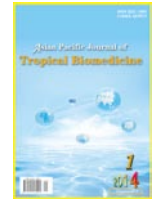


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## A note on treatment of hyperthermia in crossbred cattle

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## PEER REVIEW

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## Comments

The study has lots of practical applications as the hyperthermia is common among the livestock during the peak summer months and study has been conducted at farmers' field with successful results. Therefore, it has lots of relevance.

Details on Page

## ABSTRACT

**Objective:** To evaluate effect of iodized oil in crossbred cattle suffering from hyperthermia (heat intolerance syndrome) in Punjab, India.

**Methods:** The present study was conducted in 85 clinical cases of summer hyperthermia in exotic and crossbred cows with rectal temperature of  $\geq 40.56$  °C. Haematological examinations of the affected cows (55) showed relatively low haemoglobin, normal differential and total leucocytic count. All the affected cows (85) were treated with three doses of iodized oil (750 mg elemental iodine per dose, 5mL) given at 24 h interval by subcutaneous route in brisket region.

**Results:** Seventy seven (90.58%) cases showed remarkable clinical improvement with temperature coming to normal (38.33 to 38.88 °C) within 5 d of start of treatment. The appetite and milk production was restored by 10th day post treatment.

**Conclusions:** The findings of this study substantiate that subcutaneous administration of three doses of iodized oil given at 24 h interval is effective in decreasing rectal temperature of hyperthermic cattle.

## KEYWORDS

Cows, Hyperthermia, Iodized oil, Treatment

## 1. Introduction

Summer hyperthermia (heat intolerance syndrome) is one of the commonly encountered clinical conditions of exotic and crossbred dairy cows during summer months in Punjab, India[1]. Episodes of high environmental temperature coupled with high relative humidity and low wind speeds can decrease performance of animals[2]. In extreme instances, these conditions may manifest simultaneously and results in death as a result of hyperthermia[3]. Excess of iodine has negative effect on basal metabolic rate, parenteral iodine was administered in hyperthermic crossbred cows to see its effect in

alleviating hyperthermia.

## 2. Materials and methods

The present study was conducted in 85 clinical cases of summer hyperthermia in exotic and crossbred cows especially (with higher severity) in South Western districts of Punjab viz. Mukatsar, Ferozpur, Bathinda, Faridkot, Sangrur and Mansa due to prolonged drought during summer of 2009 with highest prevalence during July to September. Some of the affected villages experienced almost 90% morbidity and around 10% mortality. The

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condition was associated with high environmental temperature aggravated by less rainfall. The temperature–humidity index (THI) describes the effect of environment on animal's ability to dissipate heat. During drought, the ambient temperature and relative humidity frequently exceed the critical comfort level of temperature humidity index (72) resulting in elevated body temperature and panting. An index was proposed to calculate the temperature humidity index[5].

$$\text{THI}=1.8 \times T_a - (1 - \text{RH}) (T_a - 14.3) + 32$$

where  $T_a$ =Average ambient temperature in °C

RH=Average relative humidity

In these districts, the THI at 2 000 ×g for 45 min. at 2.30 p.m. fluctuated from 85 to 90 with a mean of 88.12±0.99 during July to September 2009.

Eighty five hyperthermic cows with rectal temperature of ≥40.56 °C were included for therapeutic dose response trial. The rectal temperature of affected animals and their feed and water intake was not remarkably affected during morning hours and late at night. The body temperature increased during the day with peak during noon (between 1 p.m. to 4 p.m.) with panting (Respiration rate ≥90 per min), which resulted in loss of appetite and marked fall in milk yield. All the animals had previously been under treatment for a week to 10 d, showing no response to parenteral antipyretics, antibiotics (ampicillin, enrofloxacin and ceftiofur) and anti haemoprotozoal drugs. Four of the cows had history of FMD. Blood samples were collected in disodium salt of ethylene diamine tetraacetic acid anticoagulant for determining hematological parameters of 55 hyperthermic and 15 normal healthy cows and to screen for any haemoprotozoan infection.

Each affected dairy cow was treated with three doses of iodized oil (750 mg elemental iodine per dose, 5mL) given at 24 h interval by subcutaneous route in brisket region. The follow up of the treated animals was done for 2 months post treatment.

### 3. Results

Hematological examinations of 55 affected and 15 healthy

cows showed relatively low Hb, normal differential and total leucocytic count (Table 1). The blood smears were also negative for tick born haemoprotozoan and rickettsial infection. Based on history, clinical signs and laboratory findings the cases were tentatively diagnosed to be of summer hyperthermia. All the affected cows were treated with three doses of iodized oil (750 mg elemental iodine per dose, 5 mL) given at 24 h interval by subcutaneous route in brisket region. Seventy seven (90.58%) treated cases showed remarkable clinical improvement with temperature coming to normal (38.33 to 38.88 °C) within 5 d of start of treatment. The appetite and milk production was restored by 10th day post treatment. During the follow up period (60 d post treatment) rectal temperature was within normal range. In the clinically recovered cows no signs of iodism (depressed appetite, dullness, lacrimation, excessive salivation, scaliness and sloughing of skin) were observed.

### 4. Discussion

The THI at 2.30 p.m. fluctuated between 85 to 90 with a mean of 88.12±0.99 during July to September 2009 in these districts, thus indicating thermal stress in the affected animals as the critical comfort level of THI should be 72[5].

The decrease in the rectal temperature of the hyperthermic cross bred cows may be attributed to the fact that higher intake of iodine leads to suppression of TSH production activity due to decrease in height, size and activity of follicular cells of thyroid gland[4]. Similar findings were reported in a dose response trial in hyperthermic dairy cows[1]. A number of studies[1,6] have recorded that parenteral iodine administration significantly increases the mean plasma inorganic iodine levels in dairy animals. In a study conducted on hyperthermic cows, three consecutive subcutaneous doses of 750 mg of elemental iodine significantly increased the mean plasma inorganic levels from 100.42±13.95 ng/mL to 314.83±60.20 ng/mL 7th d post treatment which indicates that this dose rate is not sufficient enough to cause iodism in these animals[1].

Thus, it can be concluded that subcutaneous

**Table 1**

Haematological changes in hyperthermic cross bred cows (mean±SE).

	Hb (g%)	TLC ( $\times 10^3$ )	Neutrophil (%)	Lymphocyte (%)	Monocyte (%)	Eosinophil (%)
Healthy (n=15)	12.28±0.42	7.05±0.38	40.57±0.99	57.00±1.27	2.00±0.30	0.42±0.20
Hyperthermic (n=55)	8.21±0.27*	8.41±0.51	45.30±2.44	50.20±2.40	1.60±0.48	1.83±0.42

\*:Significant at 5% level.

administration of three doses of iodized oil given at 24 h interval leads to negative feedback effect on the secretion of TSH by thyrotrophic cells of pituitary gland and to some extent, the TRF from hypothalamus<sup>[4]</sup> causing interference in basal metabolic rate which leads to decrease in the body temperature in the hyperthermic cross bred cows.

### Conflict of interest statement

We declare that we have no conflict of interest.

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### Comments

#### Background

Crossbreeding programme in cattle using exotic germplasm has led to an enhancement of milk production in the country and India is ranked top in the world. However, certain diseases/ problems related with physiology of these imported germplasm are prevalent which have attracted special attention of the researchers. Heat intolerance syndrome is commonly encountered condition among such animals from northern states of the country during the peak summer months. Dairy farmers suffer considerable losses through reduction in productivity and make every effort to reduce seasonal thermal stress by providing fans and cool air sources in their farms during hotter months, however the problem is multifarious.

#### Research frontiers

The role of parenteral iodine administration in management of hypothermia especially calves and lambs is well documented, however, the present study on role of iodine in declining basal metabolic rate during hyperthermia has given new dimensions. Authors have conducted trials under field conditions at farmers doorstep attempted to standardize the dose of iodine.

#### Related reports

The authors have attempted to give new dimensions to the earlier study carried by Nonaka *et al.* (2012) wherein, concluded that higher intake of iodine leads to suppression of TSH production activity and thereby decrease the body temperature. The study has practical relevance.

#### Innovations and breakthroughs

Authors have substantiated that higher intake of iodine

leads to suppression of TSH production activity due to decrease in height, size and activity of follicular cells of thyroid gland. Study has recommended that subcutaneous administration of three doses of iodized oil (750 mg elemental iodine per dose, 5 mL) given at 24 h interval by subcutaneous route is effective in decreasing rectal temperature of hyperthermic cattle.

#### Applications

Study has considerable relevance as hyperthermia is frequently encountered among the exotic and crossbred cattle population from northern states of India. The use of iodized oil in alleviating hyperthermia has given new dimensions. The recommendation framed from present study can also be applied to other species especially dogs who also show similar problems during the peak summer months.

#### Peer review

The study has lots of practical applications as the hyperthermia is common among the livestock during the peak summer months and this study has been conducted at farmers' field with successful results. Therefore, it has lots of relevance.

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