



Research Article

EFFECT OF AGE AND REARING SYSTEM ON THE HAEMATO-BIOCHEMICAL PROFILE OF BROILERS REARED UNDER AGRO-CLIMATIC CONDITION OF MIZORAM

LALNUNTLUANGI HMAR¹, ANGELA RENTHLEI L.², AYUB ALI M.³, RANJANA GOSWAMI⁴, HEMEN DAS^{5*}, GIRIN KALITA⁶, RAJAT BUROGOHAIN⁷ AND SAIDUR RAHMAN⁸

^{1,2,4,6}Department of Livestock Production and Management, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, 796015, Aizawl, Mizoram, India

^{3,5}Department of Biochemistry, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, 796015, Aizawl, Mizoram, India

⁷Department of Animal Nutrition, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, 796015, Aizawl, Mizoram, India

⁸Department of Veterinary and Animal Husbandry Extension Education, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, 796015, Aizawl, Mizoram, India

*Corresponding Author: Email - hemenvet@rediffmail.com

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Abstract: Present study was carried out to assess the effect of age and rearing system on the blood biochemical analytes of broilers in Mizoram, India. Significant effect of age was recorded on the serum concentration of cholesterol, total protein and serum albumin, which showed an increasing trend, while the glucose, ALP, uric acid, calcium and phosphorous showed a decreasing trend with the advancement of age. However, significant difference ($P < 0.05$) in the rearing system was found only in serum cholesterol and glucose level. However, it may be recommended that it is safe to slaughter the broilers even after 6th weeks to 12th weeks of age since the recorded serum levels of the different biochemical analytes was found to be within the reference range. Nonetheless, from the economic point of view, rearing of poultry birds up to 12th week is not recommended in backyard system of rearing. The data may be of use to assess the health of the broilers.

Keywords: Broilers, Age, Rearing system, Blood, Biochemical analytes

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Introduction

Poultry industry has gained a very important place in Indian economy and is a vital constituent of animal husbandry in the country. Broiler today is considered as the fastest growing segment of poultry industry. Broilers in general are raised for meat production till they reach the slaughter age of 42 days, attaining a body weight of 2 - 2.6 kg [1]. Conversely, in Mizoram due to the consumer appeal with higher fat deposit, tougher meat, yellowish colour carcass, broilers are usually reared up to 90 days till they attain the body weight of around 4 to 5 kg. Hence, it is imperative to assess the health of the birds beyond 42 days, since consuming broiler meat after the recommended 42 days is something unusual practice followed in this northeast state. The blood biochemical analytes are routinely used as an indication of the health status of farm animals including birds [2]. It is univocal that the level of different biochemical analytes varies due to age and different management practices [3]. It is reported that amongst the management practices, systems of rearing system significantly affect the health by altering their drinking, feeding and fighting activities [4, 5]. So, it is important to give emphasis on the age and rearing system of broilers considering its impact on the performance and human health by analyzing different blood biochemical analytes. In view of the above, present study was carried out to see the effect of age and rearing systems on the blood biochemical profile of broilers.

Materials and methods

Location of the study

The research was conducted in the Department of Livestock Production and

Management, College of Veterinary Sciences and A.H., Central Agricultural University, Selesih, Aizawl

Selection and Grouping of Birds

One hundred and eighty (180) day-old, Vencobb broiler chicks were procured from A.B. Feeds, Kulikawn, Aizawl, Mizoram. The broiler chicks were then randomly distributed into three (3) groups having sixty (60) broiler chicks in each groups viz. control (Deep litter system of management), treatment 1(backyard system of rearing), treatment-2 (cage system of rearing).

Biochemical Analysis of blood

For the present study, 2 ml of blood was collected in sterile screw-capped centrifuge tubes from the wing vein of the birds of the three experimental groups at 6th, 7th, 8th, 9th, 10th, 11th and 12th week of the experimental period. The tubes were kept in a slanting manner for 1 hour at room temperature followed by centrifugation at 2500 rpm for 10 minutes to separate out the serum. Blood-biochemical parameters viz. Glucose, Total Protein, Serum Albumin, total cholesterol, Alkaline phosphatase, uric acid, calcium, phosphorous were estimated using ready to use commercial kit (Crest Biosystems). Data was analysed statistically as per the methods described by Snedecor and Cochran [6].

Results and discussion:

The mean \pm SE of the different biochemical analyses of the three experimental groups from 6th to 12th weeks of age are presented in [Table-1].

Table-1 Biochemical parameters of broilers under different rearing system from 6th week to 12th week of age

Parameters	Rearing system	Age						
		6 th week	7 th week	8 th week	9 th week	10 th week	11 th week	12 th week
Serum cholesterol(mg/dl)	Deep litter	106.13±1.84 ^F	114.45±0.42 ^E	116.61±0.27 ^{aD}	118.78±0.12 ^{aC}	120.10±0.17 ^{aBC}	122.23±0.46 ^{aB}	127.98±0.39 ^{aA}
	Backyard	105.61±1.97 ^E	133.66±0.52 ^D	114.13±0.68 ^{bD}	116.86±0.65 ^{bC}	118.64±0.60 ^{bBC}	120.37±0.37 ^{bB}	124.40±0.45 ^{bA}
	Cage	105.81±1.96 ^F	114.22±0.37 ^E	116.52±0.28 ^{aD}	118.48±0.21 ^{aCD}	119.79±0.21 ^{aBC}	121.83±0.39 ^{aB}	127.26±0.39 ^{aA}
Total protein (g/dl)	Deep litter	1.99±0.07 ^D	2.32±0.06 ^C	2.51±0.10 ^B	2.53±0.06 ^B	2.80±0.08 ^A	2.81±0.05 ^A	2.82±0.07 ^A
	Backyard	1.98±0.08 ^D	2.30±0.11 ^C	2.52±0.05 ^B	2.57±0.08 ^B	2.74±0.11 ^A	2.78±0.08 ^A	2.80±0.12 ^A
	Cage	1.99±0.10 ^E	2.31±0.08 ^D	2.51±0.08 ^C	2.56±0.07 ^B	2.79±0.10 ^A	2.81±0.09 ^A	2.82±0.05 ^A
Serum albumin(g/dl)	Deep litter	1.99±0.07 ^D	2.32±0.06 ^C	2.51±0.10 ^C	2.53±0.06 ^B	2.80±0.08 ^A	2.81±0.05 ^A	2.82±0.07 ^A
	Backyard	1.98±0.08 ^D	2.30±0.11 ^C	2.52±0.05 ^B	2.57±0.08 ^B	2.74±0.11 ^A	2.78±0.08 ^A	2.80±0.12 ^A
	Cage	1.99±0.10 ^E	2.31±0.0 ^D	2.51±0.08 ^C	2.56±0.07 ^B	2.79±0.10 ^A	2.81±0.09 ^A	2.82±0.05 ^A
Serum glucose(mg/dl)	Deep litter	172.22±0.92 ^{aA}	169.07±4.02 ^{aAB}	167.05±8.27 ^{aAB}	165.33±0.08 ^{aAB}	163.28±0.66 ^{aAB}	161.58±0.59 ^{aB}	159.55±0.90 ^{aB}
	Backyard	169.10±0.59 ^{bA}	164.03±1.67 ^{bB}	162.44±0.55 ^{bBC}	161.32±1.80 ^{bBC}	159.55±1.09 ^{bCD}	157.20±0.79 ^{bDE}	155.02±0.95 ^{bE}
	Cage	172.14±0.87 ^{aA}	168.10±0.57 ^{aB}	166.67±1.19 ^{aBC}	165.17±0.86 ^{aCD}	162.86±0.44 ^{aDE}	160.42±0.41 ^{aEF}	158.75±0.59 ^{aF}
ALP(U/L)	Deep litter	125.23±0.36 ^A	120.07±0.44 ^C	122.56±0.52 ^B	115.13±0.57 ^D	109.73±0.45 ^E	102.32±0.34 ^F	97.31±0.45 ^G
	Backyard	124.09±0.41 ^A	119.68±0.65 ^C	121.90±0.44 ^B	114.77±0.50 ^D	109.39±0.55 ^E	102.63±0.45 ^F	96.57±0.33 ^G
	Cage	123.77±0.56 ^A	119.93±0.66 ^C	121.77±0.46 ^B	114.42±0.64 ^D	109.09±0.59 ^E	102.66±0.43 ^F	96.56±0.35 ^G
Uric acid(mg/dl)	Deep litter	4.15±0.20 ^A	4.16±0.25 ^A	3.89±0.30 ^B	3.44±0.16 ^C	2.93±0.43 ^D	2.20±0.15 ^E	1.95±0.42 ^F
	Backyard	4.14±0.15 ^A	4.15±0.21 ^A	3.88±0.29 ^B	3.41±0.14 ^C	2.89±0.21 ^D	2.18±0.10 ^E	1.90±0.30 ^F
	Cage	4.15±0.11 ^A	4.15±0.14 ^A	3.88±0.30 ^B	3.44±0.14 ^C	2.92±0.11 ^D	2.20±0.16 ^E	1.95±0.40 ^F
Calcium (mg/dl)	Deep litter	7.22±0.22 ^A	7.19±0.18 ^{AB}	7.13±0.25 ^{BC}	7.11±0.14 ^C	7.02±0.18 ^D	6.81±0.32 ^E	6.62±0.23 ^F
	Backyard	7.19±0.14 ^A	7.17±0.21 ^A	7.10±0.18 ^{AB}	7.08±0.21 ^{AB}	7.00±0.15 ^B	6.63±0.19 ^C	6.57±0.22 ^C
	Cage	7.22±0.10 ^A	7.18±0.25 ^A	7.12±0.20 ^B	7.11±0.32 ^B	7.01±0.20 ^C	6.79±0.21 ^D	6.62±0.18 ^E
Phosphorus (mg/dl)	Deep litter	5.91±0.12 ^A	5.24±0.13 ^B	4.44±0.06 ^C	4.39±0.24 ^{CD}	4.31±0.17 ^{DE}	4.22±0.21 ^E	3.96±0.20 ^F
	Backyard	5.90±0.16 ^A	5.23±0.17 ^B	4.43±0.11 ^C	4.37±0.29 ^{CD}	4.29±0.14 ^{DE}	4.21±0.28 ^E	3.90±0.22 ^F
	Cage	5.91±0.21 ^A	5.24±0.18 ^B	4.44±0.08 ^C	4.38±0.22 ^{CD}	4.30±0.12 ^{DE}	4.22±0.23 ^E	3.95±0.21 ^F

Means bearing different superscript within the same row & column differ significantly ($P < 0.05$)

It is evident that the serum cholesterol level of broilers in the three rearing system showed no significant difference at 6th week and 7th week of age but showed a significant difference from 8th week of age till 12th week of age in the three-rearing system. However, an increasing trend was observed from 6th week to 12th week of age in all the three rearing system. The cholesterol level is affected with age and was reported to be increased as the broilers were becoming older age. The present finding agrees with previous reports [7-9]. The cholesterol level in the backyard system of rearing was significantly lower ($P < 0.05$) than the other system of rearing. The observed lower level may be because of the fact that the physical activities birds under this rearing system is more so their metabolic activity will be more than the birds in other rearing system. Since rearing of broilers up to 12th week was not usually practiced elsewhere, comparison of the results for the age beyond 7th week with other findings is not possible. The observed level of serum cholesterol in the present study is lower than the values reported by other workers [10] and this may be due to genetic factors [11]. The protein level of broilers in different rearing system does not vary significantly during the study period. The total protein level was found to be increased significantly from 6th week to 8th week which was in line with earlier studies [12-15] but no other reports were found from 9th week till 12th week of age. In the three rearing system, numerical difference was observed in serum albumin level but the variation was found to be non-significant ($P < 0.05$). On the other hand, significant effect was found at 6th week to 9th week of age. However, the present report till 8th week of age was in close agreement with the findings of Talebi [15]. Subsequent comparison of the data up to 12th week could not be done as there were no other reports by the other researchers. The glucose level observed in the present study was found to be significantly lower ($P < 0.05$) in the backyard system than the deep litter and cage system of rearing. The reason for being low in the backyard system of rearing might be due to more movement or activity of the birds as compared to the other rearing systems. The glucose level recorded at 6th week was however lower than the reports of other workers which may be due to the different use of breed [10], but there was a decreasing trend as the age increases which was supported with the findings of Kiran *et al.* [16] who had reported a decrease in serum glucose level with age. This might be due to the seasonal influence where the birds were reared during the winter season. The ALP level in the three rearing system showed no significant difference. However, there was significant decrease ($P < 0.05$) in serum ALP level as age advanced in all the three rearing system. The highest level of ALP was observed at 6th week of age and then gradually declined as the age increases. The increased serum ALP at 6th week was due to high bone

development at younger stage than older one. The present finding was in agreement with the findings of Kumari *et al.* [17]. The present finding reveals no significant difference between the rearing systems. The uric acid level observed at 6th week of age was comparable with the reports of Talebi [15], Mehr *et al.* [18] and no other report was found beyond 7th week of age for comparison. The uric acid level showed a decreasing trend as the age increased which was in agreement with the findings of Rajman *et al.* [19], who had reported higher uric acid levels in younger broiler when compared to older breeders and also by Silva *et al.* [20], who had reported a decrease level as the age advanced. The serum uric acid observed in the present investigation was within the reference values of 1.9 to 12.5 mg/dl for adult chickens. The level of calcium in the three groups of rearing system was found to be non-significant but a significant difference was observed between the age. The highest calcium level was found at 6th week of age and thereafter the level decreases with the age of the bird. The present finding is in agreement with the findings of Silva *et al.*, (2007) and Talebi (2006). Similar to the observation made for serum calcium, the serum phosphorus level also decreases with the age of the birds. The decrease in the serum phosphorus level in the bird with age was also reported by other workers [15, 20].

Conclusion

It may be concluded that age and systems of rearing do effect the serum concentration of blood biochemical analytes. However, more research work may be carried out in future to make this recommendation authentic.

Application of Research: Data generated during the current study may be useful as reference values for the scientific community for future investigation. Further, these data may aid in monitoring the health status of broilers.

Research Category: Poultry Science

Abbreviations

ALP : Alkaline Phosphatase
kg : Kilogram
et al. : et alii
g/dl : Gram per decilitre
U/l : International Unit per litre

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***Research Guide or Chairperson of research: Dr Lalnuntluangi Hmar**

University: Central Agricultural University, Selesih, 796015, Aizawl, Mizoram

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