Veterinary Parasitology 160 (2009) 301–305

Contents lists available at ScienceDirect

Veterinary Parasitology

journal homepage: www.elsevier.com/locate/vetpar

Short communication

Diagnostic value of rectal temperature of African cattle of variable coat colour infected with trypanosomes and tick-borne infections

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ARTICLE INFO

Article history:
Received 25 July 2008
Received in revised form 11 November 2008
Accepted 17 November 2008

Keywords:
Cattle
Coat colour
Diagnostic value
Diurnal variations
Pyrexia
Rectal temperature

ABSTRACT

Diagnosis of major endemic bovine parasitic diseases in sub-Saharan Africa such as trypanosomosis, theileriosis, anaplasmosis, babesiosis and cowdriosis is increasingly relying on clinical diagnosis due to deterioration of veterinary services and laboratory facilities. Pyrexia is a common clinical feature of aforementioned diseases whose detection relies on measurement of rectal temperature. The research undertaken in this study was aimed at assessing the effects of diurnal changes and variable coat colour of indigenous Nkedi Zebu cattle on the diagnostic value of rectal temperature under tropical conditions. The results revealed that variation in rectal temperature was significantly influenced by time of day it was taken and by the coat colour of the Nkedi Zebu cattle ($P < 0.001$). Rectal temperature experienced diurnal changes: steadily rising to reach a peak at 17.00 h before declining. The mean rectal temperature of unhealthy cattle was significantly higher ($P < 0.05$) than that of the healthy ones only between 13.00 and 17.00 h of the day. During which period the proportion of unhealthy cattle having a rectal temperature of 39.4 °C or higher was significantly higher than that of healthy ones ($P < 0.001$). Regarding the variable coat colour of indigenous breeds, rectal temperature among cattle of different coat colours was significantly different ($P < 0.05$). In conclusion it is important to consider diurnal changes in rectal temperature and differences due to variable coat colour of indigenous African breeds when measuring rectal temperature for assessing pyrexia, during clinical diagnosis of bovine trypanosomosis and tick-borne diseases that are endemic in many countries in sub-Saharan Africa.

1. Introduction

Pyrexia is a common clinical feature associated with endemic bovine diseases in sub-Saharan Africa such as trypanosomosis, theileriosis, anaplasmosis, babesiosis and cowdriosis. Bovine trypanosomosis is characterized by intermittent fever, which is prominent during the early phases of the disease when the waves of parasitaemia are particularly high (Fiennes, 1970; Holmes et al., 2000). In acute *Trypanosoma vivax* infections, the body temperature rises up to 40–41 °C, while in *Trypanosoma congolense* infections, the body temperature rises up to 39.4–40 °C and pyrexia parallels the parasitaemia, which is usually lower than in *T. vivax* infections (Stephen, 1986). Theileriosis is characterized by pyrexia and in confirmed field cases, the body temperature rises up to 40.1–40.2 °C (Omuse, 1978). Pyrexia is also reported to be one of the main clinical signs both in field (Egbe-Nwiyi et al., 1997)

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doi:10.1016/j.vetpar.2008.11.020

and experimental cases (Ajayi et al., 1987) of anaplasmosis. The acute syndrome of babesiosis in cattle is characterized by fever and body temperature usually rises up to 41–45.5 °C (Losos, 1986). Cowdriosis in cattle is characterized by pyrexia, with a temperature of 40–42 °C lasting 1 week before dropping to subnormal level before death (Cowdry, 1926).

In clinical diagnosis of bovine parasitic diseases, detection of pyrexia relies on the measurement of rectal temperature. Under field conditions, rectal temperature is measured to detect pyrexia at whatever time of the day a case is presented. Regarding indigenous cattle breeds in sub-Saharan Africa, there is a wide variation in coat colour between and within breeds (Felius, 1985). Heat absorption or reflection by the bovine skin differs according to coat colour (Hansen, 1990). Diurnal variation in ambient temperature and heat absorption or reflection by bovine skin of variable coat colours certainly influence variation in rectal temperature, a key diagnostic feature for pyrexia. Given declining opportunities to confirm cases through laboratory diagnosis as veterinary services and laboratory facilities deteriorate in several countries in sub-Saharan Africa as a result of privatisation of veterinary services, diagnosis of endemic bovine parasitic diseases such as trypanosomosis and tick-borne diseases has to rely on clinical diagnosis. However, little is known about effects of diurnal changes and variable coat colour of indigenous cattle breeds in Africa on the diagnostic value of rectal temperature under tropical conditions. In view of this, a study was conducted in Uganda to assess the effect of diurnal changes and variable coat colour on rectal temperature of Nkedi Zebu cattle infected with trypanosomes and tick-borne infections.

2. Materials and methods

2.1. Experimental cattle

Twenty Nkedi Zebu heifers, aged between 12 and 18 months, consisting of 10 healthy and 10 unhealthy were selected at the National Livestock Resources Research Institute (NaLIRRI), Tororo, Uganda. The entire group of 20 consisted of 4 animals with a brown coat, 6 with a light brown coat, 8 with a black coat, 1 with a grey coat and 1 with black coat with white spots.

2.2. Classification criteria for healthy and unhealthy cattle

Cattle were designated unhealthy based on clinical evidence of anaemia, staring coat, weight loss, enlarged lymph nodes, petechial haemorrhages, diarrhoea, pyrexia in addition to clinical history of poor health, depression, anorexia and laboratory confirmation of the presence in blood parasites of *Trypanosoma*, *Anaplasma*, *Babesia* and *Theileria* genera (Table 1). Cattle were designated healthy if they did not have any history of recent sickness, manifested no clinical signs and blood examination revealed absence of blood parasites of *Trypanosoma*, *Anaplasma*, *Babesia* and *Theileria* genera.

2.3. Clinical examination of cattle

Prior to allotting respective cattle to either group, general physical examination was performed on all cattle. Parotid, prescapular and prefemoral lymph nodes were palpated to assess whether they were enlarged. The skin coat was examined for any sign of roughness or starring. Oral, vulval and conjunctival mucous membranes were examined for presence of pallor or petechial haemorrhages. Animals were examined for presence of ocular or nasal discharges. Packed cell volume was measured using the micro-haematocrit reader (Hawksley, England) and haemoglobin concentration was measured using the HemoCue (HemoCue AB, Ängelholm, Sweden) to detect anaemia. In addition, full clinical history of individual cattle was reviewed.

2.4. Assessment of the body condition score

The extent of emaciation of animals was assessed through body condition scoring performed based on a 9-score system as described by Nicholson and Butterworth (1986), in which three main conditions (fat-F, medium-M and lean-L) are divided into three categories. The scores include F+, F, F−; M+, M, M−; L+, L and L−, where L− represents 1 and F+ represents 9. Body condition scoring is essentially based on the extent to which either fat is stored or muscle mass has declined. Anatomical parts including the tail–head, brisket and hump, transverse process of the lumbar vertebrae, hips and ribs, and the depth of the *sublumbar fossa* and mass of muscle between the *tuber*

Table 1
Parasite infections and body condition scores of the unhealthy Nkedi Zebu cattle.

Animal ID	Parasite infection					Body condition score
	Trypanosoma congolense	*Trypanosoma vivax*	*Anaplasma marginale*	*Babesia bigemina*	*Theileria parva*[a]	
1	–	–	+	–	++	M–
2	+	–	++	+	+	L
3	–	–	++	–	++	L+
4	–	–	+	–	++	L+
5	–	–	+	–	+	M–
6	–	–	+	–	+	M–
7	–	–	+	–	+	M–
8	–	+	+	–	+	L
9	–	–	++	–	++	L+
10	–	–	+	–	++	M–

[a] Microschizont detected in giemsa-stained lymph biopsy smears.