animals showing signs of heat stress (panting, lethargy, poor appetite)</li> </ul>	<p>Install intermittent spray-cooling system rather than increase fan capacity above normal rates, thus permitting evaporative cooling from body surfaces</p> <p>Use evaporative air-cooling systems if summer relative humidity is usually low.</p> <p>Do not insulate under concrete floors where mature animals are being housed</p>
Excessive daily building temperature changes and/or draft problems	<p>Thermostatic control settings too low</p>	<p>Raise thermostat temperature settings to reflect a higher acceptable room temperature during warm weather</p>



### VENTILATION EVALUATION FORM

FARMER: \_\_\_\_\_ TEL. NO. & AREA CODE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ LOT: \_\_\_\_\_ CONC. \_\_\_\_\_

TWP: \_\_\_\_\_ COUNTY: \_\_\_\_\_

On the reverse, draw a sketch of the barn or room. Show length, width, and layout of room(s); location of doors, windows, air inlet, fans (identify fans by number); orientation of barn (show direction of north). Use a scale of 1 square = 1, 2 or more units (ft or m) for small, medium or large rooms, respectively.

Ceiling height: \_\_\_\_\_

Livestock: Type: \_\_\_\_\_ Number: \_\_\_\_\_ Av Wt: \_\_\_\_\_

List of existing fans:

Fan No.	Size	No. of Speeds	Manufacturer

Air Inlet: description; intake (source of fresh air); control mechanism

---



---



---



---

Other information that may affect the ventilation

---



---



---



---



