

*Original Research***Haemato-Biochemical Profile of Adult Female Turkey (*Meleagris gallopavo*) under Agro-Climatic Conditions of Mizoram (India)****M. Ayub Ali, Lalnuntluangi Hmar, L. Inaombi Devi, Hemen Das, P. K. Subudhi and Malsawmdawngkimi Colney**

College of Veterinary Sciences & Animal Husbandry Central Agricultural University, Selesih, Aizawl-796025, Mizoram, INDIA

*Corresponding author: hemenvet@rediffmail.com

Rec. Date:	May 07, 2018 05:15
Accept Date:	Sep 10, 2018 17:00
DOI	10.5455/ijlr.20180507051502

Abstract

Present study reports the normal physiological values of haematological indices and biochemical profile of the adult female turkey under agro-climatic conditions of Mizoram. The observed haematological and biochemical parameters were WBC- 26.72 ± 3.33 m/mm^3 , RBC- 2.83 ± 0.13 m/mm^3 , Hct- 34.88 ± 1.14 (%), MCV- 123.60 $nfl/cell$, Hb- 14.05 ± 0.50 g/dl , THR- 540.0 ± 365.64 m/mm^3 , MPV- 6.85 ± 0.24 fl , Pct- 0.36 ± 0.24 (%), PDW- 6.50 ± 4.42 , MCH- 49.7 ± 0.92 pg , MCHC- 40.25 ± 0.47 g/dl , RDW- 9.3 ± 0.39 , LYM- 35.75 ± 3.89 (%), MON- 10.25 ± 1.97 (%), GRA- 54.0 ± 5.81 (%), glucose- 311.75 ± 2.63 mg/dl , total cholesterol- 172.25 ± 27.24 mg/dl , triglyceride- 56.75 ± 8.54 mg/dl , HDL-cholesterol- 110.0 mg/dl , total protein- 5.60 ± 0.25 gm/dl , albumin- 1.93 ± 0.19 gm/dl , globulin- 3.68 ± 0.17 gm/dl , A:G- 0.53 ± 0.06 gm/dl , uric acid- 6.70 ± 1.96 mg/dl , BUN- 4.28 ± 0.22 mg/dl , creatinine- 0.50 ± 0.22 mg/dl , direct bilirubin- 0.10 ± 0.00 mg/dl and total bilirubin- 0.15 ± 0.05 mg/dl . Data generated may be of use for assessing the health as well as for disease diagnosis in turkey.

Key words: Biochemical, Haematological, Plasma, Turkey**How to cite:** Ali, M., Hmar, L., Devi, L., Das, H., Subudhi, P., & Colney, M. (2019). Haemato-biochemical Profile of Adult Female Turkey (*Meleagris gallopavo*) under Agro-Climatic Conditions of Mizoram (India). International Journal of Livestock Research, 9(1), 74-79. doi: 10.5455/ijlr.20180507051502**Introduction**

Turkey (*Meleagris gallopavo*) represents almost 2% of the total poultry population (Sonawane *et al.*, 2017) and play significant role in augmenting the economic and nutritional status of varied population across the globe (Anna Anandh *et al.*, 2012). In recent years, turkey production is gaining momentum as a new agricultural activity for the commercial production of meat in India (Thornton *et al.*, 2012; Hamza *et al.*, 2015 and Marchewka *et al.*, 2013). It is well established that the level of serum biochemical constituents vary according to sex, age and physiological and nutritional status (Osman and Al-Busadah, 2003). Changes



in haematological parameters are often used to determine various status of the body and to determine stresses due to environmental, nutritional and/or pathological factors (Afolabi *et al.*, 2010). A variety of factors can affect the haematological and biochemical parameters in animals, including the breed, gender, age, reproductive status and seasonal variations (Wells *et al.*, 1999). The knowledge of normal values of biochemical constituents of different animals are of academic as well as practical importance for clinical and experimental interpretations. However, no or very few works has been undertaken in relation with turkey (*Meleagris gallopavo*) under agro-climatic conditions of hilly region. Therefore, there is a need to establish an appropriate baseline data of this breed which will help in realistic evaluation of the managerial practices, nutritional and diagnosis of health conditions. Considering this fact, the present study was undertaken to establish the normal haematological and biochemical values of the turkey (*Meleagris gallopavo*) under agro-climatic conditions of Mizoram.

Materials and Methods

The present study was conducted at the Department of Veterinary Physiology & Biochemistry, College of Veterinary Sciences & A.H., Central Agricultural University, Selesih, Aizawl, Mizoram (India). Clinically healthy adult female turkey (*Meleagris gallopavo*) reared at Poultry Farm, A.H. & Veterinary Department, Government of Mizoram Selesih, Aizawl were selected for the study. Approximately 3 ml of blood samples were collected aseptically from wing vein using pre-sterilized polypropylene disposable syringe and transferred to heparinized non-vacuum tubes. 1ml of the collected blood was immediately used for haematological analysis using automated hematological cell counter (Model: MS4eVet, Melet Schloosing Laboratoires, France). Whereas, the remaining 2 ml was centrifuged at 2,500 rpm for 5 min in a refrigerated centrifuge machine (Hermle-Z326K) to separate out the plasma for biochemical analysis using a fully automated Dry clinical analyzer (FujiFilm 4000i). The results were then analyzed statistically using suitable statistical method as per Snedecor and Cochran (1994).

Results and Discussion

The mean values of the hematological parameters of the adult female turkey are presented in Table 1. The mean white blood cell observed was 26.72 ± 3.33 m/mm³ of blood and the level ranges between 22.41 and 30.48 m/mm³. The observed value in the present investigation is higher than the values reported in literature. The value reported for female turkey reared in southern Nigeria is $7.76 \pm 0.22 \times 10^3/\mu$ (Isidahomen *et al.*, 2013). The mean red blood cell count observed was 2.83 ± 0.13 m/mm³ of blood and the level ranges from 2.65 to 2.95 m/mm³. The observed cell count is comparable with the value reported for adult female turkey reared under arid tropical environment in which the observed mean cell count (millions/mm³ of blood) was 2.55 ± 0.10 during winter and 2.33 ± 0.08 during summer (Gattani *et al.*, 2016). However, the observed value

is not comparable for cell count reported for the turkey reared in Nigeria. Isidahomen *et al.* (2013) reported a mean cell count of $2.18 \pm 0.05 \times 10^6/\mu$ while Agina *et al.* (2015) reported a cell count of $3.75 \pm 0.22 \times 10^6/\mu$. The Hct (%) level was 34.88 ± 1.14 and value ranges between 33.40 and 36.00. The mean corpuscular volume (fl/cell) observed was 123.60 ± 1.64 and the values range between 122.30 and 126.00. The observed value is lower than the values reported in literature. Gattani *et al.* (2016) reported a mean value of 157.44 ± 7.27 (fl) during winter and 141.76 ± 4.48 (fl) during summer season while Isidahomen *et al.* (2013) reported a mean value of 155.57 ± 1.14 (fl).

Table 1: Hematological parameters of the adult female turkey

S. No.	Hematological Parameters	Observed Value	Range
1	White blood cell (WBC) (m/mm ³ of blood)	26.72 ± 3.33	22.41 – 30.48
2	Red blood cell (RBC) (m/mm ³ of blood)	2.83 ± 0.13	2.65 – 2.95
3	Haematocrit (Hct) (%)	34.88 ± 1.14	33.40 – 36.00
4	Mean Corpuscular Volume (MCV) (fl/cell)	123.60 ± 1.64	122.30– 126.00
5	Hemoglobin (g/dl)	14.05 ± 0.50	13.50 – 14.70
6	Thrombocyte (THR) (m/mm ³)	540.00 ± 365.64	39.00– 898.00
7	Mean Platelet (MPV) (fl)	6.85 ± 0.24	6.60 – 7.10
8	Platelet count (Pct) (%)	0.36 ± 0.24	0.03 – 0.59
9	Platelet distribution width (PDW)	6.50 ± 4.42	0.00 – 9.90
10	Mean Corpuscular Hemoglobin (MCH) (pg)	49.7 ± 0.92	48.7 – 50.9
11	Mean Corpuscular Hemoglobin Concentration (MCHC) (g/dl)	40.25 ± 0.47	39.7 – 40.8
12	Red blood cell distribution width (RDW)	9.3 ± 0.39	8.9 – 9.8
13	Lymphocyte (LYM) (%)	35.75 ± 3.89	32 – 41.2
14	Monocyte (MON) (%)	10.25 ± 1.97	9.1 – 13.2
15	Granulocyte (GRA) (%)	54 ± 5.81	45.6 – 58.9

The hemoglobin level observed was 14.05 ± 0.5 g/dl and the value ranges from 13.50 to 14.70 g/dl. The observed hemoglobin concentration is comparable with reported value of 13.34 ± 0.27 g/dl for female turkey reared in southern Nigeria (Isidahomen *et al.*, 2013) but is higher than other values reported by other workers. Gattani *et al.* (2016) reported a mean value of 11.43 ± 0.36 g/dl during winter and 10.09 ± 0.22 g/dl during summer while Agina *et al.* (2015) reported mean hemoglobin concentration of 12.95 ± 0.62 g/dl. The THR observed was 540 ± 365.64 m/mm³ and ranges between 39 and 898 m/mm³. The PCT observed was 0.36 ± 0.24 % and the level ranges between 0.03 to 0.59 %. The PDW level was 6.50 ± 4.42 and ranges from 0 to 9.90. The mean corpuscular hemoglobin observed was 49.70 ± 0.92 pg and the value ranges from 48.70 and 50.90 pg. The observed value is comparable with value reported in literature. The observed value for adult turkeys reared under arid tropical environment was 45.86 ± 2.02 during winter and 43.88 ± 1.44 during summer (Gattani *et al.*, 2016). However, Isidahomen *et al.* (2013) reported a value of 61.03 ± 2.18 which is much higher than the observed level. The mean corpuscular hemoglobin concentration observed was 40.25 ± 0.47 g/dl and the value ranges from 39.70 to 40.80. This observed value is within the range reported

by other workers. Gattani *et al.* (2016) reported a mean value of 29.55 ± 1.03 during winter and 31.16 ± 0.89 during summer for the adult female turkey while Isidahomen *et al.* (2013) reported a mean value of 41.31 ± 1.03 . The RDW value observed was 9.30 ± 0.39 and the value ranges between 8.90 and 9.80. The LYM (%), MON (%) and GRA (%) estimated were 35.75 ± 3.89 , 10.25 ± 1.97 and 54 ± 5.81 respectively and the level ranges between 32.00 to 41.20 for LYM, 9.10 to 13.20 for MON and 45.60 to 58.90 for GRA. The observed biochemical parameters in the adult female turkey is given in the Table 2.

Table 2: Plasma biochemical profile of adult female turkey

S. No.	Parameters	Average	Range
1	Glucose (mg/dl)	311.75 ± 2.63	308.00-314.00
2	Total Cholesterol (mg/dl)	172.25 ± 27.24	156.00-213.00
3	Triglyceride (mg/dl)	56.75 ± 8.54	44.00-62.00
4	HDL-Cholesterol (mg/dl)	110	110
5	Total Protein (gm/dl)	5.60 ± 0.25	5.40-5.90
6	Albumin (gm/dl)	1.93 ± 0.19	1.80-2.20
7	Globulin (gm/dl)	3.68 ± 0.17	3.50-3.90
8	A:G	0.53 ± 0.06	-
9	Uric Acid (mg/dl)	6.70 ± 1.96	3.80-7.80
10	BUN (mg/dl)	4.28 ± 0.22	4.00-4.50
11	Creatinine (mg/dl)	0.50 ± 0.22	0.30-0.80
12	Direct Bilirubin (mg/dl)	0.10 ± 0.00	0.1
13	Total Bilirubin (mg/dl)	0.15 ± 0.05	0.1-0.2

The plasma glucose concentration observed was 311.75 ± 2.63 mg/dl and the value ranges between 308.00 and 314.00 mg/dl. The observed value is higher than the values reported in literature. Gattani *et al.* (2016) reported glucose concentration of 219.49 ± 8.45 mg/dl during winter and 193.53 ± 7.34 mg/dl during summer for adult female turkeys reared under arid tropical environment. Isidahomen *et al.* (2013) reported a value of 207.00 ± 5.16 mg/dl whereas Sonawane *et al.* (2017) reported a value of 176.57 mg/dl. The total cholesterol level observed was 172.25 ± 27.24 mg/dl and the value ranges between 156.00 – 213.00 mg/dl. The observed level in the present investigation is almost comparable with the values reported in literature. Sonawane *et al.* (2017) reported a value of 170.15 ± 2.53 mg/dl while Agina *et al.* (2015) reported a value of 157.83 ± 12.81 mg/dl. The HDL-Cholesterol level observed was 56.75 ± 8.54 mg/dl and this observed value is higher compared to the value of 33.08 ± 0.37 mg/dl reported by Sonawane *et al.* (2017). The observed triglyceride level was 56.75 ± 8.54 mg/dl and the value ranges between 44.00 and 62.00 mg/dl. This observed value is lower than value reported (79.81 ± 2.01 mg/dl) by Sonawane *et al.* (2017). The observed total protein, albumin and globulin levels were 5.60 ± 0.25 gm/dl, 1.93 ± 0.19 gm/dl and 3.68 ± 0.17 gm/dl respectively and the values ranges between 5.40 and 5.90 g/dl for total protein, 1.80 and 2.20 g/dl for albumin and 3.50 and 3.90 g/dl for globulin. The observed values are more or less comparable with the values reported by other workers. Isidahomen *et al.* (2013) reported the serum total protein, albumin and

globulin levels of 5.31 ± 0.14 g/dl, 1.52 ± 0.03 g/dl and 4.23 ± 0.18 g/dl respectively. Gattani *et al.* (2016) reported a total protein value 5.45 ± 0.16 gm/dl during winter and 4.25 ± 0.25 gm/dl during summer. The albumin level was 1.62 ± 0.04 gm/dl during winter and 1.45 gm/dl during summer. The globulin level reported was 3.83 ± 0.17 gm/dl in winter and 2.79 gm/dl in summer season (Gattani *et al.*, 2016). However, Sonawane *et al.* (2017) and Agina *et al.* (2015) reported values different from the present finding. Sonawane *et al.* (2017) reported the levels of 4.17 ± 0.58 g/dl for total protein, 4.00 ± 0.14 g/dl for albumin and 0.70 ± 0.08 g/dl for globulin. Agina *et al.* (2015) reported the levels of 4.64 ± 0.17 g/dl for total protein, 2.54 ± 0.12 g/dl for albumin and 2.11 ± 0.12 g/dl for globulin. The calculated A:G ration in present investigation was 0.53 ± 0.06 . The observed A:G value is also comparable with the values reported in literature. The A:G value of the female turkey reared under arid tropical environment was 0.44 ± 0.03 during winter and 0.59 ± 0.04 during summer (Gattani *et al.*, 2016). The uric acid level observed was 6.70 ± 1.96 mg/dl and the level and the value ranges between 3.80 and 7.80 mg/dl. The BUN observed was 4.28 ± 0.22 mg/dl and the value ranges between 4.00 and 4.50 mg/dl. Observed creatinine level was 0.50 ± 0.22 mg/dl and the level ranges between 0.30 - 0.80 mg/dl. The direct and total bilirubin observed was 0.10 ± 0.00 mg/dl and 0.15 ± 0.05 mg/dl respectively.

Conclusion

It may be concluded that the physiological range of different haematological and biochemical indices recorded for the turkey breed domesticated in Mizoram is comparable with those reported in previous reports by other researcher.

Acknowledgement

We are thankful to the Dean, College of Veterinary Sciences & A.H., Central Agricultural University, Selesih, Aizawl, Mizoram for providing all the necessary facilities to conduct this work and Dr. Saipari Sailo, Manager, Poultry Farm, A.H. & Veterinary Department, Government of Mizoram, Selesih, Aizaw for allowing us to collect the blood samples.

References

1. Afolabi, K.D., Akinsoyinu, A.O., Olajide, R., & Akinleye, S. B. (2010). Haematological parameters of the Nigerian local grower chickens fed varying dietary levels of palm kernel cake (p.247). Proceedings of 35th Annual Conference of Nigerian Society for Animal Production.
2. Agina, O.A., Ezema, W.S. and Nwishiényi, C. N. (2015) Haemato-biochemical profile of apparently healthy domestic turkeys (*Meleagris gallopavo*) in Nsukka, Enuga state. Nigeria. *Animal Research International*. 12(1), 2120-2129.
3. Anna Anandh, M., Richard Jagatheesan, P.N., Senthil Kumar, P., Paramasivam, A. and Rajaranjan, G. (2012). Effect of rearing systems on reproductive performance of Turkey. *Veterinary World*, 5(4), 226-229.



4. Gattani, A., Pathak, A., Kumar, A., Mishra, V. and Bhatia, J.S. (2016). Influence of season and sex on hemato-biochemical traits in adult turkeys under arid tropical environment. *Veterinary World*, 9(5), 530-534.
5. Hamza, H.M., Al-Mayali, Hind, A. and Kadhim, A. (2015). Ectoparasites of domestic Turkey (*Meleagris gallopavo*) in Al-Diwaniya City/ Iraq. *Int. J. CurrMicrobiol Appl Sci*, 4(10), 669-677.
6. Isidahomen, C.E., Njidda, A.A. and Amaza, I.B. (2013). Effect of Genotype on Haematology and Serum Biochemistry values of Turkeys (*Meleagris gallopavo*) Reared in Southern Nigeria. *Inter J Agri Biosci*, 2(5), 297-301.
7. Marchewka, J., Watanabe, T.T.N., Ferrante, V. and Estevez, I. (2013). Review of the social and environmental factors affecting the behavior and welfare of Turkeys (*Meleagris gallopavo*). *Poultry Science*, 92(6), 1467-1473.
8. Osman, T. E. A. and Al-Busadah, K. A. (2003). Normal concentrations of twenty serum biochemical parameters of She-camels, Cows and Ewes in Saudi Arabia. *Pakistan Journal of Biological Science*, 6(14), 1253-1256.
9. Snedecor, G.O. and W.G. Cochran, 1994. Statistical methods. Oxford and IBH Publ. Co., Janpath, New Delhi.
10. Sonawane, N.D., Patodkar, V.R., Sardar V.M., Kadam, A.S., Jadhav S.N. and Lonkar, V.D. (2017). Influence of Age on Certain Blood Biochemical Parameters in Turkey Birds. *India Res. J. Ext. Edu*, 62-66.
11. Thronton, E.K., Emery, K.F., Steadman, D.W., Speller, C., Matheny, R. and Yang, D. (2012). Earliest Mexican Turkeys (*Meleagris gallopavo*) in the Maya region: Implications for pre-hispanic animal trade and the timing of Turkey Demonstration. *PLoS ONE*, 7(8): c42630.
12. Wells, M.Y., Decobecq, C.P., Decouvelaere, D.M., Justice, C. and Guittin, P. (1999). Changes in clinical pathology parameters during gestation in the New Zealand white rabbit. *Toxicological Pathology*, 27, 370- 379.

