Shade

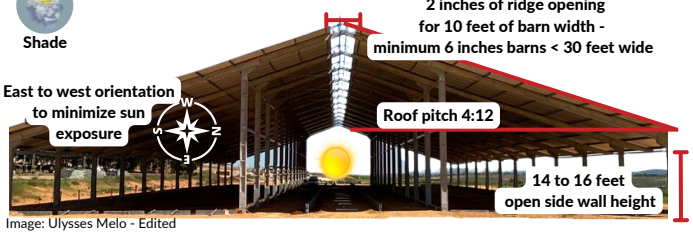
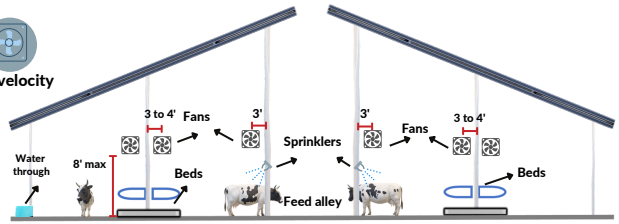


Image: Ulysses Melo - Edited

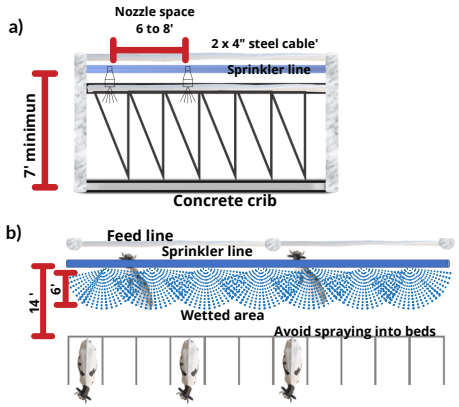
Air velocity



Typical free stall barn with fans over beds and fans and sprinklers over feedline.
Not to scale. Information is intended as a guide.

- Distance between fans = 24 - 30 feet
- Tilt fans 20 - 24 degrees - aim at the stall below the next fan in line.
- Air velocity should be 4-6 mph during periods of heat stress in resting area, feeding area and holding pens.
- Always clean and maintain fans and sprinklers before warm season

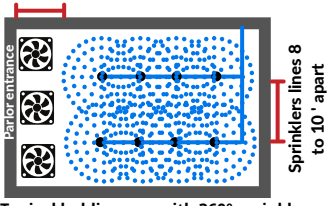
Water



Typical feedline with sprinklers a) front view b) view from the top.
Not to scale. Information is intended as a guide. (Adapted from Harner, et. al, 1999.)

- Set soaker system to initiate at a temperature of 66 to 68°F
- Wet cows to skin
- Wet cycle <2 minutes
- Use low pressure to get large water droplets

Drip dry area



Typical holding pen with 360° sprinklers and fans.
Not to scale. Information is intended as a guide.

- Fans and sprinklers should follow the same priciples as ones used on feed line.
- Holding pen fans should be set to come on at 65°F.
- Wet cows to skin, the udder will not get wet when done correctly.

Breeding as strategy to improve heat tolerance

Some cows have a naturally shorter hair coat. Those cows, called "slick," have this different hair coat due to a mutation in the prolactin receptor gene. This mutation occurs naturally in some breeds and is dominant – meaning inheritance of one copy of the gene leads to the offspring having short hair.

The slick gene was introduced to the Holstein breed, and recent studies have shown that slick cows are more heat tolerant and that the slick gene minimizes the effects of heat stress on milk production.

Slick animals have a short and sleek hair coat that was most obvious because of the very short hair on the face and poll.

Introducing the slick gene in your herd can be an effective way to improve the weather resilience of your cows!

MSU Extension dairy team

Find us at:

- Dairy at MSU
- MSU Extension Dairy Team
- @DairyMsu
- @MSUExtensionDairyTeam

For additional information or if you are interested in discussing your heat stress abatement strategies, please do not hesitate to contact Michigan State University Extension / Dairy Team personnel. To contact an expert in your area, visit https://extension.msu.edu/experts, or call 888-MSUE4MI (888-678-3464).

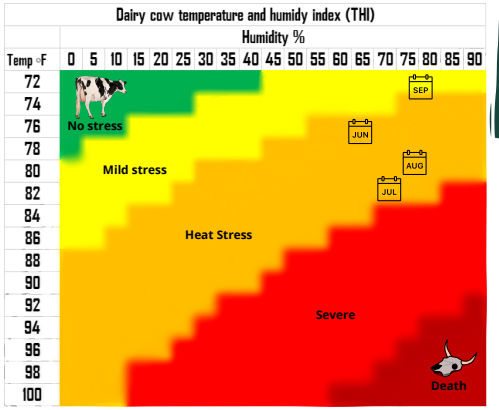
MICHIGAN STATE UNIVERSITY | Extension

MOVING MICHIGAN DAIRY FARMS TOWARDS CLIMATE AND WEATHER RESILIENCY

MOST OF THE STATE OF MI HAS WARMED TWO TO THREE DEGREES (F) IN THE LAST CENTURY.

Change in temperature is accelerating, Experiencing warmer nighttime temperatures and winters

The temperature-humidity index (THI) takes into account both temperature and humidity to estimate the level of heat stress cows will experience based on environmental conditions.



Months in the graph indicate a THI calculated using Michigan's average high temperature and average humidity.

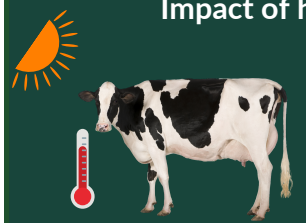
High-producing cows can begin to experience heat stress in barns at air temperatures as low as 65°F.

45

Number of heat stress days per year

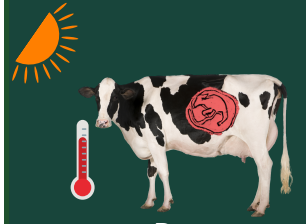
Source: Laporta et al. 2020

Impact of heat stress



Lactating cow

- Insulin concentration
- Early embryonic death
- Heat shock protein
- Catabolic hormones
- Blood NEFA and glucose
- Ruminating and lying time
- Milk and components yield
- External estrus signs
- Fertility



Dry cow

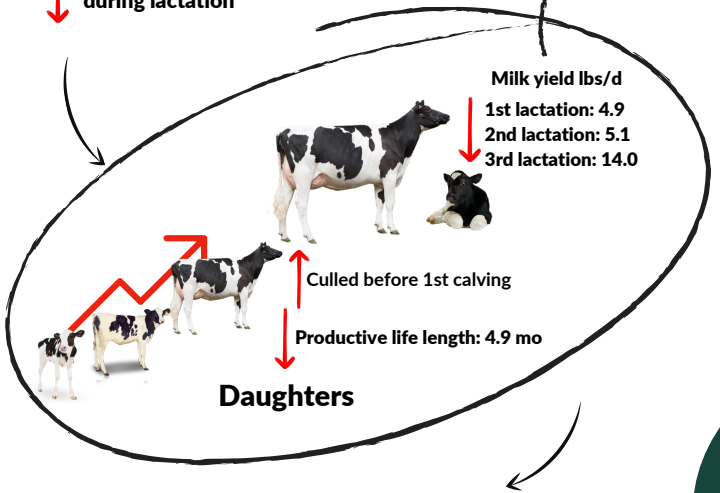
- Prolactin
- Heat shock protein
- Blood flow to uterus
- Gestation length
- Future milk production
- Mammary involution

2 Generations!!!

Late gestation dry cow

Recent studies have shown the impacts of heat stress exposure during late gestation on daughters' and granddaughters' lifetime performances.

10 lbs of milk /day during lactation

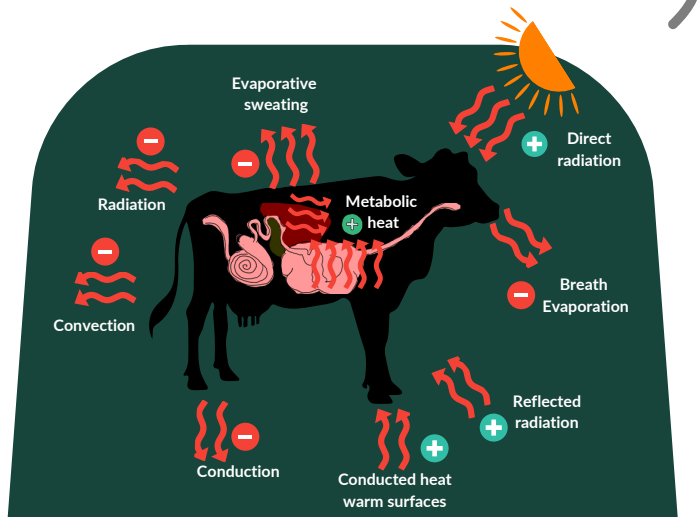


Source: Laporta et al. 2020

Annual economic loss associated with extra heifer rearing costs reduced productive life length, and milk yield of daughters, estimated for Michigan.

How do cows cool down?

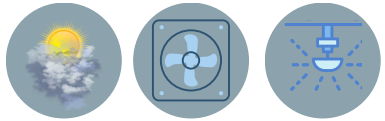
The heat absorbed by the environment and produced by the metabolic process must be lost and help the cow control its internal temperature.



Once the environment temperature exceeds the cow's internal temperature, evaporation is the only efficient way to lose heat.

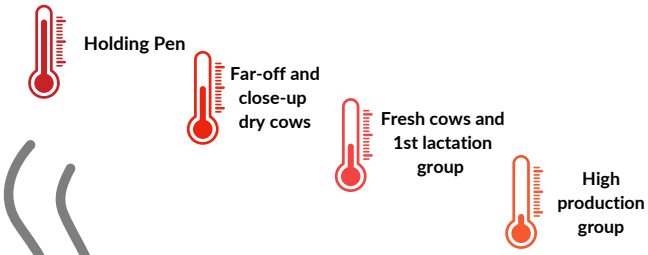
Opportunities

Appropriate cooling system relies in 3 components



Shade **Air velocity** **Water**

When installing a cooling system, prioritize areas where heat stress is more severe; it will have the most return and is easier to implement:



Cooling strategies:

Water

Hydration is VERY important for a cow to regulate body temperature.

Water should be provided with free access all the time!

- 1.5 inch tank perimeter per cow.
- At least two sources.
- Extra space in warm and humid conditions.