Research Article

Evaluation of Local Chickens Erythrocyte in Alamata District, North Ethiopia
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Abstract: This study was conducted on local chicken in Alamata district from January to April 2010 to evaluate local chicken erythrocyte and to see the effect of sex and age on these values. A total of 262 chickens were randomly selected and whole blood was collected using EDTA coated test tubes. The blood samples collected were subjected to laboratory analysis to determine the value of PCV, Hb concentration, and RBC count. MCV, MCH and MCHC were calculated from the values of PCV, Hb concentration and RBC count. It was found that the mean values for PCV, Hb, and RBC count were 39.16% (38.09-40.22 at 95%CI); 9.46gm/dl (9.21-9.71 at 95% CI) and 3.34 x10⁶/mm³ (3.20-3.47 x10⁶/mm³ at 95%CI) respectively. The calculated values for MVC, MCH and MCHC were 126.34fl, 31.10pg and 24.79%, respectively. Statistically significant (p<0.05) differences in PCV, MCV and MCHC mean values were found between young and adult chickens. However, the differences in Hb, RBC and MCH mean values were not statistically significant (p>0.05) for young and adult local chicken. Again the difference in mean values for PCV and MCHC in male and female chickens were statistically significant (p<0.05). However, no statistically significant figure (p>0.05) was found in mean values of RBC count, Hb concentration, MCV and MCH between male and female chicken. It is recommended that this finding can be considered when there is a need of normal hematological values of local chicken.

Keywords: Alamata district; Erythrocyte; Evaluation; Local; chicken; Mean.

1. INTRODUCTION

In developing countries, the majority of rural houses keep poultry in their farm yard. In Africa, village chicken produces over 70% of poultry products and 20% of animal’s protein intake (Kitalyi, 1998). Just like in other developing countries, poultry industry in Ethiopia is dominated by the traditional sector. Free-range poultry keeping is most common in the country. The chickens reared under traditional or “backyard” conditions accounts for 99%, while only 1% is chicken kept under intensive management system in commercial farms (CSA, 2008). As far as the Ethiopian poultry farming system is concerned, it is apparent that village chickens are more important than those kept under intensive management system with regard to total numbers, egg and poultry meat production (Alemu, 1995).

Analysis of normal hematological parameters of chicken is very essential in diagnosing the various pathological and metabolic disorders. It can be used as a diagnostic tool in order to assess the health status of an individual and/or a flock. Hematological changes are routinely used to determine various status of the body and to determine stresses due to environmental, nutritional and/or pathological factors. Hematological values of chickens are influenced by age, sex, breed, climate, geographical location, season, day length, time of day, nutritional status, life habit of species, present status of individual and other physiological factors (Terry, 1995).

For proper management, feeding, breeding, prevention and treatment of disease; it is desirable to know the normal physiological values under local conditions but normal hematological information of the local chickens of Ethiopia is hardly available, as researches on these line have rarely been carried out under local condition. Thus, evaluation of local chicken erythrocyte and investigation of variations in erythrocyte values between sexes and different age groups of local chicken is the aim of this paper.

2. MATERIALS AND METHODS

2.1. Study Area and population
This study was conducted from January to April, 2010 at Alamata District, North Ethiopia. The area is located at an altitude range of 2000m to 3000m above sea level with an average rain fall of 6000mm. Chicken production system in the area is characterized by minimum input from the owner, with chicken scavenge around the farm and feed on house hold wastes. Much of the chickens in the district are local breeds. Some poultry owners built poultry houses from locally available materials but in most house holds the chickens share housing with humans.

2.2 Blood Sampling and Transport

A total of 262 local chickens were randomly selected and sampled. Blood was collected through wing vein puncture after swabbing the area with 70% alcohol. Then vacutener needle (23 gauge size) was inserted directly in to the vein and approximately 2ml of blood was collected into labeled vacutener tube containing Ethylene diamine tetra acetic acid (EDTA) as anticoagulant. Blood samples were well mixed with the anticoagulant gently as soon as the sample was taken and transported to the laboratory in the ice-box at about 4\(^0\)C (OIE, 2008).

2.3 Laboratory Analysis

The blood samples containing anticoagulant was used for hematological parameters including red blood cells (RBC) count, packed cell volume (PCV), hemoglobin (Hb) concentration. The packed cell volume (PCV), values were determined by the microhematocrit method after blood samples containing EDTA were aspirated into a set of capillary tube. The tubes were sealed by wax and spun on centrifuge at 3000 rpm for 5 minute; the PCV was read as a percentage directly from graphics reader (Terry, 1995). The hemoglobin estimation was done by cyanmethaemoglobin method after blood sample and acid solution (0.1N HCL) was filled into graduated tube of hemoglobinometer. Result recording was done after 2 to 3 minute by adding water until the color matches with the standard (Bernard et al., 2000). The total red blood cell counting was performed by manual method, after blood sample was diluted by hayem’s solution, using hemocytometer chamber as out lined by (Jain, 1986). The mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) were calculated from the values of PCV, Hb concentration and RBC count according to (Stockham and Scott, 2002).

2.4 Data Analysis

SPSS version 17 statistical soft ware were used for data processing. All the data were subjected to analysis of variance (ANOVA) and P-Values less than 0.05 were considered to be statistically significant.

3. RESULTS

From a total of 262 blood samples, it was found that the over all mean values for the PCV, Hb concentration and RBC count were 39.16% (38.09-40.22 at 95% CI), 9.46 gm/dl (9.21-9.71 at 95%CI) and 3.34 \(\times\) 10\(^6\)/mm\(^3\) (3.20 -3.47 \(\times\) 10\(^6\)/mm\(^3\) at 95% CI) respectively. The mean values for MCV, MCH and MCHC were calculated from the mean values of PCV, Hb concentration and RBC count and their respective values is indicated in (Table 1).

<p>| Table 1. Mean values of different hematological parameters of 262 local chickens |
|---------------------------------|----------------|----------------|----------------|-----------|------------|------------|</p>
<table>
<thead>
<tr>
<th>Mean Value</th>
<th>PCV (%)</th>
<th>Hb (g/dl)</th>
<th>RBC (\times)10(^6)/mm(^3)</th>
<th>MCV (fl)</th>
<th>MCH (pg)</th>
<th>MCHC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Value</td>
<td>39.16</td>
<td>9.46</td>
<td>3.34</td>
<td>126.34</td>
<td>31.10</td>
<td>24.79</td>
</tr>
<tr>
<td>95% CI</td>
<td>38.09-40.22</td>
<td>9.21-9.71</td>
<td>3.20-3.47</td>
<td>121.80-130.88</td>
<td>29.65-32.55</td>
<td>24.09-25.49</td>
</tr>
</tbody>
</table>

The mean values of different hematological parameters in young and adult plus male and female local chickens are indicated in Table 2 and Table 3 respectively.
Table 2. Mean values of different erythrocyte values in young and adult local chickens

<table>
<thead>
<tr>
<th>Age</th>
<th>Total No.</th>
<th>PCV (%)</th>
<th>Hb (g/dl)</th>
<th>RBC (10^6/mm^3)</th>
<th>MCV (fl)</th>
<th>MCH (pg)</th>
<th>MCHC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>36.73</strong></td>
<td><strong>9.37</strong></td>
<td><strong>3.34</strong></td>
<td><strong>118.82</strong></td>
<td><strong>30.77</strong></td>
<td><strong>26.23</strong></td>
</tr>
<tr>
<td>Adult</td>
<td>170</td>
<td>(39.06-41.88)</td>
<td>(9.19-9.84)</td>
<td>(3.16-3.51)</td>
<td>(124.76-136.06)</td>
<td>(29.45-33.18)</td>
<td>(23.17-24.84)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>40.47</strong></td>
<td><strong>9.51</strong></td>
<td><strong>3.33</strong></td>
<td><strong>130.41</strong></td>
<td><strong>31.28</strong></td>
<td><strong>24.00</strong></td>
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<tr>
<td></td>
<td><strong>P-value</strong></td>
<td>0.001</td>
<td>0.586</td>
<td>0.963</td>
<td>0.016</td>
<td>0.741</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Numbers in parenthesis are values at 95% Confidence Interval

Table 3. Mean values of different erythrocyte values in female and male local chickens

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total No.</th>
<th>PCV (%)</th>
<th>Hb (g/dl)</th>
<th>RBC (10^6/mm^3)</th>
<th>MCV (fl)</th>
<th>MCH (pg)</th>
<th>MCHC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>38.15</strong></td>
<td><strong>9.38</strong></td>
<td><strong>3.31</strong></td>
<td><strong>124.49</strong></td>
<td><strong>31.09</strong></td>
<td><strong>25.19</strong></td>
</tr>
<tr>
<td>Male</td>
<td>61</td>
<td>(39.64-45.31)</td>
<td>(9.14-10.32)</td>
<td>(3.14-3.73)</td>
<td>(122.23-142.66)</td>
<td>(27.98-34.25)</td>
<td>(22.04-24.91)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>42.48</strong></td>
<td><strong>9.73</strong></td>
<td><strong>3.44</strong></td>
<td><strong>132.44</strong></td>
<td><strong>31.11</strong></td>
<td><strong>23.24</strong></td>
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</tr>
<tr>
<td></td>
<td><strong>P-value</strong></td>
<td>0.001</td>
<td>0.251</td>
<td>0.422</td>
<td>0.145</td>
<td>0.9910</td>
<td>0.042</td>
</tr>
</tbody>
</table>

*Numbers in parenthesis are values at 95% Confidence Interval

DISCUSSION

The mean values for PCV in this study was 39.16% (Table 1) which is in agreement with Terry, (1995) who reported that most caged birds have a PCV of 35-55%. It is also found that there were significant differences in PCV values of adult and young local chickens (Table 2). Adult local chickens had higher PCV values than young. This finding is in agreement with Islam et al. (2004) who reported significantly higher PCV values in adult local Bangladesh chicken than young. Elizabeth et al. (2007) had also reported the same finding. However, the current study is in contrary to the report of Azeez et al. (2009). This study also revealed that lower mean PCV values in female local chickens t than male (Table 3). The difference was statistically significant \(p=0.01\). It was also reported by Elizabeth et al. (2007) that adult males had higher PCV level than adult females birds.

Hemoglobin concentration was higher in male and adult chickens compared to the female and young local chicken (Table 2 & 3) which is in agreement with the report of Islam et al. (2004). Significantly higher hemoglobin concentration in adult local chicken than young was also reported by (Thrall, 2004) which supports this finding. The value of hemoglobin concentration obtained in the current study was in contrary with the finding of Elizabeth et al. (2007) who reported higher Hb concentration values for the female Juvenile ring necked pheasants than male. This difference might be due to environmental and breed differences.
Erythrocyte number in male was higher than female (Table 3) though the difference was not statistically significant which agrees with the previous researchers in this aspect. It was also found that statistically significant difference in mean values of MCHC between male and adult chickens compared to the female and young (Table 2 & 3) which agrees with the findings of Coffin (1955) and Sturkie (1965). From the present study the mean values of MCV and MCH in adult local chickens was higher than young which contradicted with the finding of Islam et al. (2004) who reported that MCV and MCH decreased with the advancement of age.

Most of the hematological mean values found in the present study were similar with the standard mean values of chicken hematological parameters studied so far in other countries. Since the normal hematological values for local chickens in Ethiopia are hardly available, it is recommended that this finding can be taken in to consideration when there is a need of normal hematological values of local chicken in the country.

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Competing Interests
The author(s) declare that they have no competing interests.

Author's Information
On behalf of the authors, I take the full responsibility for the article during submission and peer review.

6. REFERENCES