

PREVENTION OF HEAT STRESS IN COW BARN

(Level 1)

| Topic | Training & information Content |
|-------|---|
| 8.1 | Farm structures & housing cows/calves/young stock |
| 8.2 | Construct small zero grazing unit (SNV handbook) |
| 8.3 | Prevention of heat stress in cow barns |
| 8.4 | Cow house ground floor plan design (SNV book) |
| 8.5 | Best management practice feed fences..... |
| 8.6 | Housing & cow comfort (animal welfare) |
| 8.7 | Housing & reduction greenhouse emissions |
| 8.8 | Use of sensors (activity meter) in dairy herds |



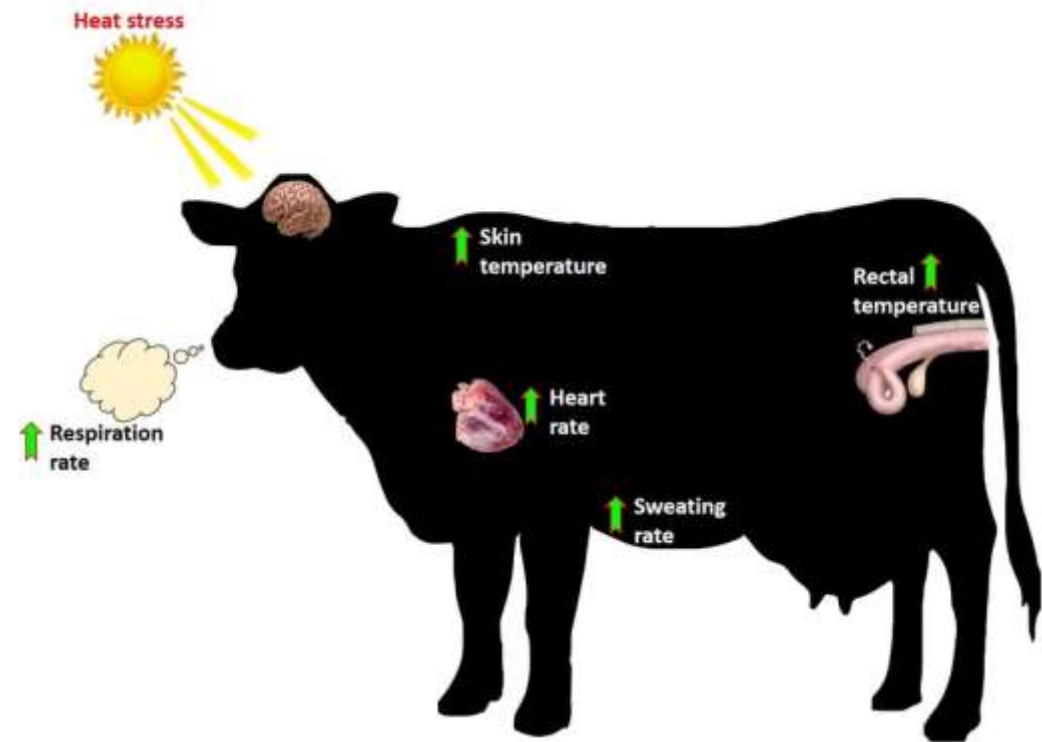
1. You will learn about (learning objectives):

- Identify factors that may cause heat stress in a cow barn?
- Know factors to consider so as to reduce heat stress in a cow barn.



2. Introduction

- The climate can have affect animal production and it influences dairy farming systems, for example: heat.
- Animals (cows) exchange heat with their immediate surrounding (environment) so as to regulate their body temperature.
- Cow house with factors like: ventilation helps manage, reduce and avoid heat stress.



3. Causes of heat stress for cows in the cow barn

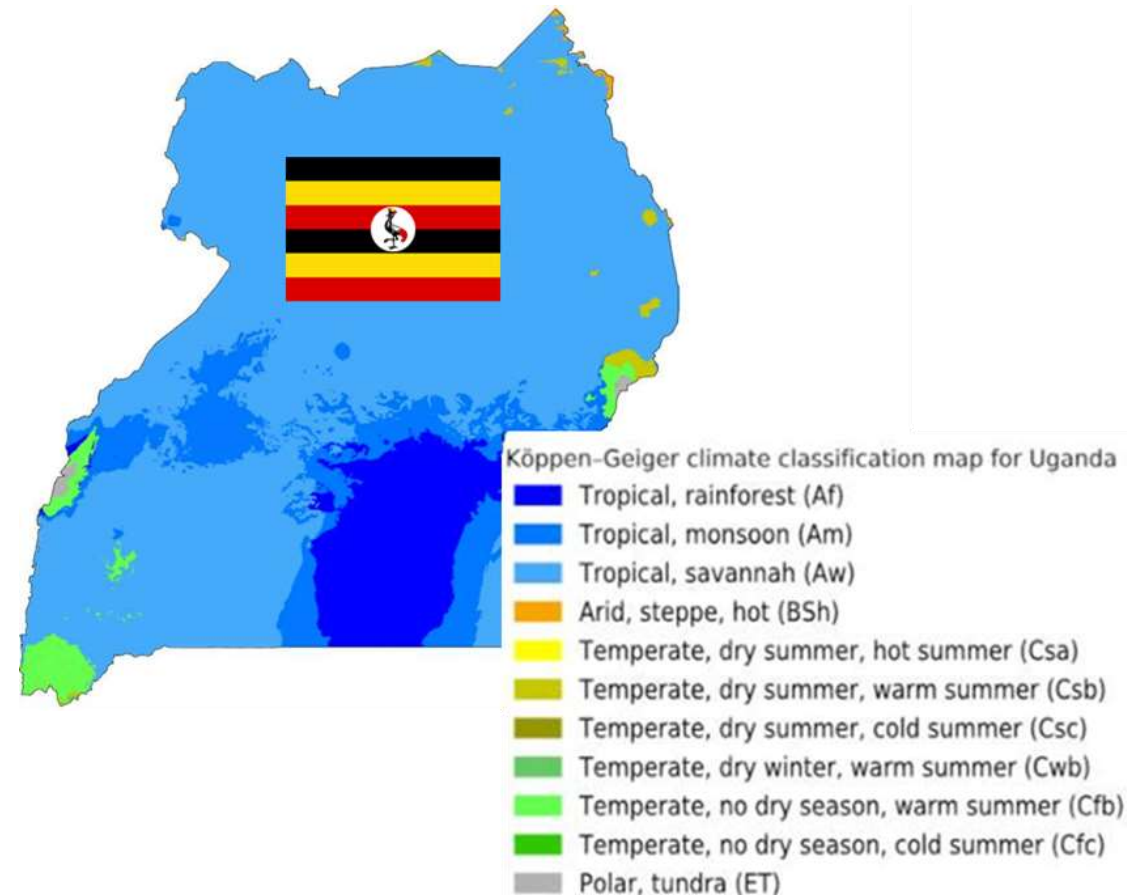
- Prolonged high temperatures are a major cause of heat stress for cows.
- Within the cow barn but also outdoors other factors that contribute to heat stress are:
 - Limited access to shade (pastures).
 - Overcrowding which results in limited air circulation.
 - Poor ventilation which results in limited circulation to fresh and cool air.
 - Limited access to clean drinking water.



See module on: Heat stress in dairy cattle nutrition

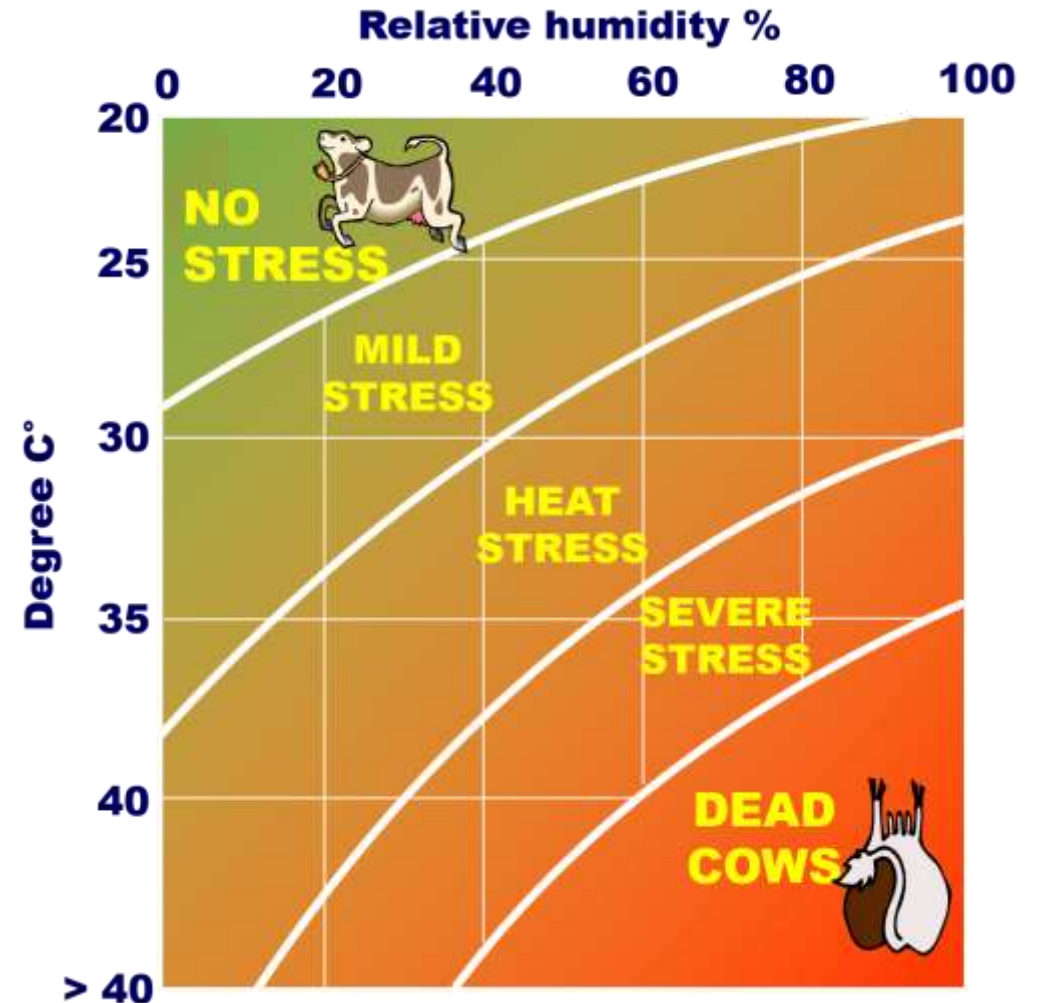
4. Climate in Uganda

- Uganda is generally a tropical climate and rainy. However, the northeast region of Uganda is semiarid.
- Rainy seasons are between the months of March to May and from the months of September to November.
- Uganda has two dry seasons that is between December to February and June to August with the months of December to February being the hottest.
- Uganda is said to be a warm tropical climate with average temperature range falling between 25-29°C.
- Even during hottest seasons evenings can be cool with temperature range between 17-18°C.



5. Temperature humidity index (THI)

- Temperature and humidity levels determine heat stress level in animals.
- Temperature humidity index (THI) is used to measure approximate level of heat stress in cattle by looking into the level of both air temperature and relative humidity.
- A THI above 72 (>72) is considered to indicate heat stress in dairy cattle.



6. How to reduce heat stress in animal housing

1. Provision of a shade.
2. Enable free flow of air through considering ventilation when designing a cow barn.
3. Provide clean drinking water to cool down COWS.



7. Provision of a shade or shelter

- Provision of a shade goes a long way at reducing the effects of heat stress.
- This is the reason why one of the response of cows to heat stress is looking for a shaded area to stay in.
- Shelter (shade) can be provided in two different ways as follows:
 1. Shade in the natural environment (trees)
 2. Sheltering in constructed structure (cow barn)



7.1 Provision of a shade or shelter Cont'd...

- Farmers should maintain adequate supply of quality feed (forage that is relatively low in fibre).
- Also provide fresh, clean water and a shady area for animals (natural (trees) or constructed).
- Where roofing systems may be hard to avail, farmers can suspend shade net in holding area/boma/pen to protect against direct sunlight.

Shading by providing roofing and net suspension



8. Shade from the natural environment

- Pastures fields provide suitable and natural environment for feeding & resting.
- Trees provide the best shade, they have a cooling effect because leaves absorb heat.
- Thick bushes/hedges used as fences provide protection from sun, when planted especially in an east-west direction provide shade in the hottest parts of the day.
- Trees that are well trimmed allows wind flow for cooling.



9. Shelter from raised structures (cow barn)

- Shade structure needs to consider all the cows in the herd and meet their needs for a cool and comfortable environment.
- Construct shelters using materials that reflect more heat during hot times of the day or periods.



10. Factors to consider when building a shelter

1. Site location for the cow barn

- Farmers should consider height of the roof and direction of prevailing wind.
- The length of the house should be from east to west.



2. Dimension of the cow barn

- Cubicle dimension should be as per cow size.
- Shade structure should be a height of 3 meters high to enable enough air supply and ventilation.



10.1 Factors to consider when building a shelter Cont'd...

3. Material to be used for the shade

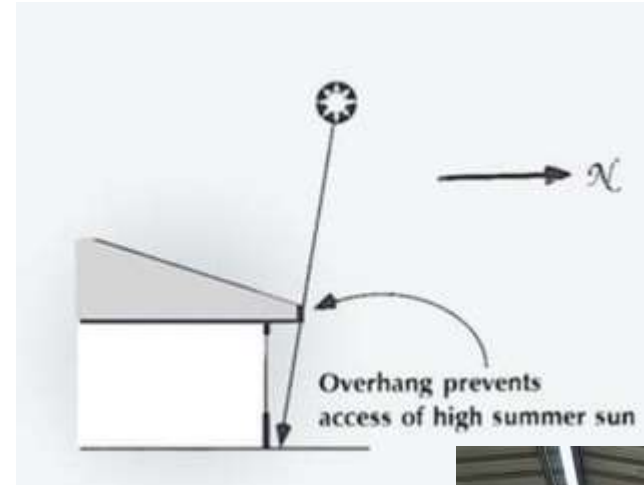
- Existing climatic conditions of a region also dictate material to be used.
- Using aluminium/galvanised steel (insulated roofs) are ideal material and in combination with other factors like ventilation goes a long way in reducing heat stress.



10.2 Factors to consider when building a shelter Cont'd...

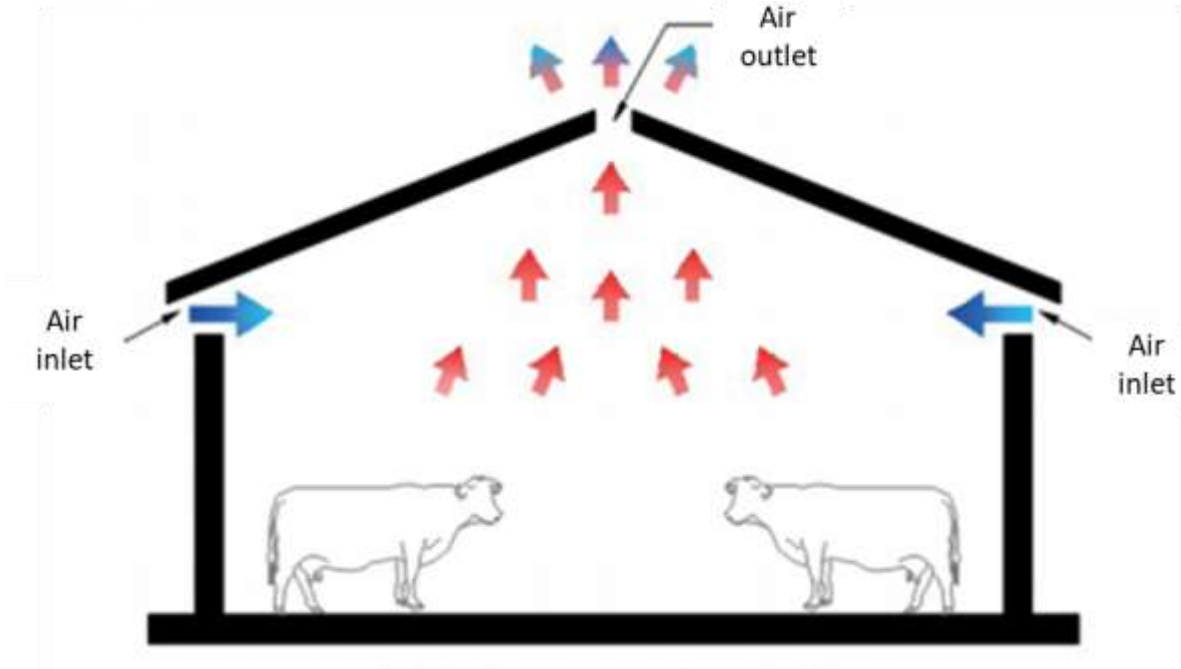
4. Improving housing efficiency

- Direct sunlight results in majority of heat gain and considering using right size of roof overhangs helps reduce sunlight penetration in the cow barn.
- One should also consider whether it is necessary or not to erect side walls in cow barn as it can prove to be an added expense in housing.
- The climatic conditions in East Africa generally does not encourage farmers to build up side walls in cow barns.
- No walls and half walls encourages better air flow. Half walls can be a height similar to cow's height approximately 165 cm.



11. Aiding ventilation through cow barn design

- The design of the cow barn significantly contributes to the management of heat inside the cow barn through the exchange of air inside the cow barn and outside.
- Good air exchange/ventilation removes hot moist air and rate of convective heat loss.
- Whether it be the interior or exterior design, this can be done in various ways such as:
 1. Design of ventilation system applied.
 2. Spacing recommendations.
 3. Number of animals



11.1 Design of ventilation system

- Increasing air flow over a cow has a dramatic effect on heat loss from the cows skin through evaporation.
- To improve ventilation area around the cow barn should be a distance a way from vegetation and forage to improve air flow.
- Side inlet and ridge outlet ventilation sites are basic ventilation improvements that farmers should consider.



11.2 Spacing recommendations

- Animals that are tied to a rope tend to face difficulties in breathing (inadequate oxygen) and even injure themselves.
- This animals movements are constrained, where otherwise they could move to a shade or if the rope is tightly made limits proper breathing.



11.3 Number of animals (stocking rate)

- A highly stocked animal housing encourages heat stress-related problems.
- Highly-stocked animal housing also furthers the impact of heat stress especially during hot periods of the day.
- Flow of fresh air within a cow barn is discouraged by this.



12. Drinking water as a coolant

- Provision of water is critical, water is an essential need for animal nutrition as it aids many processes in the body.
- Provision of cool drinking water is important during the periods of long dry seasons to help lower heat stress load on the cow.
- Location of water should be familiar to cows, close by and should be filled up quickly to ensure ease of access when needed.



12.1 Drinking water as a coolant Cont'd...

- Water troughs in the outdoors especially should be shaded to keep the water provided to cows cool as possible and close to feed source.
- Farmer should reduce cows walking long distances to access water and increase water location sites in hot weather.
- Cows tend to drink more water as temperature rises.
- There should be enough space during periods of high temperature for 25% of the herd to drink water at the same time.



13. Summary (Take home messages)

- ❑ There two basic factors farmers can work with to reduce the effects of heat stress, that is:
 - Adjusting the ration fed to cows
 - Adjusting the environment where the cow lives.
- ❑ Fresh palatable high quality feed ration ingredients (produce low heat production during digestion) should be available.
- ❑ Shift feeding time to cooler periods of the day.
- ❑ Minimize feed sorting by ensuring uniformity of mixed and delivered ration.
- ❑ Create a favourable environment for cows through animal housing either outdoors or indoors as discussed.

