ASSESSMENT OF HAEMATOLOGICAL PARAMETERS OF Punganur Cattle

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ABSTRACT

The study was undertaken with the objective of establishing the normal reference values of certain haematological parameters in Punganur cattle maintained at Livestock Research Station, Palamaner in Andhra Pradesh. Twenty-four healthy Punganur cattle in different physiological stages (calves, bulls and lactating cows) during the month of August, 2022 were selected for the study. Blood samples were collected from jugular vein during morning hours before feeding. Hematological profile such as total red blood cells (RBC), haemoglobin (HB), total white blood cells (WBC), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) etc. were estimated with automatic blood analyser. The range of values for haematological parameters such as RBC (6.77 ± 0.60 to 9.59 ± 0.59 million/ìl), WBC (8.20 ± 1.10 to 10.33 ± 1.23 thousands/ìl), haemoglobin content (8.51 ± 0.52 to 10.50 ± 0.49 g/dl), PCV (28.75 ± 2.36 to 32.25 ± 2.05 %), MCV (31.30 ± 0.38 to 42.90 ± 1.42 fl), MCH (8.79 ± 0.12 to 14.07 ± 0.45 pg), MCHC (28.27 ± 0.33 to 33.93± 0.18 g/dl) and the cells in differential leukocyte count (Lymphocytes: 3.88 ± 0.49 to 4.98 ± 0.93 thousands/ìl, Monocytes: 0.75 ± 0.08 to 1.35 ± 0.13 thousands/ìl and Granulocytes: 0.37 ± 0.10 to 0.50 ± 0.10 thousands/ìl) were recorded for different stages. The normal haematological values established in the study could be helpful in the diagnosis of different ailments in Punganur breed of cattle at different physiological stages and the values can also useful for academic purposes.

Keywords: Haematological profile, Punganur cattle, Reference values

INTRODUCTION

India is blessed with 41 registered diversified genetic groups of cattle which are adopted for different agro-climatic region of the country. Extensive work has been carried out on various aspects of different breeds of cattle under local climatic conditions. In recent years, preservation and conservation of local germ plasm has gained priority and several attempts were being made to improvise the indigenous cattle breeds due to their production potential (Sripad et al., 2014). Many of the indigenous breeds of cattle in India are giving way to the exotic and cross-bred animals. This has led to a situation, where exotic breeds like Holstein Friesian, Jersey and their cross-breeds are...
predominant in many parts of India, while the indigenous breeds like Haryana, Halliak, Killari, Gir, Punganur, Ongole and Sahiwal have been reduced to small herds. Among the different local cattle breeds, Punganur breed belongs to native tract of Rayalaseema region (Chittoor) of Andhra Pradesh. Punganur is a dwarf, dual purpose breed of cattle with an adult body weight of 240 kg for male and 170 kg for female and the milk yield ranges between 200-1100 kg per lactation with an average of 550 kgs, for lactation length of 153 ± 24 days (Ekambaram et al., 2014). They are resistant to many bacterial, viral, and parasitic diseases and have good capacity of heat tolerance. They require less care, management and can thrive well under the poor feed stuffs available in the state.

In Andhra Pradesh, most of the grazing area is subjected to decline day by day as well as occurrence of periodic drought, seasonal dry periods, low-nutrition winter grazing, common livestock diseases (Trypanosomiasis, Haemorrhagic septicaemia, brucellosis etc.) and other major environment related stress. Numerous studies have proved that indigenous cattle are able to survive in such harsh environmental conditions in comparison to exotic breeds. Now-a-days the farmers are realizing that despite of low productivity of indigenous breeds; they have the potential for higher yields provided better management conditions and selective breeding rather than cross-breeding from exotic ones. The importance of determining the haematological and biochemical indices of domestic animals have been well documented and acknowledged (Opara et al., 2006). Hematological values can provide baseline valuable information and help in realistic evaluation of management practice, nutritional and physiological status of animal and diagnosis of health condition (Radostits et al., 2006 and Mir et al., 2008). To the best of our knowledge there is paucity of information in the literature regarding the haematological values of Punganur breed of cattle.

Keeping these points in view, the study was undertaken at Livestock Research Station, Palamaner, Andhra Pradesh with the objective of determining the reference values for haematological parameters for Punganur breed of cattle.

MATERIALS AND METHODS

Study area

Livestock Research Station, Palamaner is in Chittoor district of Andhra Pradesh at a height of 683 meters above sea level, with longitude - 13.20 N and latitude - 78.75 E coordinates and belongs to hot and humid agroclimatic zone. The average temperature of Palamaner ranges from 260 °C to 350 °C, rainfall of 36.08 mm and average humidity of 65% to 70%.

Study animals

The study was carried out on Punganur cattle belonging to different physiological stages. Twenty-four animals from each stage i.e., calves (3 to 6 months age), bulls and lactating cows were selected during the month of August 2022. The animals were maintained under isolateral management conditions at the LRS, Palamaner. The experimental animals were fed daily with adlibitum quantity of green fodder and concentrate feed was given as per the ICAR requirements. Fresh water was available throughout the day. The animals were separated from the herd only for the duration of blood collection.

Collection of blood samples

About 2 ml of blood was collected from jugular vein aspetic method in sterile vacutainers containing EDTA (ethylene diamine
tetra acetic acid) salt, twice from each animal at an interval of two weeks, prior to letting out of animals for grazing during early morning hours between 7.30 AM to 8.30 AM. Samples were immediately transported to the laboratory on ice.

**Sample analysis**

Whole blood analysis was carried out at department of Veterinary Physiology, College of Veterinary Science, Tirupati, using Mindray Vet 2800 Haematology analyser. 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.

**Statistical analysis**

Data recorded were subjected to statistical analysis using Microsoft office Excel 2019 software and values are presented as mean ± standard error.

**RESULTS AND DISCUSSION**

The study describes the blood composition of relatively genetically pure indigenous Punganur cattle of different physiological stages. The mean and standard error of Hematological (Hb, WBC, RBC, Platelet count, PCV, Lymphocytes, Monocytes, Granulocytes, MCH, MCHC and MCV) parameters are given in Table 1.

The Hb concentration ranged from 8.51 to 9.47 g/dl, with a slight variation among different stages. Blood Hb concentration could be used as an indicator of adaptability to the environment and the animal with higher Hb concentration have been found to be more adaptable than with lower Hb levels (Lankesh et al., 2015). In the present study, lactating cows have comparatively higher Hb than bulls and calves, indicating long term adaptation to the environment. The changes in haematological values could also be dependent on the nutritional status of the animal.

The RBC count (x106 /µl) in calves, bulls and lactating cows was 9.59, 7.85 and 6.77, respectively. Reduced RBC count as age advanced may be due to increased destruction of erythrocytes and environment induced adaptive changes with increasing age (Mohan et al., 2009). The PCV (%) ranged from 28.75 to 32.25 in different groups of cattle. The values are in concurrent to the statement that decreasing value of PCV as age progressed (Mirzadeh et al., 2010). The WBC count (x103 /µl) in calves, bulls and lactating cows was 9.02, 8.20 and 10.33, respectively. The counts of white blood cells at period of lactation and during pregnancy were comparatively higher than found at most of the otherages in cattle. The presence of higher WBC count during these stages could be due to lactation stress. Higher value of MCV, MCH and MCHC observed in lactating over non-lactating cows by Randhawa et al.(2009), agreed with the findings.

Knowledge on the haematological values is very much useful to diagnose the different pathological as well as the metabolic disorders, which are adversely or deleteriously affect the reproductive and productive performance of the cows. However, this requires for the establishment of normal reference values for different breeds. Pathological values are defined as those values deviating from the normal standard reference values. Evaluation, analysis and interpretation of the obtained results mainly depend on the standard reference values for different breeds in different regions as well as under existing environmental or climatic conditions. However, Factors such as breed, sex, age, seasonal variation, pregnancy, lactation,
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Calves</th>
<th>Bulls</th>
<th>Lactating cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dl)</td>
<td>8.51±0.52</td>
<td>10.50±0.49</td>
<td>9.47±0.73</td>
</tr>
<tr>
<td>WBC (x103 /µl)</td>
<td>9.02±0.76</td>
<td>8.20±1.10</td>
<td>10.33±1.23</td>
</tr>
<tr>
<td>RBC (x106 /µl)</td>
<td>9.59±0.59</td>
<td>7.85±0.41</td>
<td>6.77±0.60</td>
</tr>
<tr>
<td>Platelets (x105 /µl)</td>
<td>10.80±1.02</td>
<td>17.43±1.90</td>
<td>9.37±1.06</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>32.25±2.05</td>
<td>30.56±1.42</td>
<td>28.75±2.36</td>
</tr>
<tr>
<td>Lymphocytes (x103 /µl)</td>
<td>4.43±0.37</td>
<td>3.38±0.40</td>
<td>4.38±0.87</td>
</tr>
<tr>
<td>Monocytes (x103 /µl)</td>
<td>1.35±0.13</td>
<td>0.80±0.11</td>
<td>0.75±0.08</td>
</tr>
<tr>
<td>Granulocytes (x103 /µl)</td>
<td>4.98±0.93</td>
<td>4.02±0.71</td>
<td>3.88±0.49</td>
</tr>
<tr>
<td>MCV (fL)</td>
<td>31.30±0.38</td>
<td>41.64±0.84</td>
<td>42.90±1.42</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>8.79±0.12</td>
<td>13.36±0.29</td>
<td>14.07±0.45</td>
</tr>
<tr>
<td>MCHC (g/dl)</td>
<td>28.27±0.33</td>
<td>32.36±0.22</td>
<td>32.93±0.18</td>
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</tbody>
</table>

Each value is the mean of 24 observations
nutritional and health status of the animal alter haematological attributes. Since the Punganur local cattle used in the study did not show any significant clinical signs or pathological symptoms, therefore they were believed as healthy animals and the result or data observed can serve as standard reference values for these animals in future veterinary science and animal husbandry.

CONCLUSIONS

The haematology values were the mean of 24 observations which were considered to be in the normal range in the cattle breeds. The findings of the study may serve as reference values in which alterations due to metabolic, nutrient deficiency, physiological and health status can be compared for diagnostic and therapeutic purpose in different age and physiological states of Punganur cattle breed, which are unique cattle breed adapted to existing climatic conditions.

REFERENCES


