HEAT STRESS IN CATTLE (Heat Intolerance Syndrome)

Commonly during summer month

Elevation of body temperature due to peracute results after a dairy cows has been exposed to **High ambient temperature & Elevated ambient humidity / Excessive heat production / Deficient to heat loss / Absorption**.

- Cattle do not sweat effectively (Through respiration cool themselves)
- Compare to other animal cattle cannot dissipate their heat load effectively
- Major disadvantage
  Additional heat generate from Rumen by fermentation processs & Lactation
- **Susceptibility:** Heavy cattle/Black haired/High lactating cattle cannot handle heat stress compare to light weight/low milk yield animal.(**High fat – prevent the heat dissipation**)
- Cattle lose water from Increased respiration & Perspiration (**process of sweating**)

CLINICAL SIGNS

VISIBLE SIGNS	INVISIBLE SIGNS
• Increased Rectal temperature : >40°C • Increased Respiration : 70 breaths /min (**Due to ↑ temp on Respiratory centre**) • Panting (**Open Mouth breathing**) • Protrusion of tongue • Congested CMM (**Conjunctival Mucus Membrane**) • Anorectic (**which is natural response to reducing metabolic heat**) • Standing & their head down • Increased drooling of saliva • Increased heart rate (**↑Temperature - ↓BP due to peripheral vasodilatation**) • Dilated pupils • Rapid dehydration in calves • Sweating • Initially Increased thirst (**Due to dryness of mouth**) • Decreased urination (**Due to ↓ Renal Blood Flow)**	• Rumen pH is typically lowered • Increased Rumen Temperature • Rumen & Intestine motility are reduced • Increased peripheral blood flow • Decreased blood flow to intestine - decreased absorption • Huge loss of electrolyte : ↑ **K loss** from skin by **sweating** ↑ **Na loss** by **urinary excretion** ↓ **HCO3** through **salivation** • Reproductive hormone altered • Stress hormones appears in blood • Loss of homeostasis • **HEAT STRESS IS ACIDOGENIC & Rumen pH- 6 to 6.5**

Causes of heat stress

- High ambient temperature > 21°C
- High ambient humidity > 70 %
- Solar radiation
- Low air movement

Treatment (**Main Goal is to Reduce the body temperature**)

1. Shift the animal to cool / shade area
2. **Fluid therapy**
   - **Inj. RL - 10ml/kg**
   - **Inj. NS - 10ml/kg**
   - **Inj. D20 - 10ml/kg**
3. **Intraruminal fluid therapy**
   - For reduce rumen temperature
4. **Inj. Tribivet / B-complex : 10 -15ml / cow , I/M**
5. **Bol.Ecotas/ Rumentas : 2 boli/ twice in a day**
6. **Mineral mixture : Pow. Agrimin forte : 50 g /day**
7. **Liver tonic**
   - **Syrup.Vitakind – Liv : 100ml/day**

} Electrolyte & Supportive for enhance Rumen motility, Rumen microflora & ↑ Milk yield

8. **Corticosteroid**
   - **Inj. Prednisolone : 0.3mg/kg,I/M** (or)
   - **Inj. Dexamethasone : 20mg/Cow,I/M**

} For prevention of **Myocardial injury**

9. **Antibacterial** for prevention of bacterial translocation, when diarrhea is occur.
   - **Inj. Sulphadiazine + Trimethoprim : 1ml/30kg, I/M** (or)
   - **Inj. Enrofloxacin : 5 -7.5mg /kg, I/M** (or)
   - **Inj. Metronidazole : 20 - 25mg/kg, I/V** (or)
   - **Inj. Gentamicin : 4mg/kg I/M ,I/V**
10. **Inj. Sodium bicarbonate : 1ml/kg ,I/V** – For correction of metabolic acidosis
    (or) Oral
11. **Cool water** (**Not Cold Water**) sprinkle over the animal body in every one hour.
12. **Inj. Vitamin AD3E : 5ml/cow I/M**
13. **Rubbing of Alcohol (It cause vasodilatation)** over the body , that will cause heat evaporation
14. **Lowering the fibre** content of the diet will decrease the heat load.

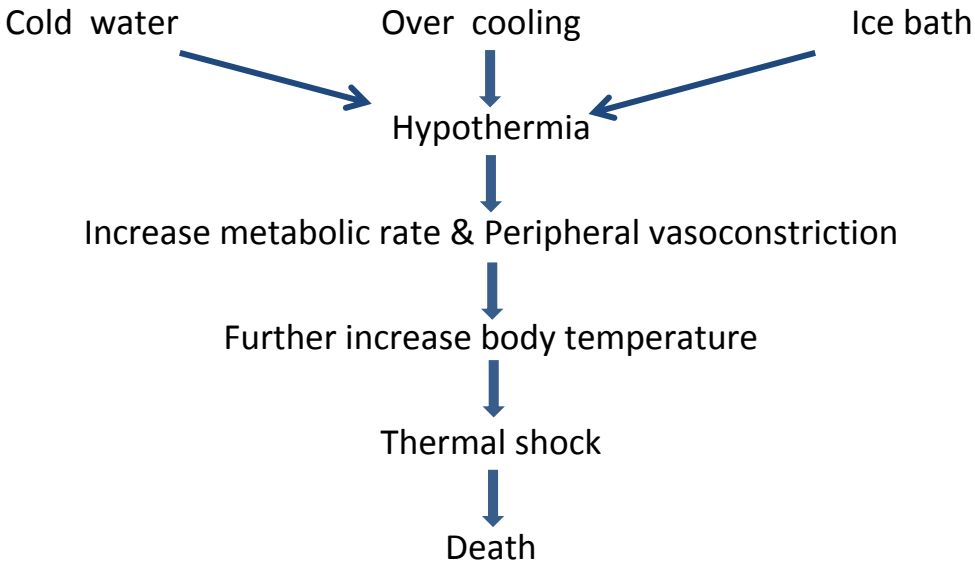
(Animal become alert & start taking feed and rumination after 5-6 hours)

Systemic infections due to heat stress

- Increase incidence of milk fever
- Metritis
- Uterine prolapse
- Mastitis (Increase somatic cell count)
- Laminitis
- Ketosis
- Failure of Artificial Insemination
- Premature birth

POINTS TO REMEMBER BEFORE GIVING TREATMENT

1. **Avoid over cooling of animal**



2. **Cows are cooled prior to presentation** by their owner ,it may /may not have a more favourable prognosis & decrease the mortality.
3. After recovery
   - Keep the animal 2-3days under the shade
   - Prevent grazing at 11 AM to 5 PM
4. Avoid transportation of animal in afternoon/summer month
5. Water temperature affect Rumen temperature – check water temperature and provide **normal cool water** (not cold water)
6. **Oral rehydration is contraindicated in recumbent animal**
7. Increase interval between estrus cycle

During early stage of pregnancy

↓

Fertilization & Implantation of the egg into the uterine wall

↓

Embryo directly affected by mother body temperature

↓

Non-Implanted egg to be expelled

↓

But It does not affect fertility of future estrus cycle

(This is a reason for "Longer Estrus Cycle " during hot weather)

8. If the temperature is above **108 – 110°F that animal will not recover** & That level of temperature cause brain damage.
9.

Heat stress	Heat stroke
1. Cow will shows open-mouth breathing (Panting) 2. Shallow respiration 3. Can still stand 4. Drink plenty of water	1. Cow will usually be down & can't rise 2. Rapid respiration 3. Lost control of normal function 4. Won't drink water

10. **Thermo-neutral zone of dairy cows range : 0 – 22°C**
11. **THI – Temperature Humidity Index : more than > 80** indicate animal suffered heat stress.
12. **Heat stress** lowers the natural immunity & making animals more vulnerable to disease.
13. Heat stress/ Heat stroke in dry period – That impairs mammary gland development – Decreased milk production ,upto next parturition.
14. **Heat stress cows get 20% chance for conception (Artificial Insemination)**
15. Insulin is a **potent- antilipolytic** (Block fat break down) ⟶ Block adipose mobilization ⟶ ↓ Metabolic heat production. Don't use insulin injection to heat stress animal ,that will cause severe hypoglycemia even if you gave D20%.
16. (But generally heat stressed cattle exhibit increased basal insulin level)
17. **Niacin (Nicotinic acid) / Vitamin B3**
    - It involved energy yielding pathway
    - Important for energy metabolism & milk production
    - It escape from rumen fermentation & absorption occur in small intestine
18. Feed with high fibre content can increase the heat through fermentation in the rumen. In heat stress cows rumen pH is acidic – That impairs fibres digestion efficiency – Rumen **fibrolytic bacteria** are mostly affected when rumen pH drops.
19. Sprinklers alone not enough for heat dissipation , **sprinklers + fan = effective one.**
20. Avoid vaccination when ambient temperature is too high.
21. Heat stress sheep and goat are **prone to develop bloat.**
22. **Reduction in saliva (HCO_3)** entering the rumen make the heat stressed cow much more susceptible to subclinical & acute rumen acidosis.
23. Bacterial translocation

    Heat stress – Enterocyte membrane damage – Intestinal barrier dysfunction - Increase intestinal permeability – Penetration of endotoxins with Inflammatory responses – Diarrhea.
24. **Postmortem : Rigor mortis & Putrefaction develop earlier.**
25. **Death** is due to **"Respiratory Failure"**
26. **Don't use wet cloth/ wet gunny bags over the animal**

27. **Don’t use potassium chloride oral suspension** in heat stress cattle – Potassium chloride is acidic- that again reduce the **rumen pH too acidic.**
28. **Don’t give dexamethasone intravenously – It may increase HR too high & cause cardiac arrhythmia.**
29. **In delayed case of heat stress –** there will be a chance of organ failure – They not responds to the treatment – Animal collapse immediately while giving treatment – Because of organ failure.

Don’t use wet gunny bags

Move the animal to shade