



Fan Cooling Dairy Cows

By

Curt A. Gooch, P.E.

Dog dead hot summer days provide a particular challenge in keeping cows comfortable. In the Northeast, characteristics of these days are high daytime and night-time temperatures, high humidity, and little or no natural air movement. Such conditions are particularly stressful to dairy cattle.

Effects of Heat Stress

Decreased dry matter intake and loss of milk production, which are most noticeable, are not the only adverse effects of heat stress. Day-time feed intake depression and subsequent night-time slug feeding can cause acidosis and possibly further lead to laminitis. Nutrient absorption of consumed feed is reduced, decreasing feed utilization efficiency.

Heat stress can cause reproductive systems to shut down, possibly for up to several months afterwards. Consequently, rates of conception are lower and those animals that do conceive subject their embryos and fetuses to conditions within the uterus that compromise growth causing lower birth weights of calves. Milk production in the subsequent lactation (occurring in cooler weather) has also been shown to be adversely affected by previously endured heat stress.

The economical effects of heat stress clearly cannot be based on lost production alone. Fortunately, there are methods available to relieve heat stress which are economical and practical.

Effective Use of Fans

Locating fans in strategic locations throughout your dairy facility is the first step in providing supplemental cooling to your cows (we are assuming that adequate ventilation is present and plenty of fresh water is always available throughout the shelter). Research has shown that airflow over a cow with a velocity between 400 and 600 feet per minute will significantly help to maintain cow comfort at temperatures 75 °F and above.

When locating fans in a dairy facility, follow these guidelines in order of importance when incrementally installing fans:

1. Holding area
2. Milking area
3. Close up dry cows
4. Calving area
5. Fresh cows
6. High producers
7. Low producers

Holding Area:

Cooling fans should ideally be positioned in a holding area to direct air away from the parlor (figure 1a). When limited vertical space does not allow for placement of fans over the cows, locate fans along the sidewall to blow laterally across the pen in the direction of prevailing summer wind (figure 1b). Do not blow air from the holding pen into the parlor since this can be unsanitary and moves hot humid air into the milking area.

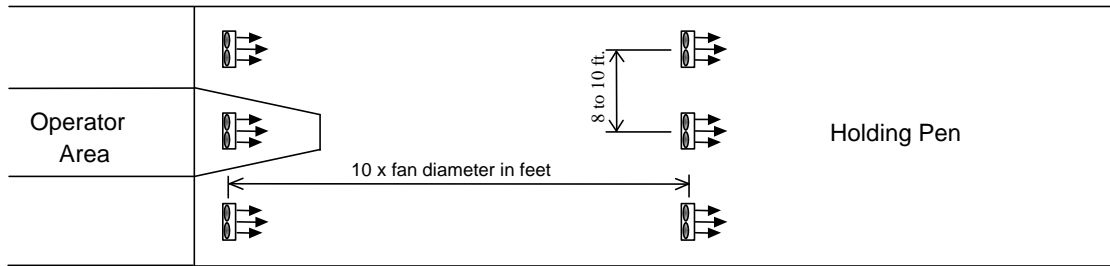


Figure 1a. Preferred placement of fans for cooling cows within a holding area.

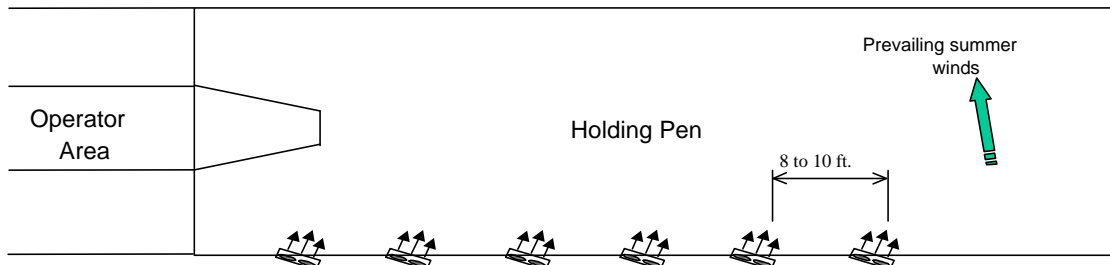


Figure 1b. Compromised option for locating cooling fans when ceiling heights prohibit preferred arrangement.

Lactating Cow Shelters:

Exact placement of fans is critical, as moving air can be used to entice cows to rest in stalls or stand at the feed bunk. Poor fan location will result in cows standing in alleys or half in and half out of a stall.

When fans need to be installed incrementally in a lactating cow shelter for economic reasons, use the following order to prioritize fan placement:

1. Over the feed alley
2. Over the inner rows of stalls
3. Over the outer rows of stalls (west sidewall stalls first)

If sufficient funds are available to outfit all rows of stalls but not the feed alley then provide fans over each row of stalls first.

Fans should be installed so that they are spaced longitudinally down the shelter with a spacing of no more than 10 times their blade diameter (figures 2a and 2b). Three-foot fans should be spaced no more than 30 feet apart while four-foot fans no more than 40 feet. Fans spaced more than 10 times their diameter lose effective velocity and as a result all cows will not be adequately cooled.

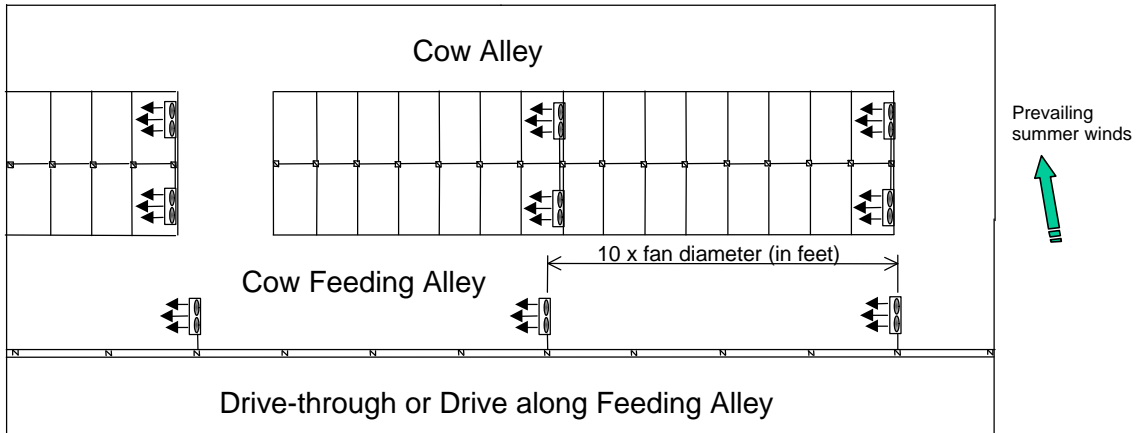


Figure 2a. Plan view of placement of supplemental cooling fans in a freestall shelter.

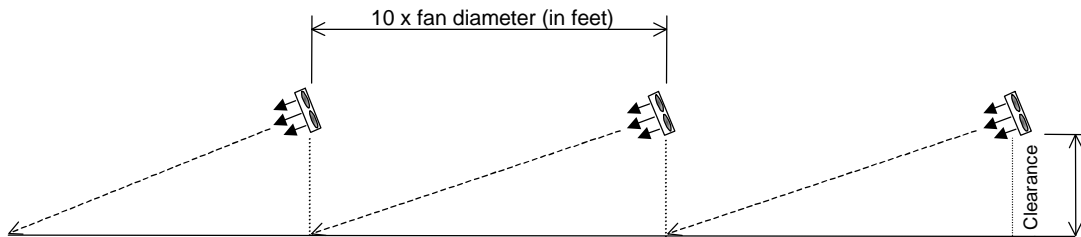


Figure 2b. Side view of placement of supplemental cooling fans in a freestall shelter.

Fans should be located vertically just high enough so they are out of reach of cattle and don't interfere with alley scraping or bedding operations as shown in figure 3. Tilt fans approximately 15 to 20 degrees from the vertical so they are aimed at the bottom of the next fan down the line. If structural limitations require fans to be mounted directly above the feed barrier (cannot be cantilevered over the feeding cows), then consideration should be given to rotate these fans so they are blowing at an angle on feeding cows.

Fan Controls:

Fans are best controlled by a thermostat. This eliminates the need for daily human attention. Mount the sensor for the thermostat so its reading represents the conditions in the cow zone. Set the thermostat so the fans start running at about 73 degrees or even a little lower if multiple hot days followed by hot nights are predicted. Complete cow cooling can sometimes take place in hot conditions when night-time temperatures drop and air movement is continued throughout the night.

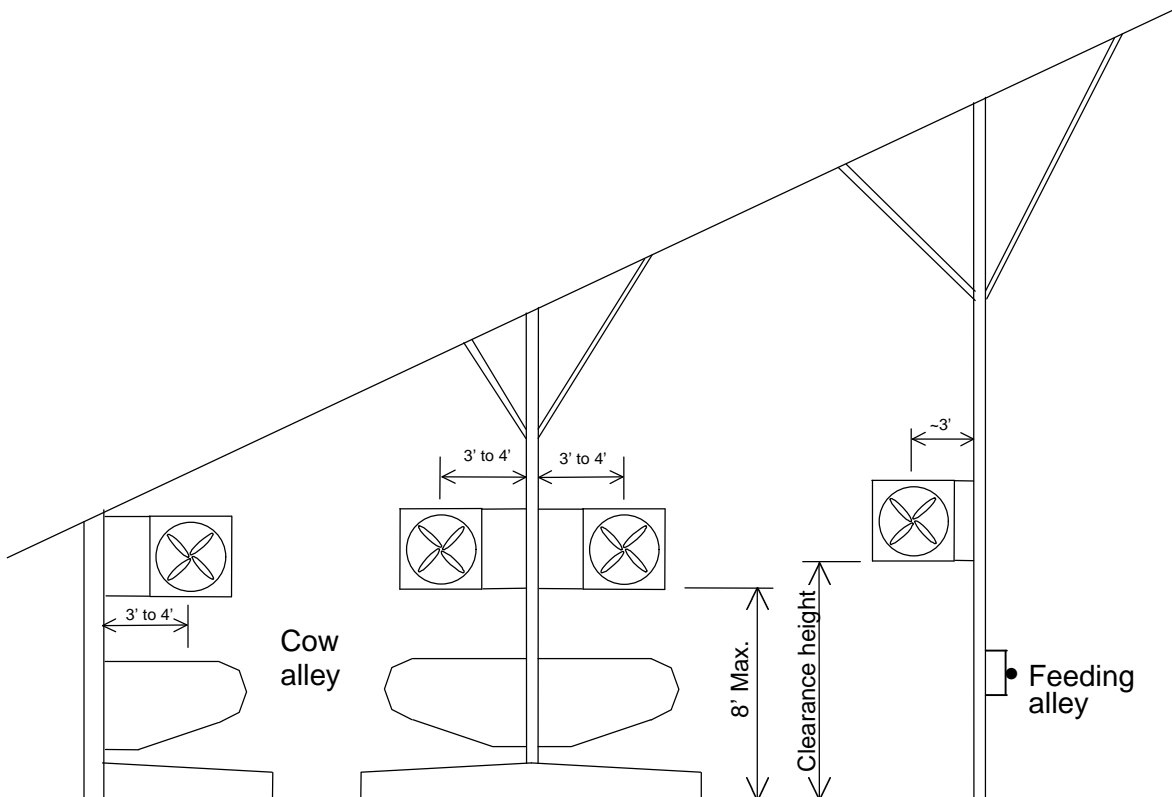


Figure 3. Placement of fans over feeding and resting cows in a freestall shelter.

Additional Cooling

Fans alone cannot effectively cool cows when the temperatures rise above the high 80's. Additional cooling can take place by using water to remove heat from the cow's body or by using it to lower the temperature of the air surrounding the cow.