

Popular Article

Management Of Heat Stress in Farm Animals in India

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Abstract

Heat stress during the summer season hamper the reproductive and productive performance of farm animals by causing physiological (hormonal imbalance, decreased oocyte and semen quality, and decreased embryo development) changes, decrease in feed intake, and development of negative energy balance. The effects of heat stress on farm animals can be minimized via adapting suitable scientific strategies comprising physical modifications of the environment, feeding management, breeding management, and housing management of farm animals.

Introduction

Heat stress is the elevation of body temperature (hyperthermia) over normal body temperature. During the extreme hot humid or hot dry weather in which the physiological system of the body fails to regulate the body temperature, causes a reduction in feed intake, a decrease in milk yield, a lower conception rate, and weakens the immune system. India experiences a tropical climate with moderate to high heat stress in April, May and June due to high THI (Thermal humidity index) ranging from 75 to 85. Developing countries are more susceptible to climate change as they largely depend upon climatic sensitivity (NDRI Vision 2030, 2010). The climatic change affects the performance in terms of production and reproduction, health, and well-being of livestock. Heat stress seems to be one of the most critical factors affecting animal production in many regions of the world. Hence, it is crucial to understand the impact of heat stress on livestock production and reproduction. These efforts may help in identifying the appropriate targets for developing suitable mitigation strategies.

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Causes of heat stress

- Rising environmental temperature and humidity and high solar radiation level due to the absence of natural cloud cover.
- Warm cloudy nights may increase the risk of heat stress as the animals dissipate the heat energy during the night.
- Husbandry practices and farm layout may sometimes facilitate the onset of heat stress in animals.

Prone month(s) for heat stress in India: -

Part of India	Comfort months	Stressful month
UttarPradesh, Haryana, Delhi, and Punjab	November-February	May - September
Rajasthan, Gujarat, and some parts of Madhya Pradesh, and Maharashtra	December-January	May-September
Bihar, West Bengal, Jharkhand, and some parts of Assam	November-February	April-October
Tamil Nādu, Karnataka, Andhra Pradesh, Telangana, and some parts of Maharashtra	November-February	April-September

Signs and symptoms of heat stress in India

- Abnormal vital parameters elevation in heart rate (tachycardia) and respiration rate, restlessness, and rise in body temperature (106-108°F). Unusual excessive salivation, along with tongue protrusion.
- Animal become dull and depressed, sometimes unconscious.
- Heat stress affects milk yield and quality (fat % and SNF %) both, affects follicular development, and semen production resulting in a low conception rate.

Management of heat stress in dairy animals-

A) Breeding Management

As cows show lesser heat symptoms during heat stress duration as compared to thermal comfort periods, so it is necessary to accept a good heat detection program to detect cows with minimal heat symptoms. Always prefer artificial insemination (AI) breeding instead

of natural mating by bulls, because in natural mating both bulls and cows suffer infertility due to summer stress.

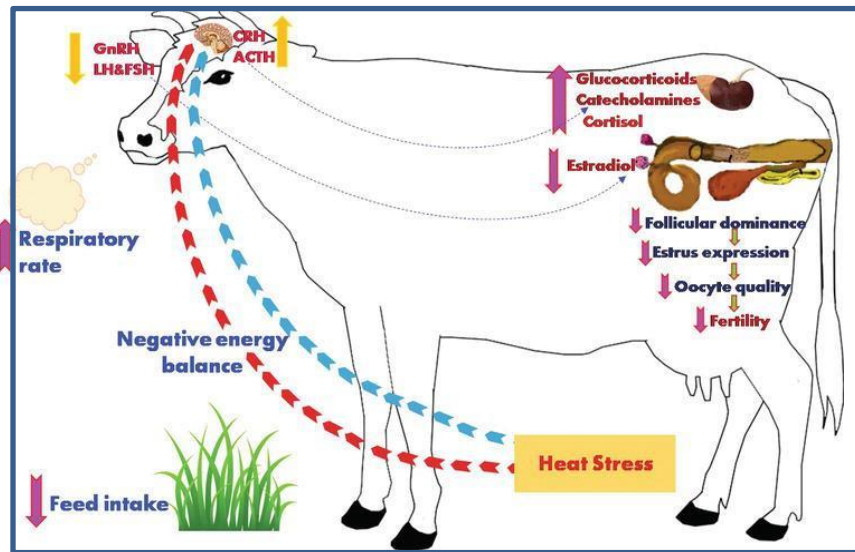


Fig.1: Various effects of heat stress on cattle (Singh *et al.*, 2021)

B) Feeding Management

Feeding of fodders and concentrate should be in the ratio of 70:30 of the total diet. It is advisable to feed additional food in form of cereals and oil cakes. In the summer season, an additional 35 percent protein-rich concentrate mixture is suggested to be fed, and clean and cool water is to be provided 5-6 times a day. Feeding of buffers to farm animals during heat stress will help in the maintenance of rumen pH. Some additional nutritional management tips to manage heat stress are as follows: -

- Increase the frequency of feedings,
- Avoid feeding during hot hours of the day and prefer cooler times of the day for feeding,
- Provide high-quality forage and adequate fibers,
- The use of bypass proteins can enhance milk yield and protein content.

C) Cooling systems in the farm

Provide an appropriate number of fans on the farm along with the water sprinkling facility, as the best cooling option. Avoid excessive sprinkling as it can also result in wet bedding making animals more susceptible to mastitis and other diseases.

The farmers can practice taking buffaloes to ponds for wallowing could be counterproductive if the animals are made to walk to and from the pond in the hot season.

Buffaloes should not be allowed in the sun from mid-morning to late afternoon when solar

radiation intensity is at its peak. Studies have indicated that wallowing twice daily from 11.30 pm to 3.30 pm gave the most comfort to buffaloes, which resulted in higher dry matter intake and milk yield.



Fig. 2: Wallowing in buffalo (Wahid *et al.*, 2011)

D) Housing

Orientation: prefer east to west (E→W) orientation because it will offer more shade than any other orientation and will protect the animals from direct and exhausting sun rays.

Roof material: Use thatch material followed by clay tiles, woods, reinforced concrete cement, galvanized sheets, PVC sheets, and asbestos sheets.

Roof slope and angle: The height of the roof preferably should be 12 feet for the flat type and 20 feet at the center for the gable type with 12 feet at eaves (Saini, 2014). The animal house roof angle should always be less than 45-degree. Thatch material roof angle is limited to 30-35 degrees, for clay tiles it is 25 degrees and for galvanized sheets, it is 15 degrees (Shastri and Thomas, 2016).

Ventilation: There should be appropriate ventilation in the housing to avoid the stagnation of the stale or foul air inside the barn and to provide fresh air to the animals. The most commonly used ventilation modes are windows, furrows, or holes (MWPS, 2000).

Conclusion

Heat stress is the biggest challenge in the context of optimal performance (reproductive and productive) in farm animals, especially in tropical countries like India. Heat stress causes physiological and hormonal imbalances and compromises both male and female

performances in the farm animals. Various managerial practices including breeding, nutrition, and housing help in minimizing the heat stress.

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