

HAEMATOLOGICAL PROFILE IN HALLIKAR CATTLE AT THE NATIVE TRACT

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Abstract: The study was undertaken with the objectives of establishing the normal reference values of certain haematological parameters in Hallikar cattle maintained at a government farm in their native tract at Karnataka. Twenty four healthy Hallikar cattle were selected and divided into four groups. Group I and II consisted of male Hallikar cattle aged between one to three years and three to six years, respectively. Group III and IV consisted of female Hallikar cattle aged between one to three years and three to six years, respectively. The range of values for haematological parameters such as TEC (6.97 ± 0.10 to 7.56 ± 0.13 millions/ μ l), TLC (8.19 ± 0.33 to 9.77 ± 0.27 thousands/ μ l), haemoglobin content (10.90 ± 0.17 g/dl to 11.50 ± 0.16), PCV (33.30 ± 0.42 to 35.10 ± 0.48 %), ESR (5.92 ± 0.36 to 6.29 ± 0.33 mm/24hrs), MCV (46.50 ± 0.76 to 47.80 ± 0.70 fl), MCH (15.30 ± 0.19 to 15.60 ± 0.25 pg), MCHC (32.50 ± 0.41 to 33.20 ± 0.63 g/dl) and the per cent of cells in differential leukocyte count (Lymphocytes: 57.70 ± 0.58 to 61.80 ± 0.63 , Neutrophils: 29.30 ± 0.67 to 32.80 ± 0.55 , Eosinophils: 5.33 ± 0.39 to 6.50 ± 0.40 , Monocytes: 2.75 ± 0.25 to 3.08 ± 0.32 and Basophils: 0.37 ± 0.10 to 0.50 ± 0.10) were recorded for various groups. There was non-significant ($P > 0.05$) difference of various haematological parameters among different groups except lymphocyte percentage which were significantly ($P < 0.05$) higher in young age groups in both the sexes compared to their respective older age groups. It was concluded that the normal haematological values established in the present study could be helpful in the diagnosis of different ailments in Hallikar breed of cattle and the values are also useful for academic purposes.

Keywords: Hallikar cattle, haematological profile, reference values.

INTRODUCTION

India has diversified cattle genetic resources having 30 well recognized breeds that constitute about 7.75 per cent of the total cattle breeds of the world (Mahima *et al.*, 2013). Among them, the Hallikar cattle are considered as one of the premier draught purpose breeds of India which is popularly known as the champion of draught breeds. It is the pride cattle breed of Karnataka having a history of over 600 years and is the progenitor of the Amrith Mahal, Khillar and Kangayam breeds. The home tract of Hallikar cattle is spread over Chitradurga, Chickmagalur, Kolar, Tumkur, Mysore, Mandya, Hassan and Bangalore rural districts of

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Karnataka. Hallikar animals are world famous for their excellent draught animal power, endurance and discipline at work and these animals are fast track animals used extensively for dry land agricultural operations and transportation in rural areas (Kumar *et al.*, 2006). As per the livestock census of 2007, the total population of Hallikar cattle was 1.99 million with 0.75 million females in India (Shekar *et al.*, 2011).

The haematological values provide valuable baseline information and help in realistic evaluation of managerial practices, nutritional and physiological status of animals and diagnosis of health condition (Osman and Busadah, 2003). The haematological parameters of cattle are influenced by many factors like breed, age, sex, seasonal variation, lactation, pregnancy, health and nutritional status of the animal (Sattar and Mirza, 2009). The perusal of literature did not reveal any reports on normal reference values of haematological parameters in Hallikar cattle. Therefore, the present study was carried out in Hallikar cattle to establish the normal reference values of haematological parameters.

MATERIALS AND METHODS

Twenty four healthy Hallikar cattle reared at Hallikar Cattle Breeding Centre, Government of Karnataka, Kunikenahalli, Turuvekere taluk, Tumkur district were randomly selected for the present study. All the animals had a good general body condition and they were stall fed partially and allowed for grazing for six hours daily and all the animals were maintained under identical managerial conditions. They were divided into four groups according to the age and sex, with six animals in each group. Group I and Group II consisted of male Hallikar cattle aged between one to three years and three to six years, respectively. Group III and Group IV consisted of female Hallikar cattle aged between one to three years and three to six years, respectively. Male animals were uncastrated and the female animals were not in the state of pregnancy.

Approximately five ml of blood was collected aseptically by jugular venipuncture in to the vacutainers containing EDTA (ethylene diamine tetraacetic acid) salt, for four times from each animal at an interval of one week, prior to letting out of animals for grazing during early morning hours between 7.30 AM to 8.30 AM.

The haematological parameters such as Total erythrocyte count (TEC), Total leukocyte count (TLC), Packed cell volume (PCV), Haemoglobin (Hb) content, Erythrocyte sedimentation rate (ESR), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH) and Mean corpuscular haemoglobin concentration (MCHC) were determined with the help of

automatic haematology analyzer. The differential leukocyte count (DLC) was performed manually following the standard procedure described by Jain (1986).

Data was analyzed by GraphPad Prism version 5.01 (2007) by application of one way ANOVA with Tukeys post test and the significance was determined at P value of 0.05.

RESULTS AND DISCUSSION

The values recorded for different haematological parameters in the Hallikar cattle in the present study for various groups are presented in Table 1.

The values of total erythrocyte count, haemoglobin, packed cell volume erythrocyte sedimentation rate, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration, total leukocyte count, the per cent of neutrophils, eosinophils, monocytes and basophils did not differ significantly ($P>0.05$) between various groups. The per cent lymphocytes were significantly ($P<0.05$) higher in younger animals of both the sexes compared to adults.

The values of TEC were within the normal physiological range as reported by Kramer (2000) for cattle. The range of values were also in conformity with the values recorded for indigenous breeds of cattle as reported by Patel and Menon (1965) in Gir cattle, Pyne and Maitra (1981) and Roy *et al.* (2010) in Sahiwal cows, Kapale *et al.* (2008b) in Gaolao cattle and Raghunandan *et al.* (1977) Mahima *et al.* (2013) in Haryana cattle.

The mean haemoglobin levels were within normal physiological range for cattle as reported by Jain (1986). The levels were in agreement with the values reported in indigenous breeds of cattle by Raghunandan *et al.* (1977) in Haryana cattle, Pyne and Maitra (1981) in Sahiwal cows, Deshpande *et al.* (1986) in Red Kandhari cattle and Mahima *et al.* (2013) in Haryana cattle.

The mean values of packed cell volume were within normal physiological range reported for cattle (Jain, 1986). The findings of the present study are in agreement with the observations of various workers in indigenous breeds of cattle such as Raghunandan *et al.* (1977) in Haryana cattle, Deshpande *et al.* (1986) in Red Kandhari cattle, Kapale *et al.* (2008b) in Gaolao cattle and Mahima *et al.* (2013) in Haryana cattle.

The values of erythrocyte sedimentation rate recorded in present study were in accordance with the findings of Ahmad (1995) in Sahiwal cows.

The values of MCV were in accordance with the observations of Ahmad (1995) in Sahiwal cattle, Roy *et al.* (2010) in Sahiwal cows and Mahima *et al.* (2013) in Haryana heifers. However, Kapale *et al.* (2008b) reported higher MCV values in Gaolao calves than the values

recorded in Gaolao adult cattle. Deshpande *et al.* (1987a) reported increased MCV with advancement of age and decreased MCV with advancement of age in male and female Red Kandhari cattle, respectively.

The results of MCH obtained in the present study were within the normal physiological range for cattle as reported by Jain (1986). They are also in accordance with the observations of Kapale *et al.* (2008b) in Gaolao cattle, Roy *et al.* (2010) in Sahiwal cows and Mahima *et al.* (2013) in Haryana heifers.

The MCHC values were within the normal physiological range reported for cattle (Jain, 1986). The results obtained in this study were in accordance with the observations of Deshpande *et al.* (1987a) in Red Kandhari cattle and Mahima *et al.* (2013) in Haryana heifers. It was opined that, *in toto*, the erythrocytic parameters such as TEC, haemoglobin content, PCV, ESR, MCV, MCH and MCHC could vary depending on sex, season, nutrition, physiological status, genetic makeup, disease conditions, exercise, excitement, lactation, pregnancy, time of the day, various environmental factors, stress, degree of dehydration, altitude etc.

The TLC was within the normal reference range as reported for cattle (Jain, 1986). The values of the present study were also in agreement with the observations of various workers in indigenous breeds of cattle such as Deshpande *et al.* (1987b) in Red Kandhari cattle, Kapale *et al.* (2008b) in Gaolao cattle, Mahima *et al.* (2013) in Haryana cattle. However, the wide variation in the reference values of TLC reported in various studies could be attributed to the differences in breed, age, temperature, physiological status, stress prior to handling and parasitic infestation (Kapale *et al.*, 2008b and Farooq *et al.*, 2011).

The values recorded for differential leukocyte counts in the present study were within the normal physiological range established for cattle. The lymphocyte per cent differed significantly ($P < 0.05$) between the age groups in both male and females, with higher levels in younger animals compared to adult ones, which were in conformity with the findings of Patel and Menon (1965) in Gir cattle and Kapale *et al.* (2008a) in Gaolao cattle and the same could be required for providing better immunity to the younger animals.

It was concluded that the various haematological values established in Hallikar cattle in their native tract in the present study could serve as reference values which will help in diagnosis of different ailments in Hallikar cattle and also they are useful for academic purposes.

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Table 1. Haematological values in Hallikar breed of cattle

Haematological parameters	Group I	Group II	Group III	Group IV
TEC (millions/ μ l)	7.56 \pm 0.13	7.22 \pm 0.09	7.34 \pm 0.14	6.97 \pm 0.10
TLC (thousands / μ l)	9.77 \pm 0.27	8.76 \pm 0.32	9.11 \pm 0.25	8.19 \pm 0.33
Haemoglobin (g /dl)	11.50 \pm 0.16	11.00 \pm 0.14	11.30 \pm 0.20	10.90 \pm 0.17
PCV (%)	35.10 \pm 0.48	33.40 \pm 0.47	34.70 \pm 0.49	33.30 \pm 0.42
ESR (mm/24 hrs)	6.04 \pm 0.30	6.29 \pm 0.33	5.92 \pm 0.36	6.04 \pm 0.36
MCV (fl)	46.70 \pm 0.99	46.50 \pm 0.76	47.50 \pm 0.90	47.80 \pm 0.70
MCH (pg)	15.30 \pm 0.24	15.30 \pm 0.19	15.40 \pm 0.27	15.60 \pm 0.25
MCHC (%)	32.70 \pm 0.34	33.20 \pm 0.63	32.50 \pm 0.41	32.60 \pm 0.45
Lymphocytes (%)	61.80 \pm 0.63 ^a	59.00 \pm 0.67 ^b	60.40 \pm 0.54 ^a	57.70 \pm 0.58 ^b
Neutrophils (%)	29.30 \pm 0.67	31.00 \pm 0.45	31.00 \pm 0.44	32.80 \pm 0.55
Eosinophils (%)	5.71 \pm 0.36	6.50 \pm 0.40	5.33 \pm 0.39	6.50 \pm 0.40
Monocytes (%)	2.83 \pm 0.25	3.08 \pm 0.32	2.79 \pm 0.27	2.75 \pm 0.25
Basophils (%)	0.41 \pm 0.10	0.41 \pm 0.10	0.50 \pm 0.10	0.37 \pm 0.10