

Assessment of Dairy Housing Ventilation

1. Can the building be ventilated naturally?

- 1.1 Yes: ventilate naturally. (Minimal ½ sidewalls, 2” ridge and 1” eaves per 10 ft. building width, minimal 1:4 ceiling slope.)
- 1.2 No: Step 2

2. Are there doors that must remain open for animal exit and entry?

- 2.1 If yes, positive pressure mechanical system through a duct. Specify fan sizes and inlet areas like negative system below, but fans force air into the duct rather than drawing air out of the duct.
- 2.2 If no, Step 3.

3. Negative pressure mechanical system

3.1 Calculate interior volume (Length x Width x Height)

3.2 Calculate seasonal exhaust rates.

- 3.2.1 Winter 4x per hour (cu.ft/15)
- 3.2.2 Mild season 15x per hour (cu.ft./4)
- 3.2.3 Hot weather 40x per hour (cu.ft./1.5), 50x (cu.ft./1.2) or 60x (cu.ft./1)
- 3.2.4 Wind Tunnel (Cross-sectional area x 220 ft/min)

3.3 Size the fans to deliver appropriate exhaust rates.

3.4 Calculate inlet area needed for each ventilation rate. (Size so incoming air is enters at approximately 500 ft/minute (200-800).

- 3.4.1 Winter cfm/500 ft/min = sq. ft.
- 3.4.2 Mild cfm/500 ft/min = sq. ft.
- 3.4.3 Hot cfm/500 ft/min = sq. ft.
- 3.4.4 Wind tunnel: 2.5 sq. ft per 1,000 cfm

3.5 Size the inlet system to distribute air evenly to all of the animals.

3.5.1 *Slot inlet:* (or else drilled holes – see 3.5.2 below)

- 3.5.1.1 Minimal Slot Width: Determine the total length of slot in feet. Divide the winter inlet area by the length to get the width of the slot. (ex. 0.15 ft). Convert the width to inches.
- 3.5.1.2 Maximal Slot Width: Divide the hot weather inlet area by the total slot length to get maximal slot width. Convert to inches.

3.5.2 *Drilled hole inlets:* Determine the area of the plug cutter in sq. ft.

- 3.5.2.1 Minimal inlet area: Divide the winter inlet area by the hole area to get the number of holes. Distribute them evenly through out the animal housing area.
- 3.5.2.2 Maximal inlet inlets: Subtract the minimal area from the maximal area and divide the difference by the area of a single hole. Distribute evenly and make a device to cover them during cold weather.

- 3.5.3 If a *duct box* is constructed, the cross-sectional area should equal 1.5 times the maximal inlet area divided by the number of evenly spaced fresh air openings into the duct.