Farm Structures
FACTSHEET

BRITISH COLUMBIA | Ministry of Agriculture

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MINIMIZING THE CHANCES OF VENTILATION DISASTERS

Well-designed, mechanically ventilated livestock buildings normally allow operators greater environmental control than is possible in naturally ventilated barns. However, they carry with them the inherent possibility of disaster should the electrical power supply be interrupted. A typical swine or poultry barn with a negative pressure ventilation system relies on airtight construction to properly introduce air through strategically placed inlets. The difference in air pressure, created by exhaust fans, between the inside of the barn and the outdoors opens and closes these inlets. Without fan operation, introduction of fresh air is eliminated and temperatures and contaminant levels rise quickly in a densely populated barn.

The ideal system, which would protect a producer from catastrophic loss, is an adequate alarm system, coupled with an automatic start standby diesel generator. Such installations are the exception rather than the rule, primarily due to prohibitive cost. If an engine-driven generator is being considered, a diesel is far superior to a gasoline engine. Starting is more reliable, less maintenance is required and fuel storage and delivery is safer. One step down is the installation of a tractor-driven generator. Implicit in this situation, however, is the requirement that someone be around the farm at all times. Generator sizing can be on whether one wishes to service a full load or a partial load system. A partial load system will be sized to operate critical functions only such as minimum ventilation, heating, water pumping, partial lighting, etc. Typically, summer conditions dictate maximum electrical loads.

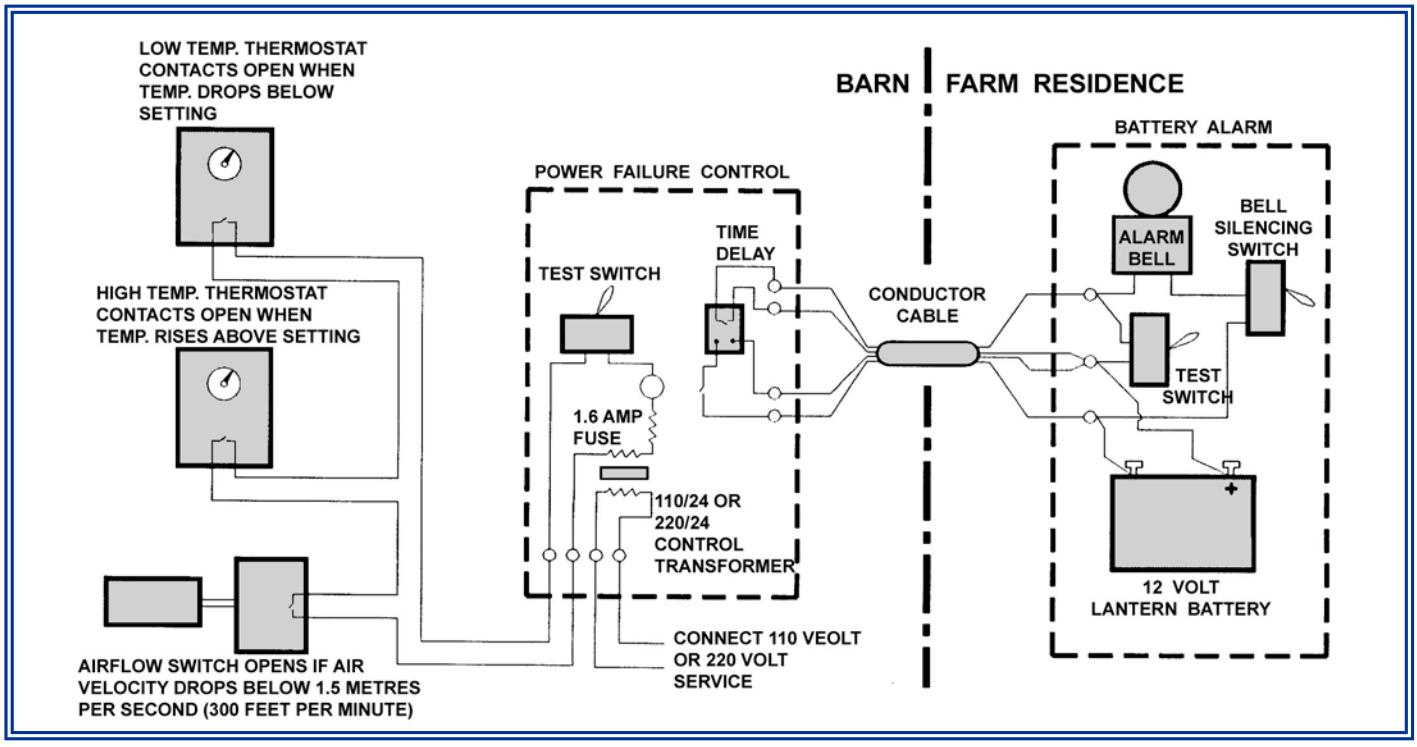
Barring any built-in standby power, a producer must rely on quick detection of power, fan or thermostat failure, and introduce emergency fresh air by opening doors, inlets or shutters until immediate repair is made. In situations where attendants might not always be present, it is essential to guarantee some automatic minimal airflow subsequent to a failure. This can be done by equipping emergency counterweighted or spring loaded doors with electromagnets or damper motors which energize upon power failure and open automatically. Building designs that incorporate chimney fans without backdraft dampers are superior to wall-mounted fans in ensuring that some stale air is exhausted by natural convection. Making sure that air inlets are blocked permanently to prevent total closure will also aid in providing some fresh air. The gap thus created should be sized based on minimum winter ventilation flows.

There is no better safeguard against failure than a well-designed alarm setup that monitors systems at multiple levels such as at both legs of the power supply, and at critical points in the barns themselves. Failure at any level should activate an alarm within both the barn and farm residence.

The alarm system should have the following features:

- Battery power and low-voltage operation so smaller-gauge wire can be used.
- Thermostats in rooms set at 35°C to sense high temperature caused by ventilation failure.
- Power outage sensors with a 15–20 second delay to prevent alarm activation during lightning storms or hydro load transfers.
- Recharge capability on the low-voltage power supply.
- Airflow or sail switches to detect stoppage of continuously operating minimum ventilation fans.
- Power failure controls in a separate room with outside entrance only, to prevent exposure to corrosive and dusty barn environments.
- Control boxes that are moisture-proof.
- System and component test switches.
- Alarm buzzer in the farm residence, and lights and horns or sirens outside the barns that can warn neighbours.
- Possibly an automatic telephone dialer that will call an answering service or neighbours if no attention has been given to a failure after a preset time.

The schematic diagram below illustrates the major features that should be incorporated into an alarm system.



Whichever system or combination of systems is installed, it is essential that alarms, fail-safe devices and standby generators be tested regularly, at least once a month. A ledger of test dates should be tabulated or, alternatively, alarm and system testing should be contracted out.

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