Journal of Animal and Veterinary Advances 3 (7): 459-462, 2004
© Grace Publications Network, 2004

Effects of Dicalcium Phosphate (D.C.P) and Vitamin-D on Heamato-biochemical Parameters and Growth Performance in Broiler Chicks

M. A. Jalil, M.M. Rahman, [2]S.M.H. Rashid, M.R.I. Akanda, [1]M.M. Rahman, [3]M.R.R. Sarker
Department of Physiology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh; [1]Department of Pharmacology, Bangladesh Agricultural University, Mymensingh-2202; [2]Department of Pathology and Parasitology, Dinajpur Government Veterinary College, Dinajpur-5200, Bangladesh; [3]Veterinary Surgeon, Veterinary Clinic, Dinajpur Govt. Veterinary College, Dinajpur-5200, Bangladesh

Abstract: The effect of Dicalcium phosphate (D.C.P) and Vit-D with ready Commercial feed on hemato-biochemical parameters and growth performance was studied in day old broiler chicks (Vencob strain) to 35-day-old broiler birds during the period from November 7 to December 12, 2002 (For 35 days). These chicks were divided into 4 groups viz. A (n=5), B(n=5) C, (n=5) and D(n=5). Birds of group A was the control group, supplied commercial feed (C.F), group B,C,D were supplied 98% C.F+2%D.C.P,C.F+vitD,(AD capsule was fed as source of vit-D & A=408IU/drop, D=40.8IU/drop i,e 1 drop vit-AD containing the above dose and also fed I drop to each bird everyday) and 98% C.F+2%D.C.P+vit-D. The group D was the reated and target group. The hematological parameters (TE.C, Hb, PCV, ESR, DLC) and weight were determined every 7 days and the Biochemical parameters (serum-ca level and serum P-level) were estimated at day 21, day 28 and day 35. There was no remarkable change in hematological parametcrs but highly weight gained in the treated and target group (Group-D) in each experimental day shown in the Table. At day 21 and day 28, hematological parameters were within normal range shown in the table but serum-calcium and phosphorus level in group B and D were increased. The serum Ca & P level were highly as it was treated with D.C.P. On the other hand due to supplement of D.C.P & vit-D helped in bone metabolism, development of bone and marked weight gained in broiler chicks of group-D. Serum-Ca and serum-P was also within normal range in group-D shown in table Body weight increased in group-D due to supplementation of D.C.P and Vit-D which helped Ca & P absorption from the gut of the broiler chicks and thereby body weight gained also determined the hematological and biochemical values. But the values differed from the values of my research work as their work was differ from my research work. There highly weight gained comparatively in target and treated group-D in day 35 than day 21 and other days. In group-D, due to supplement of D.C.P and vit-D, Ca and P were absorbed from the gut of the birds by the help of vit-D and influence of PTH (parathyroid hormone) resulting proper bone development and weight gain.

Key words: Broiler, dicalcium phosphate, Vit-D, Growth and heamato-biochemical parameters

Introduction

In Bangladesh Poultry production can play an important role by providing a large part of increasing demand for animal, side by side it is the source of income and can create employment opportunities for the people in the shortest possible time.

In the world proteins is the class one food for human consumption. Peoples are chronically under noursihed and 200 million children are suffered from protein energy, malnutrition in the developing world (UNDP 2000).

Some scientists reported and realized that the animal protein is better than that of plant protein Though proteins are available from plant sources but they have lower biological value due to their improper distribution of essential amino acids. According to BBS (Bangladesh Bureau of Statistics) 1999, the consumption of animal protein in Bangladesh is only 9.5gm/per person as against standard requirement of 36gm/person (Ahmed and Islam, 1990). At present Poultry meat and eggs contribute approximately 30% of total animal protein (Ahmed and Islam, 1990). To fulfill the demand and to solve the unemployment problem, poultry industry particularly broiler industry should be buildup in the view of huge production with short duration and minimum cost. The hematological and biochemical constituents of blood are fluctuate due to age, sex, breed, climate geographical location, nutrition status and present status of the individual (Dukes, 1955).

1, 25 $(OH)_2$ D_3 (Cholecalciferol) plays an important role in the absorption of Ca and P from the gut of chicks with the help of PTH (Parathyroid hormone), nourishment of body, proper bone development and also body weight gain.

Materials and Methods

The experiment was carried out in the Department of Physiology Laboratory, Bangladesh Agricultural University, Mymensingh during the period from November 7 to December 12, 2002. A total of 20 day old broiler chicks (Vencob strain) were divided into 4 groups (A, B, C, D). Each group containing 5 birds. Group-A is considered as control group and supplying them only the commercial feed throughout the experimental period. Birds of in group B, C and D were provided diet with 98% commercial feed (C.F)+2% D.C.P, C.F+vit-D (vitamin AD, one drop/bird/day, A= 408 IU/ drop, D= 40.8 IU/drop) and 98% C.F+2% D.C.P+vit-D respectively. The experimental

birds were reared throughout the entire experimental period in the well ventilated, well protected house and provide commercial diet ad libitum. Hematological and growth performances were recorded in every seven days and biochemical on 21st, 28th and 35th day of the birds. Blood samples in 4% trisodium citrate were collected from the wing veins for hematological traits. All treated birds were sacrificed for sufficient blood at day 35. For biochemical (calcium and phosphorus) traits blood samples were collected by needle puncture and slaughter immediately and then serum samples were separated for the tests were performed in a Reflotron (Fisons Ltd, Germany) autoanalyzer at "Syem Diagno complex" in Mymensingh. Hematological parameters (TEC, Hb, PCV, ESR, DLC) were determined by standard method (Coffin, 1955).

Table 1: Effect of Dicalcium Phosphate (D.C.P) and vit - D on haemato-biochemical parameters and growth performance of broiler chicks

S/N Parameters with units	Sampling day	Group A,B,C,D containing n = 5 Mean (± SE) values in different groups of birds			
		Group-A	Group-B	Group-C	Group-D
Total erythrocyte count (TEC) $10^6/mm^3$	0	2.76±.18**	2.73±.018**	2.79±.063**	2.83±.021**
	7	2.75±.023**	2.76±.017**	2.79±.033**	2.76±.038**
	14	2.79±.063**	2.63±.043**	2.50±.031**	2.63±.012**
	21	2.76±.017**	2.74±.030**	2.80±.033**	2.77±.024**
	28	2.88±.086**	2.81±.115**	2.93±.060**	2.91±.070**
	35	2.91±.178**	3.07±.160**	2.89±.158**	2.99±.095**
Hemoglobin (Hb) gm%	0	6.42±.058**	6.44±.040**	6.46±.050**	6.44±.050**
	7	7.08±.037**	7.42±.106**	7.24±.235**	7.48±.080**
	14	7.74±.092**	7.46±.120**	7.24±.092**	7.46±.103**
	21	7.54±.092**	7.42±.142**	7.60±.070**	7.38±.115**
	28	7.78±.160**	7.80±.100**	7.62±.135**	7.67±.092**
	35	7.56±.156**	7.62±.159**	7.62±.058**	7.72±.073**
Packed cell volume (PCV)%	0	19.60±.244**	19.98±.020**	20.00±.031**	20.02±.037**
	7	23.60±.927**	23.58±.765**	24.00±.707**	24.00±.774**
	14	27.20±.583**	28.40±.509**	28.40±.509**	27.40±.400**
	21	26.00±.632**	28.80±.1.15**	27.60±.509**	28.40±1.07**
	28	26.60±.086**	27.20±1.06**	28.40±.509**	28.42±.508**
	35	24.20±.860**	25.00±1.04**	23.40±.927**	22.20±.734**
Erythrocyte sedimentation rate (E.S.R) mm/1st hour	0	1.44±.040**	1.40±.054**	1.46±.050**	1.42±.037**
	7	2.04±.050**	2.12±.058**	2.10±.044**	2.12±.048**
	14	2.96±.050**	3.56±.237**	3.60±.230**	3.34±.050**
	21	2.72±.037**	3.30±.255**	3.10±.070**	3.18±.091**
	28	2.90±.054**	3.04±.081**	3.04±.060**	3.05±.082**
	35	3.40±.244**	3.40±.244**	3.40±.244**	4.40±.244**
L	0	60.60±.244**	60.60±.244**	60.40±.244**	60.80±.200**
	7	60.20±.200**	60.20±.200**	60.20±.200**	61.80±.200**
	14	59.80±.200**	59.60±.509**	60.60±.400**	60.20±.663**
	21	59.60±.012**	59.80±1.28**	61.00±.632**	59.00±.010**
	28	60.20±.374**	61.00±.316**	60.60±.400**	60.50±.401**
	35	60.60±.400**	60.60±.400**	60.80±.374**	60.60±.400**
M	0	1.60±.244**	1.40±.244**	1.40±.244**	1.60±.244**
	7	1.80±.200**	1.80±.200**	1.80±.200**	1.60±.244**
Differential Leukocyte count (D.L.C)%	14	1.60±.244**	1.40±.244**	1.60±.244**	1.80±.200**
	21	1.60±.244**	1.80±.200**	1.00±.316**	2.00±.000**
	28	1.80±.374**	1.60±.244**	1.20±.200**	1.70±.300**
	35	1.40±.244**	1.60±.244**	1.40±.244**	1.40±.244**
H	0	30.60±.600**	31.60±.678**	31.60±.244**	30.80±.583**
	7	30.20±.200**	30.60±.400**	30.60±.400**	30.20±.374**
	14	30.80±.374**	31.00±.447**	30.20±.374**	32.60±.678**
	21	31.60±.927**	31.40±1.07**	31.00±.447**	31.60±.927**
	28	30.80±.583**	30.40±.244**	30.60±.244**	30.70±.245**
	35	32.60±.871**	32.20±.860**	32.00±.948**	33.00±.948**
E	0	5.60±.244**	5.40±.400**	5.60±.244**	5.60±.244**
	7	6.00±.000**	6.00±.000**	5.80±.200**	5.80±.200**
	14	5.80±.200**	6.00±.317**	6.20±.489**	5.40±.244**
	21	5.80±.200**	5.80±.374**	5.80±.374**	5.60±.812**
	28	5.40±.244**	6.20±.200**	6.40±.244**	6.40±.240**
	35	4.40±.678**	4.20±.374**	4.20±.860**	3.80±.583**
B	0	1.60±.244**	1.00±.316**	1.00±.316**	1.20±.374**
	7	1.80±.200**	1.60±.244**	1.20±.200**	1.20±.200**
	14	2.00±.316**	2.00±.316**	1.40±.400*	1.00±.000**
	21	1.40±.400*	1.20±.200**	1.20±.200**	1.60±.400**
	28	1.80±.200**	1.20±.374*	1.20±.200**	1.20±.244**

	35	1.00±.316*	1.49±.244**	1.20±.200**	1.20±.200**
Serum Ca-level (mg/dl)	0	-	-	-	-
	7	-	-	-	-
	14	-	-	-	-
	21	7.44±0.140**	9.48±0.128**	7.44±0.136**	7.86±1.136**
	28	7.40±0.180**	9.45±0.130**	7.41±0.130**	7.86±1.135**
	35	7.46±0.132**	9.48±0.180**	7.44±0.120**	9.00±0.360**
Serum p-level (mg/dl)	0	-	-	-	-
	7	-	-	-	-
	14	-	-	-	-
	21	3.24±0.092**	4.88±0.086**	5.30±0.070**	5.76±0.103**
	28	5.30±0.080**	5.20±0.074**	6.30±0.090**	6.10±0.80**
	35	5.35±0.086**	7.16±0.074**	6.32±0.096**	6.14±0.050**
Body weight (gm)	0	33.60±509**	34.00±.316**	34.40±.244**	33.80±.374**
	7	246.00±20.39**	277.00±10.67**	241.00±13.45**	303.00±17.02**
	14	720.00±20.00**	773.00±8.60**	732.20±16.78**	862.00±18.54**
	21	918.00±11.57**	989.00±6.40**	949.00±22.38**	1312.00±33.67**
	28	1331.00±19.64**	1513.00±14.62**	1570.00±15.81**	1570.00±15.81**
	35	1600.00±30.16**	1650.00±32.45**	1676.00±15.36**	2550.00±17.60***

$p<0.05$
** $p<0.01$

Results and Discussion

TEC Values: There was no marked change in values among the groups of broiler chicks shown in Table. The lowest values 2.63±0.012 millions/cu mm found in group D at day 14 and highest value 3.07±0.160 millions/cu mm found in group B at day 35. Natt and Herrick (1982) found TEC 5.03 millions/cu mm in adult chicks which was higher from the value 2.63 millions/cu mm where as in another experiment the same author found TEC 3.65 millions/cu mm which was almost similar to value 3.70 millions/cu mm of group-B.

Hb Values: There was no remarkable change in values among the groups of broiler chicks shown in Table. The values of all the 4 groups at day 28 (7.78±0.106 gm%, 7.80±0.100 gm%, 7.62±0.135 gm%, 7.67±0.092 gm%) were higher than the values at day 0, (6.42±0.58 gm%, 6.44±0.040 gm%, 6.46±0.050 gm% and 6.44±0.050 gm%) whereas Holmes *et al.* (1933) found Hb 9.16 gm% and 9.30 gm% in chickens of 21 days which was higher by approximate 2.00 gm % from the values of present work at 21 days.

PCV Values: There was no marked change in values among the 4 groups of broiler chicks shown in Table. The values were slightly lower at day 7 & 35 than other days. The values were ranges from 19.60±0.24% to 20.02±0.03 at day 0) and 26.00±0.63 to 28.40±1.07 at day 21. Newell and Shaffner (1950) found PCV 29% in immature chick blood and 45% and 29% in adult male & female chicken blood respectively which were higher than values obtained of present work. Williams (1986) found mean PCV 28.7% of male domestic chicks of 21 days which was almost similar to value of 21 days chick of present research work.

ESR Values: There was slight variation in values among the 4 groups of broiler chicks shown in Table. The values increased from day 0 to 35, specially increased at day 35. The range of the values was 1.44±0.04 to 1.42±0.03 at day 0 and 3.40±0.24 to 4.40±0.24 mm/1st hour at day 35. Surrendranathan *et al.* (1964) found ESR value 2.08±0.12 and 2.25±0.14 mm/1st hour male and female birds which was moral less within the values of the present work.

DLC Values

Lymphocyte (L): There was no marked change in values among the 4 groups of broiler chicks at day 0 to 35, shown in Table 1

Monocyte (M): There was no change in values among the 4 groups of broiler chicks also shown in Table.

Heterophil (H): The values at day 35 was slightly higher than other days shown in Table. The values range from 30.20±0.20 % to 33.00±0.98 %.

Eosinophil (E): The values at day 35 are lower than the values of other days shown in Table. The range of values was 4.20±0.37 % to 31.60±0.92 %.

Basophil (B): The values were significant and shown in Table. The lowest and highest values were 1.00±31% and 2.00±0.31% respectively. The values of present research work was not agreeable with Olson (1937) who reported differential leukocyte count in percent in adult male and female birds was as follows: Heterophils 27.2 and 22.8, Eosinophils 1.9 and 1.9, Basophils 1.7 and 1.7. Monocyts 10.2 and 8.9 respectively and in young male

and female birds of 2-21 weeks, Heterophils 20.9, Eosinophils 1.9, Basopils 3.1, Monocyte 8.1 percent respectively.

Body weight: The body weights in birds of four groups were comparatively higher and most significant in group-D than the other groups shown in table due to supplement of C.F, D.C.P and vit-D in this group where absorption of Ca & P from the gut of the birds by the help of vit-D and influence of PTH (parathyroid hormone) resulting proper bone development and weight gain. At day-35 average body weight in group A, B, C & D were 1600gm, 1650gm, 1676gm, 2550gm. Hence the group-D was the most significant.

References

Ahmed, S. and N. Islam, 1990. Backyard poultry development project in 100 villages. Proceedings of the 1st conference of Bangladesh Animal husbandry Association. Feb. 23-24, 1985. Bangladesh Agricultural Research Council, Dhaka, Bangladesh, pp:133-138.

BBS (Bangladesh Bureau of Statistics, 1999). Pocket Book, statistics Division, Ministry of Planning, Government of the people's Republic of Bangladesh.

David. L. Coffin, 1955. Manual of veterinary clinical Pathology.

De Luca, H.F. and C. Zierhold, 1998. Mechanisms and functions of vitamin-D. Nutri. Rev., 56: S 4-10.

Dukes, H.H., 1955. The Physiology of Domestic Animals. Seventh edition. Baillers Tindal and Co. London.

Prasad, S., C.K. Aggarwal and S.K. Chopra, 1998. Effect of restricted time feeding during summer on hemoglobin, packed cell volume, calcium and phosphorus levels in blood of pullets. Indian J. Poultry Sci., 33:210-213.

Rahman, M.M. and A. Rahman, 1998. Cattle and poultry Development Activities. In: Kromobikash-o-Karjakrom, DLS, Bangladesh. 1st ed. pp:31-35.

Sturkie, P.D., 1965. Avian physiology 2nd edition Cornell University Press. Ithaca New York, pp:1-84.