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Therapeutic management of heat stroke in exotic and cross bred cattle

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Abstract

A study was conducted with the objective of therapeutic management of heat stroke in exotic and cross bred cattle. Sixteen cattle were included in the study on the basis of history, clinical signs and blood smear examination to rule out the presence of haemoprotozoan and rickettsial parasites. Affected animals were managed by bringing under shade to avoid adverse effects of sunlight followed by evaporative cooling by spraying cool water on the midline of the back and forced ventilation with fan until their body temperature reached to normal, fluid therapy, corticosteroid, parenteral ascorbic acid, broad spectrum antibiotic, orally antioxidant supplementation, injectable B-complex and probiotic bolus. The 3rd day post treatment clinical parameters showed that the temperature, respiration, pulse rate almost attained normalcy. Thirteen out of the 16 cases responded to the treatment whereas three cattle got paralyzed with hind limbs.

Keywords: Heat stroke, exotic cattle, therapeutic management

Introduction

Heat stroke is a chief problem of high producing dairy exotic and cross bred cattle in summer season especially when the environmental temperature and relative humidity are high and animals are exposed to direct sunlight for long time (Grogan and Hopkins, 2002) [10]. High humidity makes the sweating mechanism relatively ineffective, thereby making the cattle unable to maintain their core body temperature. Exotic Holstein crosses are highly sensitive to environmental changes and become uncomfortable above 25 °C temperature depending on the increase in temperature and increase in humidity (Vermunt and Tranter, 2010) [10]. Heat stroke affects almost all systems of body and results in failure of thermoregulatory system (Bouchama and Knochal, 2002; Grogan and Hopkins, 2002) [6, 10]. In heat stroke as the body temperature rises animals become agitated and distressed, have labored open-mouth breathing and eventually collapse, convulse and die. It has been estimated that heat stroke causes severe economic loss in approximately 60% of the dairy farms around the world (Wolfenson *et al.*, 2000) [15]. If the body temperature rises at an increasing rate until it exceeds 42-43°C there will be damage to the central nervous system and other structures with possible fatal consequences (Bligh, 1985) [4]. Therefore heat stroke is a medical emergency requiring rapid diagnosis and treatment must begin immediately to ensure survival and decrease sequelae (Armstrong *et al.*, 1996) [3]. The present study was designed to evaluate the clinical manifestations and therapeutic management of heat stroke in exotic and cross bred cattle.

Materials and Methods

The present study was conducted on 16 clinical cases of heat stroke affected exotic and crossbred cattle presented at TVCC, College of Veterinary and Animal Science, Bikaner, due to high environmental temperature and high relative humidity during summer of 2015 with highest prevalence during June to August.

Screening criteria for cattle suffered with heat stroke to be included in the present study were history, clinical signs and examination of blood smear. Blood samples were collected from ear vein of all 16 heat stroke suffered cattle for detection of any haemoprotozoan and rickettsial infection. Clinical examination was carried out to record rectal temperature, respiration rate and pulse rate. A group of 10 healthy cows were taken as a control and clinical examination was carried out for comparison. All the confirmed cases of heat stroke were managed by following common therapy for 3 days. All affected animals were immediately brought indoors in a cool environment to avoid high humidity and the adverse effects of sunlight. Immediately hydration of animal was made by isotonic saline solution (0.9% NaCl), Ringers lactate @ 20-

50 ml/kg b.wt, IV based on degree of dehydration. Afterwards spraying of water on the midline of the back with tap water (15-16°C) was done. Forced ventilation with fans was done to promote evaporative cooling until their body temperature reached to normal. To manage the shock dexamethasone @ 0.1mg/kg b.wt. IV was given. To manage the stress ascorbic acid @ 25 mg/kg b.wt. IV was given. To prevent sepsis and systemic inflammatory syndrome due to bacterial translocation broad spectrum antimicrobial, Oxytetracycline @ of 10 mg/kg b.wt. IV was given. Supportive therapy was given as, antioxidant supplementation to attenuate the negative effects of oxidative stress, containing vit. A 1200 IU, vit. D₃ 6000 IU, vit. E 48 mg, biotin 50 mcg and nicotinamide 3 mg per ml, 10ml orally, parental vit B complex- containing vit B₁ 50 mg, B₆ 50 mg and B₁₂ 500 mcg per ml, 10ml i/m and probiotic bolus to boost up rumen microorganism containing live yeast culture 3 gram, live lactobacillus sporogenes culture 20 million CFU, amino acid 2 gram, liver extract 5 mg and fungal diastase 50 mg per bolus, 2 bids orally.

Results

The blood smears were negative for tick born haemoprotozoan and rickettsial infection. Based on history, clinical signs and laboratory findings the cases were tentatively diagnosed to be suffered by heat stroke. The living environment of the study in June was average environmental temperature of 40.8°C, average relative humidity 39 per cent and temperature humidity index 89.33. In July average environmental temperature was 36.9 °C, average relative humidity 58 per cent and temperature humidity index 88.97 whereas in August average environmental temperature 36.09 °C, average relative humidity 61 per cent and temperature humidity index 88.5. The clinical signs of heat stroke in present study included hyperthermia, panting, tachycardia, hyper salivation, muscle tremor, incoordination, mild to moderate ataxia, severe dehydration, congested mucous membranes, marked decrease in appetite, marked reduction in milk production and severe depression. Clinical manifestations recorded in the present study are in agreement with those reported by Vermunt and Tranter (2010) [10], Chandrabhan *et al.* (2013) [9] and Randhawa *et al.* (2014). Thirteen of the cattle recovered in 3 days after treatment while three cattle were found paralyzed and showed severe neurological signs.

Discussion

Heat stroke is a medical emergency requiring rapid diagnosis and treatment. This potentially life-threatening condition occurs mostly when environmental temperatures and relative humidity are high. The high rise in rectal temperature observed in present study may be attributed to exposure to high environmental temperature and humidity. Low humidity and air movements are important to allow evaporation of sweat and convection of heat (Bricknell, 1995; Bruchim *et al.*, 1999-2004 and Al-Tamimi, 2007) [7, 8, 1]. Dehydration and increase of electrolyte concentration in the body fluid of cattle exposed to heat reduces their thermoregulatory evaporation and allowing the body temperature to rise. This readjustment in thermoregulation has been observed in both panting and sweating and appears to be a regulated response that allows the dehydrated animal to save water. In species that both pant and sweat, such as the cattle, progressive dehydration leads to suppressed sweating and increased panting (Silanikove, 1987) [13]. At high environmental temperature and humidity, an

increased respiratory rate is an important way of increasing heat loss by cattle and is usually the first visible sign of heat stress (McDowell, 1972). Tachycardia may be associated with translocation of blood from the central circulation to the periphery in an attempt to get rid of heat, or it might have resulted from the increased production of nitric oxide (Howorth, 1995 and Alzeer *et al.*, 1999) [11, 2].

In the present study, all the affected cattle showed neurological signs including mild to moderate ataxia, incoordination and muscular tremors. These neurological findings could be attributed to metabolic disarray, cerebral edema or ischemia (Boersma, 1998) [5]. In thirteen of the cattle, these neurological dysfunctions disappeared after supportive therapy. However, the neurological symptoms in three cattle were more severe than in the others. They included seizure activity associated with whole body tremors, severe depression and dilated pupil. Despite therapeutic management, these three cattle were found paralyzed. Out of sixteen heat stroke suffered cases, thirteen responded to the treatment. These animals on 3rd day of treatment regained their appetite, the temperature, respiration and heart rate comes within the normal range while three animals got paralyzed with hind limbs. Conclusively the evaporative cooling therapy, fluid therapy, corticosteroid, antioxidant supplementation vit A, vit D, vit E, biotin, nicotinamide, ascorbic acid, broad spectrum antibiotic, B complex and probiotic were quite effective in treating the clinical cases of heat stroke.

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