Original Research

Assessment of Hematological Profile in Amrith Mahal Breed of Cattle

K. Manjappa[1], V. Tejaswi*, B. Venkataramireddy, B. Balachandar, L. Lahari and Gowtham Prasad

IVRI, Barielly-243122, Uttar Pradesh, INDIA

[1]Dept. of Animal Husbandry and Veterinary Services, Government of Karnataka, Karnataka, INDIA

***Corresponding author:** dr.tejaswiveli050@gmail.com

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Abstract

The current study was undertaken with the objective of determining the reference values for hematological parameters for Amrith Mahal breed of cattle in general and in the subpopulations such as male, female and different age group of animals. A total of Twenty four healthy Amrith Mahal cattle were selected and divided into four groups based on sex and age as Group I (Young male of one to three years), Group II (Adult male of three to six years), Group III (Young female one to three years) and Group IV (Adult female cattle of three to six years). Blood samples were collected from these animals andhematological parameters were determinedby using hematology autoanalyzer and some by manual method. Mean and standard error values of the hematological parameters viz., TEC , TLC , Hb , PCV, TLC, DLC, MCV, MCHC for all the four groups were tabulated. The data presented in this study can be used as a baseline to study the haematological alterations due to nutritional deficiencies, physiological status, metabolic disorders and pathological conditions.

Key words: Cattle, Amrith Mahal Breed, Haematological Parameters, Hematology Autoanalyzer Analyser

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Introduction

India is having vast animal resources with a wide variety of indigenous cattle which are very well known for their draught power, disease resistance and heat tolerance. Amrith Mahal breed a variety of indigenous cattle was established during the 16th century, which was developed from three distinct varieties such as Hallikar, Hagalvadi, Chitradurga. The Maharaja of Mysore during17th century named this breed as Benne Chavadi, which was renamed as Amrith Mahal by Tippu Sultan during the 18th century. Amrith Mahal cattle being large animals, the body is compact and muscular with well-formed shoulders and hind quarters, the neck is strong and fairly long. They were used even in wars for army expedition to Afghanistan during

the 19th century. Similarly, these cattle were also used to chase the soldiers of enemy troops by the kings of Mysore state (Narayana Swamy, 2008). The knowledge of hematological values is useful in diagnosing various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance of cows, resulting in great economic losses to dairy farmers (Ahmed *et al.,* 2003). The hematological data help to a great extent in determining the course and outcome of many viral, bacterial and parasitic diseases (Swenson, 1977). Extensive studies have been conducted on blood biochemistry of different breeds of dairy cattle and relationship between blood concentrations of various metabolites in dairy cows (Kulkarni *et al.,* 1984). The results from different breeds or species at a certain geographical location cannot be taken as norms for related animal or species in another locality. This may lead to unnecessary additional investigations, misinterpretation and erroneous diagnosis **(**Farooq *et al.,* 2012). Factors like breed, age, sex, seasonal variation, lactation, pregnancy, health and nutritional status of the animal alters hematological parameters (Mirzadeh *et al.,* 2010).

Considering all the above facts, its observed that there is paucity of normal reference values of hematological and biochemical parameters in Arith Mahal cattle .Thus the present study was undertaken to estimate the normal range of certain hematological parameters in Amrith Mahal cattle in general, male, female and different age groups (young and adult).

Materials and Methods

The present study was conducted at Amrith Mahal Cattle Breeding Centre, Department of Animal Husbandry and Veterinary Science, Government of Karnataka, Ajjampura, Chikmanguluru district.

Selection of Animals

The Amrith Mahal cattle were randomly selected based on general body condition with healthy appearance. All the animals were managed under identical extensive type of managemental conditions which were allowed for grazing for six to eight hours daily between 9.00 AM and 5.00 PM and also stall fed during late evening hours.

Study Group

Twenty four healthy Amrith Mahal cattle based on the random selection were divided into four groups as detailed below. The male animals were not castrated and the female animals were not in the state of pregnancy.

Groups Description of Animals

Group I young male cattle aged between one to three years, Group II adult male cattle aged between three to six years, Group III young female cattle aged between one to three years, Group IV adult female cattle aged between three to six years.

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Blood Collection

Five ml of blood was collected into the heparinized vaccutainer aseptically by jugular venipuncture for carrying out hematological evaluations. Similarly, another five ml of blood was collected into the coagulation activation vaccutainer and was allowed to clot for 60 min at refrigerated temperature. The sample collection was made between 8.00 and 9.00 AM. Totally the samples were collected at four times with an interval of one week, so that the study period was for about one month duration. The blood samples were carried to the Department of Veterinary Medicine, Veterinary College, Shivamogga for hematological analysis.

Hematological Parameters

The blood samples were subjected for estimating the hematological parameters such as total erythrocyte count, packed cell volume, hemoglobin, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration and total leucocyte count using the help of hematology autoanalyzer (MindRay BC 2800 Vet). The erythrocyte sedimentation rate was estimated by Wintrobe method as described by Schalm *et al.* (1975). Further, to arrive at the percentage of individual leucocytes, the differential leucocyte count was carried out by manual method (Schalm *et al.*, 1975).

Results and Discussion

The results of the present study revealed that the young male Amrith Mahal cattle(Group I) which were in the age group of one to three years showed significantly ($P<0.05$) higher values of TEC, hemoglobin, PCV, TLC and lymphocyte percentage compared to any one or two groups of animals. The levels of ESR, MCV, MCH, MCHC, per cent neutrophils, per cent basophils and per cent eosinophils did not differ significantly ($P>0.05$) between different groups. The established range of hematological and biochemical reference values for Amrith Mahal cattle in the present study are extracted and reproduced in Table 1.

The increased TEC in young animals(Group I) indicated the better erythropoietic effect that could be attributed to the functions of testosterone and could also be attributed to small sized red blood cells, which is linked to the compensatory physiological mechanism of delivering required levels of oxygen to the tissues (Holman, 1956). The higher PCV content reported in young males (Group I) compared to adult females(group IV) could be due to either the influence of pre-pubertal or pubertal age or the effect of increased level of testosterone that involved in erythropoiesis which in turn could increase PCV levels. Higher values of TLC in the young male animals could be due to physiological status, age and individual variation as opined by Kapale *et al.* (2008b). Also, the increased susceptibility of young animals to diseases as compared to adult animals could be the another reason for increased TLC values in the young male animal.

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Table 1: The established range of haematological reference values for Amrith Mahal cattle in the present study

Parameter	Group I	Group II	Group III	Group IV
TEC (millions/µl)	6.99 ± 0.32 to 8.08 ± 0.26	6.48 ± 0.22 to 7.84 ± 0.24	6.78 ± 0.33 to 7.80 ± 0.30	6.49 ± 0.31 to 7.17 ± 0.23
Hemoglobin (g/dl)	10.85 ± 0.48 to 12.32 ± 0.37	10.47 ± 0.25 to 11.42 ± 0.66	10.65 ± 0.17 to 12.20 ± 0.25	10.42 ± 0.19 to 11.67 ± 0.2
PCV (%)	32.45 ± 1.30 to36.35 ± 0.89	32.15 ± 1.95 to34.92 ± 1.25	33.52 ± 1.96 to36.32 ± 1.19	32.52 ± 1.96 to36.32 ± 1.19
ESR (mm/24 hrs)	6.00 ± 0.70 to 6.75 ± 0.47	5.75 ± 1.10 to 6.75 ± 0.75	5.25 ± 1.10 to 6.75 ± 0.47	5.25 ± 0.94 to 7.25 ± 0.62
MCV (fl)	42.19±1.90 to 52.39 ± 3.36	41.96 ± 1.61 to51.28 ± 1.69	43.83 ± 1.48 to53.86 ± 3.98	45.35 ± 1.55 to52.42 ± 1.87
MCH (pg)	14.26 ± 0.82 to 16.40 ± 0.27	14.29 ± 0.72 to17.15 ± 1.17	15.03 ± 0.75 to17.02 ± 0.09	14.86 ± 0.17 to16.24 ± 0.41
MCHC (g/dl)	31.7±2.15 to 35.74 ± 2.12	31.68 ± 0.81 to 35.02 ± 3.71	30.84 ± 0.98 to35.09 ± 1.50	30.82 ± 1.24 to 34.74 ± 1.52
TLC (thousands/µl)	9.12 ± 0.49 to 9.87 ± 1.38	8.07 ± 0.60 to 9.35 ± 1.04	8.67 ± 0.84 to 9.45 ± 0.54	7.82 ± 0.91 to 9.22 ±1.03
Lymphocytes (%)	60.25 ± 0.85 to 63.50 ± 0.64	56.75 ± 1.54 to 61.50 ± 2.10	59.25 ± 0.94 to 61.25 ± 1.31	56.25 ± 0.18 to 58.00 ± 1.82
Neutrophils (%)	26.50 ± 0.86 to 39.00 ± 1.58	29.25 ± 0.62 to 31.50 ± 0.95	27.00 ± 1.47 to31.00 ± 2.64	29.50 ± 1.84 to31.75 ± 0.94
Eosinophils (%)	4.00 ± 0.81 to 6.75 ± 1.03	4.75 ± 1.04 to8.50 ± 0.86	5.75 ± 0.47 to8.00 ± 0.40	5.25 ± 0.75 to8.00 ± 0.40
Monocytes (%)	1.75 ± 0.23 to3.50 ± 0.43	2.50 ± 0.32 to4.25 ± 0.23	1.00 ± 0.40 to4.50 ± 1.75	3.75 ± 0.47 to5.00 ± 1.47
Basophils (%)	0 to 0.75 ± 0.25	0.25 ± 0.25 to 0.50 ± 0.28	0 to 0.50 ± 0.28	0 to 0.50 ± 0.28

The lymphocyte percentage was also significantly (P<0.05) higher in young male animals (Group I) as compared to adult male (GroupII). Similarly, the monocyte per cent was significantly (P<0.05) higher in adult female animals as compared to young male animals, that indicate better phagocytic activity in female Amrith Mahal cattle.

The significantly (P<0.05) higher TEC value observed in young male Amrith Mahal cattle were in conformity with the reports of Kapale *et al.* (2008b) in Gaolao cattle and Chetty and Rao (1998) in prepuberal crossbred heifers. Higher TEC for male animals were also reported by Schalm (1975), Stark *et al.* (1978) and Sjaastad *et al.* (2005). The ESR values recorded in the present study were in accordance with the various researchers such as Ahmad (1995) for Sahiwal cows, Naik *et al.* (2013) for Punganur cattle .The values of haemoglobin , MCV,MCHC ,MCH levels found in the present study were within the normal range for indigenous cattle as reported by Mahima *et al.* (2013) for Hariana cattle, Lankesh (2013) for Hallikar cattle. The TLC and DLC values of present study in different groups were within the normal range for cattle as reported by various authors such as, Kramer (2000), Reece and Swenson (2005).

Conclusion

The reference intervals of certain hematological parameters for a variety of indigenous cattle, the Amrith Mahal from one to three years and three to six years for both male and female animals were established in the present study. The data presented in this study can be used as a baseline to study the haematological alterations due to nutritional deficiencies, physiological status, metabolic disorders and pathological conditions and therefore useful in diagnosing various pathological and metabolic disorders with respect to age and sex, which can adversely affect the productive and reproductive performance of cows.

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Department of Veterinary Physiology , Veterinary College Bengaluru, Karnataka, Department of veterinary physiology ,veterinary college Shivmoga,Karnataka, Amrith Mahal Cattle Breeding Centre, Department of Animal Husbandry and Veterinary Science, Government of Karnataka.

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