EFFECT OF SEASON ON HAEMATOLOGICAL PROFILE AND ERYTHROCYTE INDICES IN WHITE LEGHORN LAYERS

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ABSTRACT

A total of 36 blood samples were obtained from White Leghorn layers, comprising 18 samples each in winter and summer season with the aim of determining the effect of season on their Haematological profile viz., Haemoglobin (Hb), Packed Cell Volume (PCV), Red Blood Cell (RBC) and Erythrocyte indices viz, Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC). The highest Hb (g %), PCV (%) and RBC (x10^6 µl) values of 10.09 ± 0.27, 29.11 ± 0.60 and 2.71 ±0.12 respectively, were obtained during winter, while the lowest Hb, PCV and RBC values of 9.22 ±0.186, 26.44 ± 0.92 and 2.33 ± 0.9 in summer respectively. Hb, PCV and RBC values were significantly (P < 0.05) higher in winter than summer season. Erythrocyte indices did not differ statistically (P > 0.05) between seasons, but numerically higher values were obtained during winter season. Erythrocyte indices viz, MCV (fL), MCH (pg), MCHC (g/dl) obtained during winter and summer were 116.05 ± 4.24, 42.41 ±1.19 and 37.19 ± 1.36; and 107.74 ± 3.29, 39.98 ± 2.01 and 35.26 ± 1.41 respectively. The results revealed a significant seasonal variation in Hb, PCV, RBC values of White Leghorn layer and it indicates that the winter season is apparently less stressful to the White Leghorn than summer season.

Keyword: Haemotological profile, Erythrocyte indices, White Leghorn

INTRODUCTION

High temperature imposes severe stress on birds and leads to important economic losses in the poultry. Although birds perform well within a relatively wide range of temperatures, between 10 and 27°C, temperatures above 30°C may cause stress in adult hens (Daghir, 2009) and broiler chickens (Geraert et al., 1996). The present study is of much importance due to the fact that there are two distinct seasons in India (summer and winter) during which the environmental temperature varies.

Determination of haematological parameters or indices has been a reliable tool because, blood often gives specific indication of the ongoing events in the body, serving as an aid to diagnosis and health status assessment (Theml et al, 2004; Tibbo et al., 2004). Factors such as age, gender, environmental factors including season and stress to which the animals have been exposed have been shown to influence haematological parameters (Olayemi and Arowolo, 2009). By evaluating the hematological profile during the seasonal variations, the confusion with disease associated changes can be avoided (Olayemi and

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Arowolo, 2009). Since the available reports on haematological profile of domesticated avian species in different seasons are scanty, the present study was undertaken to evaluate the haematological parameters in different seasons in White Leghorn layers.

MATERIALS AND METHODS

A total of 36 blood samples were obtained from White Leghorn layers maintained at Institute of Poultry Production and Management, TANUVAS, Chennai, comprising 18 samples in winter (ambient temperature 30°C; Relative humidity 89%) at the age of 24 weeks and 18 samples in summer (ambient temperature 43°C; Relative humidity 83%) season at the age of 40 weeks. The birds were reared in deep litter under uniform standard managemental conditions. The feed and water was made available ad libitum throughout the trial period. The parameters like Haemoglobin (Hb), Packed Cell Volume (PCV) and Red Blood Cell (RBC) count were estimated by Cyanomethemoglobin, micro hematocrit and haemocytometer counting methods respectively. Erythrocyte indices viz, Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) were arrived by using standard formulae. The data were analysed as per standard statistical procedure (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The overall mean values for various parameters studied are presented in table.

Haematological profile

The highest Hb (g %), PCV (%) and RBC (x10^6µl) values of 10.09 ± 0.27, 29.11 ± 0.60 and 2.71 ±0.12 respectively, were obtained during winter, while the lowest Hb, PCV and RBC values of 9.22 ±0.186, 26.44 ± 0.92 and 2.33 ± 0.9 in summer respectively. Hb, PCV and RBC values were significantly (P < 0.05) higher in winter than summer season and these results are in accordance with Olayemi and Arowolo, (2009) in Nigerian ducks. This might be due to the reason that at low ambient temperature (LAT) in winter season, there is high oxygen demand by the body, low partial pressure of oxygen in the blood (hypoxemia) and higher metabolic rate (favours high feed intake) which stimulates erythropoiesis thereby producing higher haematological values in winter. These results are also in accordance with the findings of Abelenda et al., 1973 who in common cranes (Grus grus). During summer, high ambient temperature (HAT) increases body temperature, respiration and respiratory water loss and oxygen consumption of birds. The increased oxygen intake increases the partial pressure of oxygen in the blood of birds (Brackenbury et al., 1981) leading to decreased erythropoiesis and consequently, reducing the number of circulating erythrocyte (Donkoh, 1989).

Erythrocyte indices

Erythrocyte indices did not show any statistical difference (P > 0.05) between seasons whereas numerically higher values were obtained during winter season. Erythrocyte indices viz, MCV (fl), MCH (pg), MCHC (g/dl) obtained during winter and summer were
116.05 ± 4.24, 42.41 ±1.19 and 37.19 ± 1.36; and 107.74 ± 3.29, 39.98 ± 2.01 and 35.26 ± 1.41 respectively. The values were in agreement with the findings of Pampori and Saleem (2007) and Mary Priya and Gomathy (2008). Numerically lower MCH and MCHC during summer in the present study may be due to the HAT compared with LAT during winter. This might have resulted in changes in blood volume and blood viscosity. Variation in these results may be due to difference in breeds, hormonal and other nutritional aspects (Olayemi and Arowolo, 2009).

CONCLUSION

The present study concludes that significant seasonal variation exists in Hb, PCV, RBC values of White Leghorn layer and this indicates that the winter season is apparently less stressful and more conducive to the White Leghorn layer than summer. However, further research on evaluation of other parameters of stress has to be conducted before drawing overall conclusion on effect of season on performance of White Leghorn layers.

REFERENCES


### Table: Haematological profile and Erythrocyte Indices (Mean±S.E) in White Leghorn layer.

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Parameters</th>
<th>Winter season (n=18)</th>
<th>Summer season (n=18)</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Haematological profile</strong></td>
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<tr>
<td>1</td>
<td>Hb (g%)</td>
<td>10.09 ± 0.27</td>
<td>9.22 ± 0.18</td>
<td>2.60</td>
<td>0.019*</td>
</tr>
<tr>
<td>2</td>
<td>PCV (%)</td>
<td>29.11 ± 0.60</td>
<td>26.44 ± 0.92</td>
<td>2.41</td>
<td>0.0214*</td>
</tr>
<tr>
<td>3</td>
<td>RBC(x10^6µl)</td>
<td>2.71 ± 0.12</td>
<td>2.33 ± 0.9</td>
<td>2.43</td>
<td>0.020*</td>
</tr>
<tr>
<td></td>
<td><strong>Erythrocyte Indices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MCV(FL)</td>
<td>116.05 ± 4.24</td>
<td>107.74 ± 3.29</td>
<td>1.55</td>
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<tr>
<td>5</td>
<td>MCH(pg)</td>
<td>42.41 ± 1.19</td>
<td>39.98 ± 2.01</td>
<td>1.04</td>
<td>.304NS</td>
</tr>
<tr>
<td>6</td>
<td>MCHC(g/dl)</td>
<td>37.19 ± 1.36</td>
<td>35.26 ± 1.41</td>
<td>0.99</td>
<td>.3299NS</td>
</tr>
</tbody>
</table>

*(Significance P<0.05), NS (Non significance)