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SHORT COMMUNICATION

Effect of Different Housing Systems on Haematological Parameters of Buffaloes

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ABSTRACT

An experiment was conducted to study the effect of two housing systems on haematological parameters in buffaloes. Twelve buffaloes were selected and randomly divided into two equal groups. Animals of group A were housed in shed with net and animals of group B in shed without net. The experiment was conducted for a period of three months. Blood samples were aseptically collected fortnightly and were analysed for haematological studies. The mean values for Hb, TEC, TLC, PCV, MCHC and Neutrophil were 8.49 ± 0.52 g/dl, 5.54 ± 1.05 (10^6/cmm), 27.45 ± 0.44, 31.15 ± 0.66 (%) and 40.99 ± 1.34 (%), respectively, which was nonsignificantly higher than the values of 8.20 ± 0.80 g/dl, 5.22 ± 0.66 (10^6/cmm), 27.00 ± 0.58 (%), 30.35 ± 0.32 (%) and 39.96 ± 0.66 (%), respectively. Whereas, the values of MCH, lymphocyte, eosinophil and monocyte were 15.26 ± 1.06 (µµg), 55.33 ± 0.44 (%), 2.32 ± 0.45 (%), and 1.69 ± 0.69 (%); respectively, which were non significantly lower than the values of 15.72 ± 0.85 (µµg), 55.56 ± 0.61 (%),3.19 ± 0.05 (%), and 2.03 ± 0.84 (%), respectively in group A as compared to group B. However, WBC count (13.75 ± 0.56 (10^3/cmm) were significantly ($P<0.01$) higher than the value of 10.58 ± 0.42 (10^3/cmm) and MCV (49.45 ± 0.21, μ^3) were significantly ($p<0.05$) lower than the value of 51.85 ± 0.45 (μ^3) in group A and group B, respectively. For statistical analysis, student't' test was applied.

Keywords: Buffaloes, cattle, haematological parameters, housing systems, net shade

The buffalo a triple purpose animal is used primarily for milk in sub-continent although it does contributes significantly to draft animal power and meat. Buffalo are predominantly dairy animals and distributed in different region in country and are well adapted to the local agro-climatic conditions.

Buffaloes have poor thermoregulatory system and are much vulnerable to extreme climatic conditions particularly in summer season. Buffaloes are more sensitive to direct solar radiation than cattle due to their black body colour, which is conducive to heat absorption. Relatively small number of sweat glands per unit area of skin, and thick epidermal layer of the skin is a limiting factor in heat loss by conduction and radiation. Heat stress results from the animals' inability to dissipate sufficient heat to maintain homeothermy (Kumar, 2012). Till then to protect buffaloes from infestation of pests a new housing system covered with net is emerging. Keeping this view in mind, the study was undertaken to know the effect of this housing system on haematological parameters.

The experiment was conducted for three months i.e from 1st January 2013 to 31st March 2013 which comes under winter season i.e. 5th November. - 4th March (meteorological 45-09 weeks), Anonymous (1998). Twelve adult she buffaloes maintained at buffalo breeding Farm, College of Veterinary and Animal Sciences, Parbhani were selected and divided into two groups viz. Group A and Group B. The buffaloes reared in net shed (is a concept that shade is totally covered with 40 mm mesh to protect animals from bites of flies and is provided with a hurricane type of ventilator) were designated as group A and buffaloes reared in shed without net (conventional shed uncovered with net and not provided with hurricane ventilator) were designated as group B. All the buffaloes selected in this study were apparently healthy and free of any parasitic infestations and other disease conditions.

Dry and wet temperatures were recorded at 07.30 hrs and 02.30 hrs using wet and dry bulb thermometer, both in the shed with net and shed without net. The temperature humidity index was calculated by using formula of McDowell (1972).

$$THI = 0.72 (DBT + WBT) + 40.6$$

Blood samples were collected between 07.00 to 08.00 hours at fortnightly intervals from both the groups by passing 18 gauge hypodermic needle in jugular vein, 3 to 4 ml of blood was collected in a vial containing EDTA for haematological parameters such as Hb, TEC, TLC, PCV, MCV, MCH, MCHC and DLC by using haematology analyzer.

Analysis of data was carried out by using standard statistical procedure and interpretations by applying student "t" test (Snedecor and Cochran, 1967).

It is observed from Table 1. That, the mean value of haemoglobin was non significantly lower in group B than the values of group A. The low level of heamoglobin in both the groups of present study might be due to haemodilution and low level of nutrition due to depression of food intake with rise in ambient temperature (Abdelatif *et al.* 2009). They further stated that it might be due to depression of thyroid secretion which is associated with decreased erythropoiesis.

The mean values of total erythrocyte count were higher in group A (5.54 ± 1.05) as compared to group B (5.22 ± 0.66). This is comparable to the finding reported by Marai and Haeeb (2010). They reported that the Red blood cell count was found to be decrease significantly by 12 to 20 % in cattle under stress conditions due to destruction of erythrocyte and haemodilution effect. Muna *et al*. (2009) stated that the release of erythrocyte from spleen or the increase in oxygen consumption due to tissue demand causing erythrocyte stimulating factor release because relationship between oxygen demand of tissue and amount of oxygen carries by blood some findings for cows and buffaloes. This relives the animal of greater internal heat load under climatic stress.

The total leucocyte count were significantly ($p<0.01$) lower in group B (10.58 ± 0.42) than the count of group A (13.75 ± 0.56). THI was also highest (Table 2) in group A, which supports the investigation reported by Muna *et al*. (2009) and Jabbar *et al*. (2012). They further stated that the season revealed the significant differences in the values of leucocyte. The WBC count was significantly lower during the winter season and higher in summer season, which supports the findings recorded in the present study on 75th day which might be due to high THI and beginning of summer season.

The mean values of packed cell volume were non significantly lower in group B (27.00 ± 0.58) and higher in group A (27.45 ± 0.44). Jabbar *et al.* (2012) state that seasonal changes also affect the PCV values and increasing trend in PCV was seen during winter. These finding are agreement with present study of PCV, which shows increasing trend in both the groups. Whereas, Abdelatif *et al*. (2009) reported the low values of PCV may be due to haemodilution. They further stated that vasodilation which occurs when animals are exposed to heat causes a decline in the hydrostatic blood pressure below blood colloidal pressure so that more interstitial fluid passes into the intravascular compartment.

The mean corpuscular volume were significantly ($p<0.05$) lower in group A (49.45 ± 0.21) than the values of group B (51.85 ± 0.45). The mean value of MCV is comparable to those mentioned by Muna *et al.* (2009) in winter season.

Mean corpuscular haemoglobin values were higher in group B than the values in group A. All the average mean values of both the groups in the present study are comparable to the values reported by Verma *et al.* (2008) in winter season. They studied on Murrah buffalo calves kept under two different housing system i.e. open site covered from wall to roof was closed, using gunny bag to prevent free flow at hot and cold wind. They further reported higher MCH values in control group and lower in experimental group, which supports the finding of present investigation.

The mean corpuscular haemoglobin concentration values in group B were lower than the values of group A. Which supports the findings of Verma *et al*. (2008) The relative consistency of MCHC in the present study may be attributed to concomitant increase or decrease in Hb concentration or PCV levels (Muna *et al*. 2009).

Neutrophil shows non significantly higher values in group A and lower values in group B. It is noticed that the neutrophil count was not affected by temperature

throughout study in both the groups, which is in agreement with the findings of Serdaru *et al*. (2011).

Lymphocyte counts in group B (55.56 ± 0.61) were non significantly lower than group A (55.33 ± 0.44). The average mean values of the present study were in agreement with Serdaru *et al.* (2011). They studied on seasonal variation of some haematological parameters of the buffaloes during winter period, which support the finding to present work as conducted in winter season.

The mean values of eosinophil were higher in group B (3.19 ± 0.05) and lower in group A (2.32 ± 0.45). which is comparable to the findings reported by Muna *et al*. (2009). He further stated that, the increasing trend of temperature does not affect the eosinophil count. Increased eosinophil count may suggest the increased infestation and biting of pests to these animals.

Table 1: Effect of two housing systems on haematological parameters in buffaloes

Parameter	Group A	Group B
Haemoglobin (g/dl)	08.49 ± 0.52	08.20 ± 0.80^{NS}
RBC (10^6/cmm)	05.54 ± 1.05	05.22 ± 0.66^{NS}
WBC(10^3/cmm)	13.75**± 0.56	10.58 ± 0.42
PCV (%)	27.45 ± 0.44	27.00 ± 0.58^{NS}
MCV (μ^3)	49.45 ± 0.21	51.85* ± 0.45
MCH (µµg)	15.26 ± 1.06	15.72 ± 0.85^{NS}
MCHC (%)	31.15 ± 0.66	30.35 ± 0.32^{NS}
Neutrophil (%)	40.99 ± 1.34	39.96 ± 0.66^{NS}
Lymphocyte (%)	55.33 ± 0.44	55.56 ± 0.61^{NS}
Eosinophil (%)	02.32 ± 0.45	03.19 ± 0.05^{NS}
Monocyte (%)	01.69 ± 0.69	02.03 ±. 84^{NS}

*P<0.05, **P<0.01, NS-Non significant

Monocytes were also non significantly lower in group A (1.69 ± 0.69) than the values of group B (2.03 ± 0.84). The higher values in group-B might be due to cortisol secretion (Abdelatif *et al.* 2009). They further stated that monocytes respond to elevation in blood corticosteroid concentration, but species differences are seen with the type of response and mechanism of monocytosis which occurs in some species is not known. No basophil was observed in present study. However, all the average mean values were within normal physiological limits (Schalm's *et al.* 2000).

Temperature humidity index (THI) has been widely used as a heat stress index in buffaloes with values below 72 considered to be comfortable; 72-78 as mild; 78-88 as moderate and above 88 as extremely stressful (Bouraoui *et.al*, 2002). It is observed that THI of group A and group B were 80.44 ± 0.56 and 78.71 ± 0.26, respectively considered as moderate stressful to buffaloes. THI of 66.63 ± 0.45 at morning of group A indicated that shed with net house though showing higher THI but was in normal physiological range which do not exhibit any discomfort to animals.

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