EFFECT OF DIFFERENT BEDDING MATERIAL AND DIETARY SUPPLEMENTS ON HEAMATO-BIOCHEMICAL PARAMETERS OF KADAKNATH CHICKEN

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ABSTRACT

Kadaknath is an important chicken breed of India. It is also known as Kalamashi due to its black-colored meat. The present study was planned to investigate the effect of different bedding material and dietary supplements on heamato-biochemical parameters of Kadaknath. The experiment was carried out at the Poultry unit, Livestock Farm Complex, College of Veterinary and Animal Science, Bikaner, Rajasthan University of Veterinary and Animal Sciences, Bikaner, from March to august, 2021. Day old 288 chicks reared under electrical brooder up to 7 days of age were randomly distributed in equal number into different bedding material (sand, saw dust and wheat straw) where they kept for 24 weeks. There was significantly ($P<0.05$) effect was recorded in haemoglobin, PCV, serum cholesterol, serum creatinine and higher significant ($P<0.01$) effect was recorded in serum glucose, serum albumin, serum cholesterol in immune response of birds. The mean value of SGOT (IU/L), SGPT (IU/L) and H:L ratio was non-significantly effect was recorded. All these variations in hemato-biochemical parameters in Kadaknath birds may be due to the effect of different bedding material and their feed habits.

Key words: Kadaknath, heamatology, biochemical, bedding material

Introduction

Poultry industry is one of the fastest growing segments of the agriculture sector of India, which has made impressive progress during the last three decades owing to comprehensive research and development initiated by the government and subsequently taken up by the organized private sector. Among the poor rural people, poultry farming is an age-old practice where they keep their birds either in backyard system or scavenge them nearby field with very little investment on health care and management. Although growth potential of rural poultry is low; however, whatever they produce is the net profit to the farmers (Thakur *et al*., 2006).Indigenous birds are valuable genetic resources for the country due to their adaptability to local conditions and their resistance against common diseases. The local gene pool still provides the basis for poultry sector. However, little information exists on potential productivity and production characteristics of indigenous chickens (Hoffman, 2005). Genetic improvement of important economic traits of native chicken would increase the productivity and profitability of these birds.

Materials and Method

Location and climatic conditions of the experiment

The experiment was carried out at the Poultry unit, Livestock Farm Complex, College of Veterinary and Animal Science, Bikaner, Rajasthan University of Veterinary and Animal Sciences, Bikaner March to august, 2021.Geographically Poultry unit, Livestock Farm Complex, Bikaner is situated at an altitude of 201 meters above the mean sea level in Thar desert. Bikaner witnesses extreme temperatures. The climate of the poultry unit is hot desert climate with a very little rain fall and extreme temperatures. In summer temperature can exceed 45°C and during the winter season temperatures come down near 4° Centigrade. The average maximum and minimum temperatures recorded during the experimental period of this area were 37.72 and 29.84°C, respectively.

Experimental birds

The study wasundertaken on day-old Kadaknath (288) chicks which were purchased from Central Poultry Development Organization (CPDO), Chandigarh. Out of 288 birds 36 birds were slaughtered at the end of experiment for evaluating carcass characteristics and remaining 252 birds were further used for remaining traits (growth traits and egg production traits) entire the end of experimental trail. Standard norms for bio-security and minimal stress were strictly observed during the transportation of chicks. A total of 288 Kadaknath birds were utilized for the study. The birds were maintained under intensive system. The birds were fed commercially available ready made starter, grower and layer rations were procured and feed additives such as Giloy (*Tinospora cordifolia*) herb and Vitamin E were supplemented. The Giloy and Vit.-E were supplemented at 5 g/kg and 250 mg/kg in alone and combination, respectively. At last day of trial, two birds from each replication were randomly picked up for blood sample collection and estimation of Heamato-biochemical Parameters of Kadaknath.

Heamato-biochemical parameters

The following haemato-biochemical parameters were estimated as per standard method

Hematological parameters

At last day of trial, two birds from each replication were randomly picked up for blood sample collection and estimation of heamato-biochemical parameters of Kadaknath. Hematological study was carried out on heparinized blood

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sample collected from 2 birds from each replicate of Kadaknath in all treatment groups. Hematological parameters were Hb (g/dl) and PCV (%).

Biochemical parameters

Biochemical parameters were estimated from serum isolated from the blood sample at last day of trial, two birds from each replication were randomly picked up for blood sample collection and estimation of biochemical parameters of Kadaknath. The blood samples were collected in sterile vial and kept in slating position for 30 minutes. Then centrifuged at 2000 rpm for 15 minutes. Biochemical parameters were serum glucose, total serum protein, serum albumin, serum triglycerides, serum cholesterol, serum creatinine, serum alanine transaminase (SGPT), serum aspartate transaminase (SGOT) and hetrophil-lymphocyte ratio by using standard diagnostic kit.

Statistical analysis

The mean and SE for various traits were calculated according to standard statistical procedures (Snedecor and Cochran, 1994). Significant differences hemato-biochemical parameters were tested by one-way ANOVA. One-way ANOVA was used to test for significant differences the traits.

Results and Discussion

The effect of different bedding material and dietary Supplement on Hemato-biochemical parameter in Kadaknath were presented in Table 1(a). The mean sum of squares obtained with analysis of variance is given in Table 1(b). The parameters recorded were haemoglobin, packed cell volume, serum glucose, total serum protein, serum albumin, serum triglycerides, serum cholesterol, serum creatinine, serum alanine transaminase (SGPT), serum aspartate transaminase (SGOT) and hetrophil-lymphocyte ratio.

Heamatological parameters

The overall mean values of hemoglobin (%) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 17.26 followed by T_1 (15.20), T_0 (14.60) and T_2 (12.35). Similarly in group B_2 treatment T_3 (combination of Giloy and Vit.-E) it was 16.45 followed by T_1 (14.20), T_0 (13.80) and T_2 (13.60) and in group B_3 treatment T_1 (giloy) to be (17.61) followed by T_2 (17.01), T_3 (16.91) and T_0 (14.85). The statistical analysis of data revealed the significant ($P<0.05$) effect was observed among various treatment groups.

The overall mean values of packed cell volume (%) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 39.50 followed by T_2 (36.01), T_1 (32.91) and T_0 (32.53). Similarly in group B_2 treatment T_1 (giloy) to be (31.66) followed by T_3 (31.40), T_0 (30.95) and T_2 (30.03) and in group B_3 treatment T_2 (Vit.-E) to be (35.01) followed by T_3 (33.76), T_1 (32.81) and T_0 (30.15).The statistical analysis of data revealed the significant ($P<0.05$) effect was observed among various treatment groups.

The results observed in present study were in contradictory with the finding of Hridoy *et al.* (2021) they reported no significant increased Hb value with supplementation of Vitamin E in broilers. Ekunseitan *et al.* (2021) found significant decrease in Hb, PCV and TEC values, which was contrary to present findings with Vitamin E supplementation in broiler chicken.

Raza *et al.* (2018), they found significant increase in Hb and no significant increase in PCV values, which was contrary to present findings with Vitamin E supplementation in broiler chicken. Khobragade (2003) found non-significant differences in PCV, which was contrary to present findings with Giloy supplementation in broiler chicken. The increase in PCV might be attributed to increased hemoglobin level in treated broiler birds through profound effect on haemopoetic system and with the increase in haemoglobin containing cells. Further, in the groups supplemented with Giloy and vitamin-E in combination, significantly higher values of hematological parameters as compared to control indicated synergistic effect of Giloy and vitamin-E in Kadaknath.

Biochemical parameters

Serum glucose (mg/dl)

The overall mean values of serum glucose (mg/dl) was found in group B_1 treatment T_1 (giloy) to be 196.24 followed by T_2 (194.26), T_0 (186.13) and T_3 (182.71). Similarly in group B_2 treatment T_2 (Vit.-E) to be (196.60) followed by T_0 (193.80), T_1 (186.70) and T_3 (171.25) and in group B_3 treatment T_0 (Control) to be (184.25) followed by T_1 (179.60), T_2 (179.20) and T_3 (167.71). The statistical analysis of data revealed the highly significant ($P<0.01$) effect was observed among various treatment groups.

The results observed with respect to effect of Giloy supplementation in present study are in contrary with Khobragade (2003) who reported significant effect on serum glucose. Heat stress is generally thought to increase the glucocorticoids secretion which further, increases gluconeogenesis (Webster, 1983) which might be a one reason for increase in serum glucose concentration in non-supplemented group. With respect to Vitamin E supplementation, Sahin *et al.* (2001) reported significant decrease in glucose on inclusion of Vitamin E in broiler diet.

Total serum protein (mg/dl)

The numerically mean values of total serum protein (mg/dl) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 5.15 followed by T_1 (4.58), T_2 (3.93) and T_0 (3.85). Similarly in group B_2 treatment T_3 (combination of Giloy and Vit.-E) to be 4.93 followed by T_1 (4.59), T_0 (4.19) and T_2 (3.95) and in group B_3 treatment T_2 (Vit.-E) to be 4.71 followed by T_1 (4.48), T_0 (4.06) and T_3 (4.00). The statistical analysis of data revealed the non significant effect was observed among various treatment groups.

The non-significant results observed in present study of Giloy are in agreement with the findings of Khobragade (2003) who reported non-significant effect on total serum protein on inclusion of geloi herb in broilers. With respect to vitamin E, the non-significant effect on total protein in present study was in partial agreement with Misalkar (2010), he reported no significant effect on total protein on supplementation of Vitamin E in broilers. On contrary, Sahin *et al.* (2001) reported significant increase in total protein on inclusion of Vitamin E in broilers.

Serum albumin (gm/dl)

The mean values of serum albumin (gm/dl) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 3.81 followed by T_1 (3.02), T_0 (1.66) and T_2 (1.58). Similarly in group B_2 treatment T_1 (Giloy) to be 3.16 followed by T_3 (2.36), T_0

Table (a): Effect of different bedding material and dietary Supplement on Heamato-biochemical parameter in Kadaknath

Bedding material	Treatment	Hb % (gm/dl)	PCV (%)	Glucose (mg/dl)	Total Protein (mg/dl)	Serum Albumin (gm/dl)	Serum triglycerides (mg/dl)	Serum cholesterol (mg/dl)	Serum creatinine (mg/dl)	SGPT (U/L)	SGOT (U/L)	H:L Ratio (%)
Sand (B_1)	B_1T_0	14.6^{bcd}	32.53^{ab}	186.13^{cd}	3.85	1.66^{a}	175^{ab}	167.5^{e}	0.6^{a}	28.5	187.5	5.28
	B_1T_1	15.2^{bcd}	32.91^{ab}	196.24^{d}	4.58	3.02^{bcd}	131^{b}	139^{a}	0.85^{b}	40	158.5	4.91
	B_1T_2	12.35^{a}	36^{bc}	194.26^{d}	3.93	1.58^{a}	121.5^{a}	163.5^{e}	0.47^{a}	24	183.5	6.76
	B_1T_3	17.26^{cd}	39.5^{c}	182.71^{bcd}	5.15	3.81^{d}	120^{a}	136.5^{a}	0.44^{a}	59.5	207.5	5.63
Saw dust (B_2)	B_2T_0	13.8^{abc}	30.95^{ab}	193.8^{d}	4.19	1.93^{abc}	147^{a}	184.5^{f}	0.51^{a}	36	139	7.19
	B_2T_1	14.2^{bcd}	31.66^{ab}	186.7^{cd}	4.59	3.16^{cd}	122.5^{a}	177.5^{f}	0.65^{ab}	52	175.5	5.82
	B_2T_2	13.6^{ab}	30.03^{a}	196.6^{cd}	3.95	1.5^{a}	117.5^{a}	159^{de}	0.64^{ab}	28	190.5	6.29
	B_2T_3	16.45^{bcd}	31.4^{ab}	171.25^{ab}	4.93	2.36^{abc}	119.5^{a}	140^{a}	0.45^{a}	49.5	192.5	7.98
Wheat straw (B_3)	B_3T_0	14.85^{bcd}	30.15^{a}	184.25^{bcd}	4.06	1.93^{ab}	138.5^{a}	153.5^{cd}	0.46^{a}	36	139	7.19
	B_3T_1	17.61^{d}	32.81^{ab}	179.66^{abc}	4.48	1.71^{a}	124^{a}	145^{abc}	0.49^{a}	32	173.5	6.28
	B_3T_2	17^{bcd}	35.01^{abc}	179.2^{abc}	4.71	2.46^{abc}	130.5^{a}	150^{bcd}	0.67^{ab}	43	136.5	5.17
	B_3T_3	16.91^{bcd}	33.76^{ab}	167.71^{a}	4	1.5^{a}	127.5^{a}	142^{ab}	0.43^{a}	43.5	136	7.31
SEM		1.007	1.63	4.01	0.34	0.36	19.90	2.82	0.07	7.70	31.16	0.91

Means superscripted with different letters within a column differ significantly from each other (P<0.01, P<0.05)

Table (b): Analysis of variance for Heamato-Biochemical in Kadaknath

Source of variance	DF	Sum Square										
		Hb % (gm/dl)	PCV (%)	Serum Glucose (mg/dl)	Total Serum Protein (mg/dl)	Serum Albumin (gm/dl)	Serum triglycerides (mg/dl)	Serum cholesterol (mg/dl)	Serum creatinine (mg/dl)	SGPT (U/L)	SGOT (U/L)	H:L Ratio (%)
Group	11	63.42*	163.25*	1810.06**	4.10	12.65**	25557.46*	5480.33**	0.36*	2517.33	14322.46	21.14
Total	23	87.77	227.32	2196.13	6.96	15.80	35070.96	5671.33	0.49	3943.33	37630.96	41.34
Error	12	24.35	64.06	386.07	2.85	3.15	9513.5	191	0.12	1426	23308.5	20.19

*=significant (P<0.05), **= highly significant (P<0.01)

(1.93) and T_2 (1.50) and in group B_3 treatment T_2 (Vit.-E) to be 2.46 followed by T_0 (1.93), T_1 (1.71) and T_3 (1.50). The statistical analysis of data revealed the highly significant (P<0.01) effect was observed among various treatment groups.

The results observed in present study were in agreement with the findings of Sahin *et al.* (2001) reported significant increase in serum albumin on inclusion of Vitamin E in broilers. The result is contrary, with respect to vitamin E, the non-significant effect on albumin in present study was in partial agreement with Misalkar (2010), and he reported no significant effect on albumin on supplementation of vitamin E in broilers.

Serum triglycerides (mg/dl)

The mean values of serum triglycerides (mg/dl) was found in group B_1 treatment T_0 (control) to be 175.01 followed by T_1 (131), T_2 (121.50) and T_3 (120.00). Similarly in group B_2 treatment T_0 (control) to be 147.00 followed by T_1 (122.50), T_3 (119.50) and T_2 (117.50) and in group B_3 treatment T_0 (control) to be 138.50 followed by T_2 (130.50), T_3 (127.50) and T_1 (124.50). The statistical analysis of data revealed the significant (P<0.05) effect was observed among various treatment groups.The results observed in present study were in contrary with the findings of Sahin *et al.* (2001), they reported significant decrease in serum triglycerides by supplementation of vitamin E in broilers.

Serum cholesterol (mg/dl)

The mean values of serum cholesterol (mg/dl) was found in group B_1 treatment T_0 (control) to be 167.50 followed by T_2 (163.50), T_1 (139.01) and T_3 (136.50). Similarly in group B_2 treatment T_0 (control) 184.50 followed by T_1 (177.50), T_2 (159.01) and T_3 (140.00) and in group B_3 treatment T_0 (control) 153.50 followed by T_2 (150.01), T_1 (145.00) and T_3 (142.01). The statistical analysis of data revealed the highly significant (P<0.01) effect was observed among various treatment groups. Majekodumi *et al.* (2013) reported non-significant lower level of cholesterol in Giloy at graded levels and ascorbic acid either alone or in combination might be due to reduction of lipid peroxidation and enhancement of clearance of endogenous cholesterol. The results observed in present study were in contrary with the findings of Sahin *et al.* (2001), they reported significant decrease in serum cholesterol by supplementation of vitamin E in broilers.

Serum creatinine (mg/dl)

The mean values of serum creatinine (mg/dl) was found in group B_1 treatment T_1 (Giloy) to be 0.85 followed by T_0 (0.61), T_2 (0.47) and T_3 (0.44). Similarly in group B_2 treatment T_1 (Giloy) 0.65 followed by T_2 (0.64), T_0 (0.51) and T_3 (0.45) and in group B_3 treatment T_2 (Vit.-E) 0.67, T_1 (0.49), T_0 (0.46) and T_3 (0.43). The statistical analysis of data revealed the significant (P<0.05) effect was observed among various treatment groups. The statistical analysis of data revealed significant (P<0.05) effect due to Giloy and vitamin-E either alone or in combination.The findings of the present study are in contrary with findings of Sahin *et al.* (2001), they reported no significant decrease in serum creatinine by supplementation of vitamin E in broilers.

Serum alanine transaminase (SGPT)

The numerically highest values of serumalanine transaminase(u/l) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 59.50 followed by T_1

(40.01), T_0 (28.50) and T_2 (24.00). Similarly in group B_2 treatment T_1 (giloy) 52.00 followed by T_3 (49.50), T_0 (36.00) and T_2 (28.01) and in group B_3 treatment T_3 (combination of Giloy and Vit.-E) to be 43.50 followed by T_2 (43.00), T_0 (36.01) and T_1 (32.00). The statistical analysis of data revealed the non significant effect was observed among various treatment groups.

The results observed in present study were in contrary with the findings of the level of ALT is used as liver function test and elevated levels monitored liver malfunction (Maryamma *et al.* 1990). Lower levels of ALT on supplementation of geloi and ascorbic acid either alone or in combination in broilers could be due to antioxidant activity of both which may act together to scavenge the free radicals during stress *i.e*. chronic heat stress. The findings was in contrary with findings of Sahin *et al.* (2001), they reported significant decrease in serum ALT by supplementation of Vitamin E in broilers.

Serum aspartate transaminase (SGOT)

The numerically values of serum aspartate transaminase (u/l) was found in group B_1 treatment T_3 (combination of Giloy and Vit.-E) to be 207.5 followed by T_0 (187.50), T_2 (183.50) and T_1 (158.50). Similarly in group B_2 treatment T_3 (combination of Giloy and Vit.-E) to be 192.50 followed by T_2 (190.50), T_1 (175.50) and T_0 (139.01) and in group B_3 treatment T_1 (Giloy) to be 173.50 followed by T_0 (139.00), T_2 (136.50) and T_3 (136.00). The statistical analysis of data revealed the non significant effect was observed among various treatment groups.

The results observed in present study were in contrary with the findings of Jadhav *et al.* (2014) and Naresh (2016) reported significant improvement in AST by supplementation of poly herbal feed in broilers. Lower levels of AST on supplementation of Giloy and ascorbic acid either alone or in combination in broilers could be due to antioxidant activity of both which may act together to scavenge the free radicals during stress *i.e*. chronic heat stress.

Hetrophil-lymphocyte ratio (%)

Numerically values of hetrophil-lymphocyte ratio(%) was found in group B_1 treatment T_2 (Vit.-E) to be 6.76 followed by T_3 (5.63), T_0 (5.28) and T_1 (4.91). Similarly in group B_2 treatment T_3 (combination of Giloy and Vit.-E) to be 7.98 followed by T_0 (7.19), T_2 (6.29) and T_1 (5.82) and in group B_3 to be treatment T_3 (combination of Giloy and Vit.-E) to be 7.31 followed by T_0 (7.19), T_1 (6.28) and T_2 (5.17). The statistical analysis of data revealed the non significant effect was observed among various treatment groups.

The H/L ratio in birds is a reliable indicator of stress (Langsdorf and Zydney, 1993). The findings of H/L ratio obtained in the present study are in accordance with the results of Raza *et al.* (2018), they reported significant decrease in H/L ratio on Vitamin E supplementation in broilers. The reduction in H/L ratio due to supplementation of Tulsi leaf powder at graded levels or Vitamin E alone and various combinations of both may be due to antistress effect of both through the reduction in the synthesis of adrenal steroid in broilers. On contrary, Misalkar (2010) reported no significant decrease in H/L ratio on supplementation of Tulsi leaf powder and Vitamin E in broilers.

Conclusion

From the present experiment it can be concluded that that combination of Giloy and vit.-E provides the highest positive effect on heamato-biochemical in Kadaknath. There was significantly ($P<0.05$) effect was recorded in haemoglobin, PCV, serum cholesterol, serum creatinine and higher significant ($P<0.01$) effect was recorded in serum glucose, serum albumin, serum cholesterol in immune response of birds. All these variations in heamatological and biochemical parameters in Kadaknath birds may be due to the effect of different bedding material and their feed habits.

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Conflict of Interest

The authors declare no conflict of Interest.

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