Farm Structures
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture and Food

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VENTILATION OF THE MILKING COMPLEX

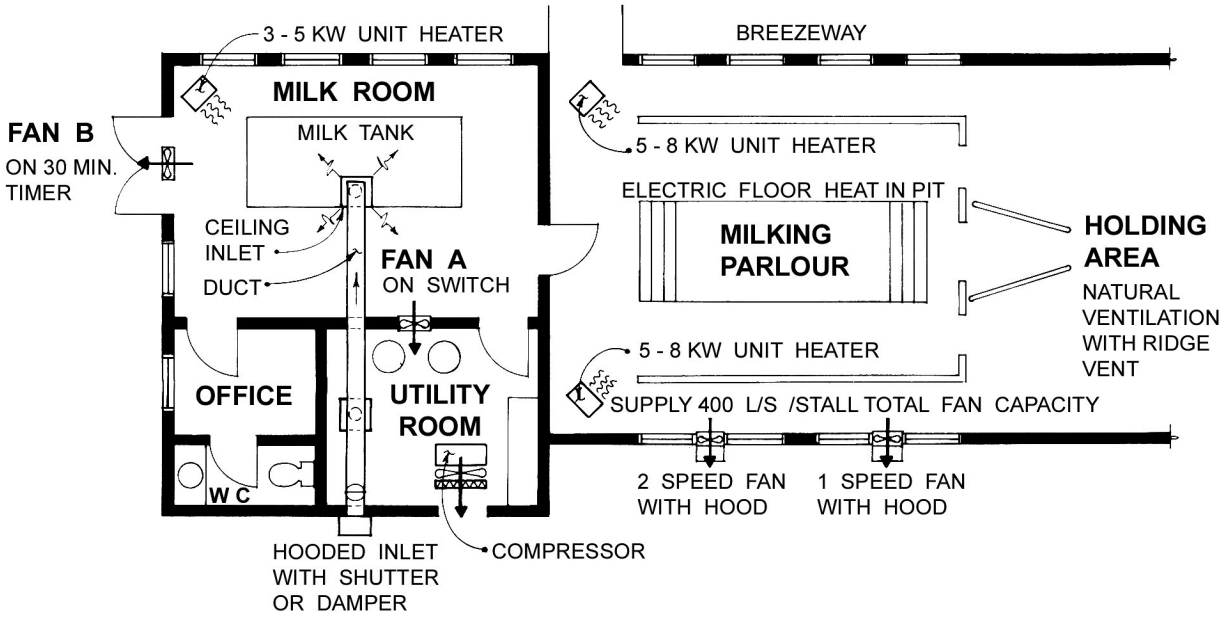

Figure 1 **Typical Floor Plan of a Milking Complex Showing Ventilation Details**

Inadequate ventilation in the milkroom, milking parlour and holding area is a common problem. Malodorous air, condensation and algal growth on the walls and ceilings indicate poor ventilation. By providing proper heat and ventilation, the operator will enjoy the benefits of a comfortable working environment. With a drier parlour and milkroom, the building lasts longer with less maintenance. The best time to plan a ventilation system is before the barn is built, however, it's never too late to install improvements.

The Dairy Industry Programs Section of the BC Ministry of Agriculture and Food confirms that off-odours in the milkroom can affect the flavour of milk which is stored in an unsealed bulk tank. Figure 1 indicates an example of a milking centre which implements the guidelines set out in this note.

MILKROOM AND UTILITY

The common recommendation for milkroom ventilation is to install a pressuring fan based on the theory that positive pressure will limit the inflow of odorous gases from the milking parlour. A pressuring fan provides poor air circulation and leads to freeze-up problems when exterior temperature drops below 0^{o} C.

This leaflet outlines a recommendation for a negative pressure ventilation system, which provides superior air circulation, air mixing at ceiling level to reduce condensation and the utilization of heat from the utility room.

- Insulate walls to a minimum RSI 3.5 (R-20) and ceilings to RSI 4.9 (R-28).

- Install two exhaust fans in the milkroom. The fan and duct system is shown by schematic in Figure 2. **Fan A** should exhaust into the utility room. Put this fan on a wall switch in parallel with the milkroom lights, this fan should be on whenever the milkroom is in use. **Fan B** on a 30-minute timer switch, exhausts to the outside. The operator should turn **Fan B** on during cleaning and whenever condensation occurs.

- Use a 280 L/s (600 cfm) fan in location **A.** Use a 470 L/s (1000 cfm) fan in location **B**. These fan sizes will provide satisfactory operation for an average sized milkroom.

- Use the mechanical heat generated in the utility room to supplement winter heat requirements. Draw outside air from the cleanest outside or attic source available. Winter operation causes compressor heat to be circulated from the utility room to the milkroom. The gravity shutters open to draw in outside air whenever **Fan B** is on. Use a minimum 360 mm (14") diameter duct or rectangular equivalent.

- An insulated cover at the compressor fan opening must be installed for winter operation. Excess heat is exhausted through this opening during the summer.

- Install a centre-mounted ceiling inlet as in Figure 3.

- Use a 3 – 5 kW ceiling-mounted unit heater on a thermostat to provide supplemental heat.

- Electric floor heat may be used for quicker drying of the milkroom floor. Use a heating cable which provides 200 – 300 Watts/m^2 (20 – 30 Watts/ft^2).

- Put automatic door closers on all doors to prevent undesirable air circulation. Keep doors shut. Use swing-out doors wherever possible. This ventilation system will not function properly if doors are left open.

- The milkroom should have two outside walls. Put screened, opening windows on these walls to provide cross-flow natural ventilation in summer.

- If the milkroom has a southern exposure, provide for extra large windows on this wall. Winter operation is improved by the addition of passive solar heat.

- The office and adjoining washroom may be heated with electric resistance heaters. A small exhaust fan in each room (or a screened, exterior window opening) helps remove moisture and stale air.

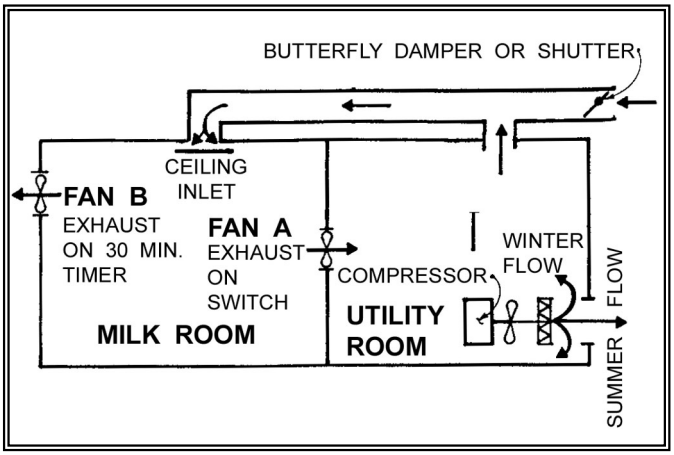

Figure 2 Cross Section Showing Ventilation Details

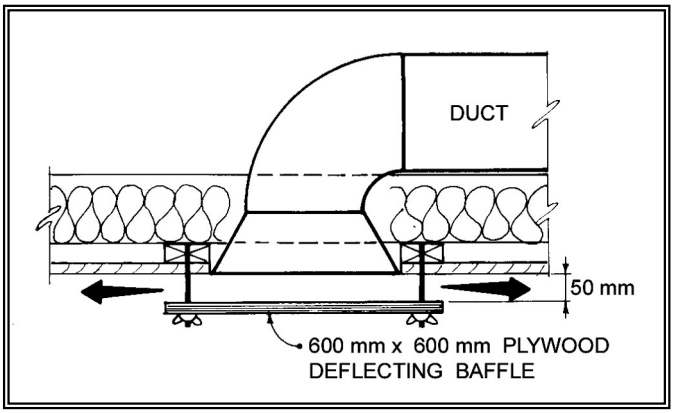

Figure 3 Detail of Milkroom Air Inlet

MILKING PARLOUR

The milking parlour environment is a compromise between operator and cow comfort. In British Columbia, not enough attention has been paid to the operator. A comfortable working environment makes for a productive operation. Proper heating and ventilation in the parlour as a worthwhile investment.

The ventilation system must be able to remove the heat and moisture produced by the cows. This heat and moisture is significant. A cow produces about 0.65 kg H_20/hr (1.5 lb H_20/hr) and about 600 Watts (2000 Btu/hr) sensible heat.

If ventilation is inadequate, condensation will form on the walls and ceilings of the parlour. Supplemental heat may be required between milkings to prevent freezing and for operator comfort.

- Put electric floor heat in the pit. This will keep the operator's feet warm and speeds drying of the floor. Provide for 200 – 300 Watts/m^2 (20 – 30 Watts/ft^2). Use a manual switch or timer for control. Electric floor heat may also be used on exit ramps where snow build-up and icing may be a problem.
- Insulate walls to RSI 3.5 (R–20) and ceilings to RSI 4.9 (R-28). Block wall construction will not provide this level of insulation even if vermiculite is added to core spaces. Stud frame walls or special modular block construction is required. Frame construction requires preservative-treated bottom sill, and bottom end of studs, with sealed interior panelling.
- Provide screened, opening windows on both sides of the parlour for cross-flow summer ventilation. Window area should be at least 0.3 m^2/stall (3 ft^2/stall). For winter operation, the exhaust fans should provide for partial opening. Track-type sliding windows or top-pinned swing-out windows will work well.
- Install adequate thermostat controlled heating capacity to maintain a 10^0C (50^0F) inside temperature. Ceiling-mounted unit heaters are effective and popular. Some operators prefer a central hot-air furnace with in-floor ducting to the pit. This system is effective but costly. For a well insulated parlour, between 10 and 15 kW of heating capacity is usually required.
- To conserve heat between milkings, some provision for closing the parlour off from the holding area and exit ramp is required.
- Total fan capacity should be 200 L/s (400 cfm) per stall. This allows for a summer mechanical ventilation option. Minimum winter rate should be 50 L/s (100 cfm) per stall. Use a two-speed fan and a single speed fan to provide three stages of fan operation. The fans should be thermostatically controlled with a manual override switch. An interlocked heating/ventilation circuit may be required to prevent energy waste (see our Publication No. 306.460-1).
- Ceilings should be 2400 mm (8 ft.) above platform level. Low ceilings do not permit adequate air circulation in the parlour.

HOLDING AREA

Natural ventilation is the best ventilation option for the holding area. To ensure good natural ventilation, barn orientation, construction and type and area of ventilation openings are all important.

- Use a good natural ventilation design in your holding area. Ridge vents having an opening of 50 mm per 3000 mm (2" per 10 ft.) of building width are recommended. Adequate wall openings are also required. These should be located on both side walls and have an opening of 25 mm per 3000 (1" per 10 ft.) of building width.
- High ceilings are preferred in holding areas. This improves the environment by allowing better air circulation around the crowded cows.
- If natural ventilation is not possible, provide fresh air by locating a large (minimum 50 L/s per cow – equivalent imperial 100 cfm) exhaust fan in the ceiling of the holding area. Fresh air can be drawn from the barn or through vents located on side-walls adjacent to the holding area.

FOR FURTHER INFORMATION CONTACT
John Luymes, Farm Structures Engineer
Phone: (604) 556-3114
Email: John.Luymes@gems7.gov.bc.ca

RESOURCE MANAGEMENT BRANCH
Ministry of Agriculture and Food
1767 Angus Campbell Road
Abbotsford, BC CANADA V3G 2M3