Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(1): 1821-1823

Received: 07-10-2020
Accepted: 09-12-2020

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A brief physiological note on helmeted guinea fowl (*Numida meleagris*) reared in intensive rearing system in Mizoram

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Abstract
A total of 12 helmeted guinea fowl (*Numida meleagris*) consisting of 3 males and 9 females were reared in intensive rearing system for one year. The birds were in the age group of 8-9 months. Physiological parameters *viz.* respiration rate, pulse rate and cloacal temperature were recorded in the early morning in the interval of two months. Blood samples were collected from wing vein for haematology in the interval of three months. The average body weight was 1.53±0.05 kg. Respiration rate, pulse rate and cloacal temperature were 70.71±4.85 breaths/min, 301.60±11.96 beats/min and 41.92±0.19 ^{o}C respectively. Haemoglobin, total erythrocyte count, total leukocyte count and packed cell volume were 11.92±0.36 g/dl, 3.07±0.24 million/µl, 29.83±0.62 thousand/µl and 41.92±2.33% respectively. The study indicated normal physiological and haematological parameters of guinea fowl reared in the intensive rearing system. Physiological indices and haematological findings indicated adaptive mechanisms of helmeted guinea fowl to higher altitude.

Keywords: guinea fowl, haematology, intensive rearing, Mizoram, physiology

1. Introduction
Helmeted guinea fowl (*Numida meleagris*) is best known guinea from guinea fowl bird family. Guinea fowls are native to Africa though it has been introduced to many parts of the world. Guinea fowl production has proven to be commercially viable and is raised in large numbers in Europe and the United states. However, guinea fowl farming in India is still in infancy and is being reared only in rural areas of India in free range scavenging system.
Guinea fowls are easier to manage by poor farmers as they are resistant to most poultry diseases at the adult stage. Recently, guinea fowls have been introduced to both free range rearing and intensive rearing systems. Intensive rearing system has become a necessity where there is availability of limited space and there is demand for academic and research purposes. Introduction of new rearing systems however are known to impart certain stressful stimuli to a number of species of livestock animals.
Previous studies in helmeted guinea fowls found in different parts of Africa revealed normal health indices of guinea fowls [1-4]. Further studies in guinea fowls of south eastern Nigeria indicated significant effects of production system on hematology of guinea fowl [4]. There is however scanty data available on health indices and hematology of helmeted guinea fowl reared in Indian environmental conditions in general and in North Eastern states of India in particular.

2. Material and Methods
The study was carried out at College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram for a period of 1 year from February, 2019 to January, 2020.

2.1 Rearing of helmeted guinea fowls
A total of 12 numbers of 8-9 months old helmeted guinea fowls consisting of 3 males and 9 females were reared in Poultry Unit, Instructional Livestock Farm Complex. The guinea fowls were reared in the intensive rearing system. The birds were provided layer mash feeds @130 g/bird/day with an ad libitum supply of drinking water. The feeding was done two times a day.

The % composition of feed provided to the birds is presented in Table 1.

Table 1: The composition of feed in the basal diet

Ingredients	Concentration (%)
Maize	64.8
Soybean meal	26.2
Fish meal	3.5
Rice bran oil	2.21
Dicalcium phosphate	1.25
Sodium chloride	0.3
Limestone powder	1.15
Methionine	0.27
L-Lysine	0.12
L-Threonine	0.045
Toxin binder	0.067
Trace mineral P	0.067
Vitamin Premix	0.017
Choline chloride	0.067
Antioxidant	0.01

2.2 Record of physiological response

The body weight, respiration rate, pulse rate and cloacal temperature of each birds was taken 6 times at the interval of every 2 months. The body weight of each of the birds was recorded in the early morning by using a digital weighing balance with correction level to 0.1g. The respiration rate, pulse rate and cloacal temperature were recorded after recording body weight. Respiration rate was calculated by counting the number of chest movements per minute. Pulse rate was recorded by holding each of the birds for a period of 3 minutes to calm down and record was taken thereafter by putting a stethoscope on the left chest. Cloacal temperature was recorded by inserting a digital thermometer onto the cloacal wall.

2.3 Blood sampling and analysis of samples

Venous blood samples were collected in EDTA coated tubes. Blood samples were collected from wing veins of each bird by using 24-gauge needles at the interval of 3 months. Haemoglobin, total erythrocyte count (TEC), total leukocyte count (TLC) and packed cell volume (PCV) were estimated in the whole blood by following manual procedures [5].

2.4 Statistical analysis

Data obtained from the study was analysed to find out the mean, standard error of mean, minimum and maximum of each of the parameters by following the standard procedures [6].

3. Results and Discussion

The body weight, respiration rate, pulse rate, cloacal temperature and haematological parameters are presented in Table 2.

3.1 Physiological parameters

The average, minimum and maximum body weight of helmeted guinea fowl recorded in the present study was higher than that of Zambian guinea fowl [2]. Higher body weight of guinea fowls in the present study could be due to restricted movement in intensive rearing system in addition to proper feeding regimes followed in the farm as guinea fowls with ad libitum feed and water intake were found to range their body weight from 1.32 to 1.68 kg [7]. The findings also indicated better adaptability of the birds in the tropical monsoon climatic condition of Mizoram.

Respiration rate is considered to be one of the best means for detection of adaptability of livestock animals. In presence of any stress, the animal's first response is increase in respiration rate. Normal respiration rate of guinea fowls in the present study falls in the range of respiration rate of different types of indigenous chicken e.g. Aseel, Kadaknath, indigenous chicken of Mizoram [8, 9]. The present finding indicated good adaptability of guinea fowls to intensive rearing system.

The pulse rate of guinea fowls was found to be slightly higher than the previous record [7]. Increase in pulse rate has been detected in numbers of migratory birds when the birds were subjected to higher altitude. Mizoram id elevated by 1130m above sea level. The guinea fowls reared in Mizoram might have adapted to higher altitude which had led to higher pulse rate.

The cloacal temperature of various indigenous chicken and guinea fowls was found to differ significantly during different intervals of heat and cold [8-10]. Similar to previous findings as high as 42.89 ºC of cloacal temperature was recorded in guinea fowls in the present study. Wide variation in rectal temperature is an indicator for bird's adaptive mechanism to environmental variations of temperature and relative humidity as greater is the variability in its body temperature better is its thermoregulatory activity.

Table 2: Body weight, physiological response and hematology of helmeted guinea fowl

Parameter	Mean ± SE	Min - Max
Body weight (kg)	1.53 ± 0.05	1.32 – 1.83
Respiration rate (breaths/min)	70.71 ± 4.85	42 – 119
Pulse rate (bats/min)	301.60 ± 11.96	284 – 330
Cloacal temperature (ºC)	41.92 ± 0.19	40.61 – 42.89
Haemoglobin (g/dl)	11.92 ± 0.36	10.00 – 14.60
TEC ($x10^6$/µl)	3.07 ± 0.24	1.83 – 4.40
PCV (%)	41.92 ± 2.33	33.00 – 54.00
TLC ($x10^3$/µl)	29.83 ± 0.62	27.00 – 33.00

3.2 Haematological parameters

The guinea fowls in the present study were found to possess haemoglobin concentration resembling to that of other guinea fowls in free range [2] and battery cage rearing system [4]. Previous studies on guinea fowls in their native places indicate significant effects of rearing system on haematological profile [4]. The present finding indicated a good adaptive characteristic of guinea fowls. The TEC and PCV recorded in the present study were found to be in higher ranges as compared to other reports in free range [2], battery cage rearing system [4] and intensive rearing system [1]. Higher TEC and PCV are indicators of adaptation of the birds to higher altitude as erythrocyte characteristics are influenced by altitude [11]. The TLC of guinea fowls in the present study was in higher ranges as compared to previous reports in different countries in different rearing systems. Higher leukocyte and neutrophil counts were recorded in free ranging guinea fowls than in intensive rearing systems in previous studies [4] indicating their adaptive characteristic to open environment. In the present study, the increase in TLC might be one adaptive means of these birds.

4. Conclusion

The study revealed physiological indices and hematological profile of helmeted guinea fowl reared in intensive rearing system in the tropical monsoon climatic condition. The

present findings indicated physiological adaptation of helmeted guinea fowls to higher altitude in tropical climatic conditions. The baseline data presented in the article could be utilized in monitoring health status of helmeted guinea fowl reared in different parts of India.

5. Acknowledgement

The authors are thankful to the Dean, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, India for providing financial assistance in conducting the experiment.

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