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Effect of Different Rearing Systems 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 rearing systems i.e. intensive, backyard and scavenging system on heamato-biochemical parameters of Kadaknath. The experiment was conducted in the Department of Livestock Production and Management, College of Veterinary Science & Animal Husbandry and Amilki village in Rewa (M.P.). Day old 90 male chicks reared under electrical brooder up to 15 days of age were randomly distributed in equal number into intensive, backyard and scavenging rearing systems where they kept for 98 days. Heamatological studies revealed that the mean value of RBC, Hb, PCV, MCHC was significantly ($p<0.05$) higher in intensive system. The enhanced heamatological profile in intensive rearing system may be due to consumption of some bioactive nutrients in the feed supplements. Mean value of WBC, and DLC was significantly ($p<0.05$) higher in scavenging system, which indicated more chances of subclinical infections in scavenging system followed by backyard and intensive system. The mean value of glucose (mg/dl), total protein (g/dl), albumin (g/dl) and albumin globulin ratio, SGOT (IU/L), SGPT (IU/L), cholesterol (mg/dl), creatinine (mg/dl), bilirubin (mg/dl), blood urea nitrogen (mg/dl) was significantly ($p<0.05$) higher in intensive system. All these variations in biochemical parameters in Kadaknath birds may be due to the effect of different rearing systems and their feed habits.

Keywords: Kadaknath, Heamatology, Biochemical, Rearing systems

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.

Kadaknath is mainly reared by tribal communities of the Jhabua and Dhar districts in the western region of the state of Madhya Pradesh and in adjoining areas of the states of Gujarat and Rajasthan. Although the meat of this breed has an unattractive appearance, it has a delicious flavor (Panda and Mahapatra, 1989). The meat and eggs of kadaknath are considered rich source of protein and iron. Haemato-biochemical parameters need to be measured in native chickens as it may help in understanding the ability of birds to adjust in different rearing systems. Therefore, the present study was undertaken to evaluate the Haemato-biochemical parameters of Kadaknath breed in intensive, backyard and scavenging rearing systems.

MATERIALS AND METHODS

Agroclimatic condition of the region

The present work was carried out in the Department of Livestock production and Management, College of Veterinary Science & Animal Husbandry, and Amiliki village in Rewa (M.P.). The place is situated at 24ºN and 81ºE longitude at 450 MSL in the southern part of third agro-climate zone, including Kymore plateau and Satpura hills. The soil is mixed red and black soil with uniform topography. It has tropical climate with average annual rainfall of 1128 mm. Summer temperature goes up to 45ºC and in winter it remain as low as 4ºC.

Experimental population

Day-old 90 male chicks of Kadaknath breed were obtained from the hatchery unit of the College of Veterinary Science & Animal Husbandry, Rewa. All chicks were numbered with the help of wing banding. Chicks were brooded upto 15 days of age on deep litter with 23 hours light and 1 hour dark light schedule under electric brooder following standard conditions. At the age of 15 days all the chicks were randomly divided into 3 groups comprising 30 chicks in each. The chicks were vaccinated against Marek's, Ranikhet and Gumboro (IBD) diseases on 0, 7 and 14 days, respectively.

Heamtological parameters

Hematological study was carried out on heparinized blood sample collected from 6 birds of each group from day old at every 14^{th} day interval of Kadaknath in all the three system. Hematological parameters were RBCs (million/ mm^3 or million/µl), WBCs (thousand/ mm^3 or thousand/ µl), DLC (%), Hb (g/dl), PCV (%), MCV (μ^3), MCH (pg/ cell) and MCHC (g/dl).

Biochemical parameters

Biochemical parameters were estimated from serum isolated from the blood sample collected after every 14 days of interval from 6 birds of each group. 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 total protein, albumin, globulin, AG ratio, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic-pyruvic transaminase (SGPT), cholesterol, bilirubin, blood urea nitrogen (BUN), creatinine by using standard diagnostic kit (Erba Pvt. Ltd.).

The data obtained was subjected to analysis of variance (ANOVA) and level of homogeneity following the procedure of Snedecor and Cochran, 1994 using SPSS statistics 16 software.

RESULTS AND DISCUSSION

Heamatological parameters

Heamatological parameters of Kadaknath breed in different rearing systems are presented in Table 1. In the present study the value of RBCs (million/µl) increased significantly ($p>0.05$) along with age of birds in different rearing systems, which was agreed by Kundu *et al*. (1993), Sjaastad *et al*. (2003) and Islam *et al*. (2004). Number of RBCs was significantly higher in intensive system (3.99 ± 0.08) as compared to backyard (2.74 ± 0.07) and scavenging system (1.77 ± 0.07). The increase in RBCs in the birds kept in intensive system may be an indication of higher protein intake (Maxwell *et al*., 1998). The RBC counts may be influenced by different factors such as nutrition, physical activity and rearing systems. The present findings indicated that the health and nutritional status of the birds kept in scavenging system was poor as compared to other systems.

Likewise the values of Hb and PCV were significantly higher ($p>0.05$) on day 84 as compare with day 28 in intensive, backyard and scavenging systems, respectively. Similar findings were reported by Nyaulingo (2013), who observed increased RBC, PCV and Hb due to increased feed intake along with age of birds. It has been reported that the PCV values indicate an increase in the circulating red blood cells due to good nutrition and welfare (Talebi *et al*., 2005; Sobayo *et al*., 2008).

Table 1: Heamatological parameters of Kadaknath in different rearing system at biweekly interval

Parameter	n	System	Before grouping (Mean±SE)		After grouping (Mean±SE)				
			Day old	14 Day	28 Day	42 Day	56 Day	70 Day	84 Day
RBC (million/ µl)	6	I	1.74 ^{aA}±0.07	2.47 ^{aB}±0.08	3.63 ^{bC}±0.07	3.73 $^{cC±}$0.07	4.34 ^{cE}±0.07	4.45 ^{cE}±0.08	3.99 ^{cD}±0.08
		B	1.73 ^{aA}±0.01	2.46 ^{aB}±0.08	2.45 ^{aB}±0.08	2.55 ^{bBC}±0.08	2.62 ^{bBC}±0.07	2.69 ^{bBC}±0.08	2.74 ^{bC}±0.07
		S	1.72 ^{aA}±0.07	2.44 ^{aB}±0.08	2.59 ^{aB}±0.10	1.56 ^{aA}±0.10	1.63 ^{aA}±0.10	1.70 ^{aA}±0.09	1.77 ^{aA}±0.07
WBC (thousands/ µl)	6	I	18.37 ^{aA}±0.07	20.51 ^{aB}±0.07	22.46 ^{aC}±0.07	23.50 ^{aD}±0.07	24.46 ^{aE}±0.07	25.30 ^{aF}±0.07	25.50 ^{aF}±0.07
		B	18.35 ^{aA}±0.07	20.50 ^{aB}±0.07	24.61 ^{bC}±0.07	25.51 ^{bD}±0.07	28.41 ^{bE}±0.07	30.22 ^{bF}±0.06	30.52 ^{bG}±0.06
		S	18.33 ^{aA}±0.07	20.50 ^{aB}±0.04	26.41 ^{cC}±0.07	28.61 ^{cD}±0.07	32.31 ^{cE}±0.07	33.46 ^{cF}±0.07	34.73 ^{cG}±0.07
Heterophil (%)	6	I	24.16 ^{aA}±0.16	25.16 ^{aB}±0.16	28.83 ^{aC}±0.16	31.16 ^{aD}±0.16	34.16 ^{aE}±0.16	34.83 ^{aF}±0.16	35.16 ^{aF}±0.16
		B	24.15 ^{aA}±0.16	25.15 ^{aB}±0.16	37.16 ^{bC}±0.16	37.83 ^{bD}±0.16	40.16 ^{bE}±0.16	41.16 ^{bF}±0.16	42.16 ^{bG}±0.16
		S	24.13 ^{aA}±0.16	25.13 ^{aB}±0.16	38.16 ^{cC}±0.16	42.16 ^{cD}±0.16	43.16 ^{cE}±0.16	46.16 ^{cF}±0.16	47.16 ^{cG}±0.16
Eosinophil (%)	6	I	0.67 ^{aA}±0.21	0.83 ^{aAB}±0.16	1.16 ^{aABC}±0.16	1.33 ^{aBCD}±0.21	1.66 ^{aCDE}±0.21	1.83 ^{aDE}±0.16	2.16 ^{aE}±0.16
		B	0.66 ^{aA}±0.21	0.82 ^{aA}±0.16	1.66 ^{abB}±0.21	1.83 ^{abBC}±0.16	2.16 ^{abBC}±0.16	2.33 ^{aC}±0.21	2.33 ^{aC}±0.21
		S	0.64 ^{aA}±0.21	0.81 ^{aA}±0.16	1.83 ^{bB}±0.16	2.16 ^{bBC}±0.16	2.33 ^{bBC}±0.21	2.33 ^{aBC}±0.21	2.66 ^{aC}±0.21
Basophil (%)	6	I	0.33 ^{aA}±0.21	0.66 ^{aA}±0.21	1.33 ^{aB}±0.21	1.33 ^{aB}±0.21	1.66 ^{aBC}±0.21	1.83 ^{aBC}±0.16	2.16 ^{aC}±0.16
		B	0.32 ^{aA}±0.21	0.64 ^{aA}±0.21	1.66 ^{abB}±0.21	1.66 ^{aB}±0.21	1.66 ^{aB}±0.21	1.83 ^{aBC}±0.16	2.33 ^{aC}±0.21
		S	0.31 ^{aA}±0.21	0.62 ^{aA}±0.21	2.16 ^{bB}±0.16	2.33 ^{bB}±0.21	2.66 ^{bBC}±0.21	3.16 ^{bCD}±0.16	3.33 ^{bD}±0.16
Monocyte (%)	6	I	0.50 ^{aA}±0.22	1.33 ^{aB}±0.21	2.16 ^{aC}±0.16	2.33 ^{aCD}±0.21	2.66 ^{aCDE}±0.21	2.83 ^{aDE}±0.16	3.16 ^{aE}±0.16
		B	0.49 ^{aA}±0.20	1.32 ^{aB}±0.21	2.1 6 ^{aC}±0.16	2.33 ^{aCD}±0.21	2.83 ^{aDE}±0.16	3.16 ^{aE}±0.16	3.33 ^{aE}±0.21
		S	0.48 ^{aA}±0.23	1.31 ^{aB}±0.21	2.33 ^{aC}±0.21	2.83 ^{aCD}±0.16	2.83 ^{aCD}±0.16	3.33 ^{aDE}±0.21	3.66 ^{aE}±0.21
Lymphocyte (%)	6	I	41.66 ^{aA}±0.21	47.16 ^{aB}±0.16	52.83 ^{aC}±0.16	57.33 ^{aD}±0.21	58.33 ^{aE}±0.21	59.16 ^{aF}±0.16	60.33 ^{aG}±0.21
		B	41.64 ^{aA}±0.21	47.14 ^{aB}±0.16	54.33 ^{bC}±0.21	60.33 ^{bD}±0.21	64.66 ^{bE}±0.21	66.83 ^{bF}±0.16	68.33 ^{bG}±0.21
		S	41.62 ^{aA}±0.21	47.12 ^{aB}±0.16	58.16 ^{cC}±0.16	64.33 ^{cD}±0.21	71.16 ^{cE}±0.16	74.33 ^{cF}±0.21	75.83 ^{cG}±0.16
Haemoglobin (g/dl)	6	I	4.55 ^{aA}±0.07	6.55 ^{aB}±0.07	8.68 ^{bC}±0.07	9.60 ^{cD}±0.07	10.55 ^{cE}±0.07	11.60 ^{cF}±0.07	10.53 ^{cE}±0.08
		B	4.54 ^{aA}±0.07	6.54 ^{aB}±0.07	7.65 ^{aC}±0.07	7.95 ^{bD}±0.07	8.18 ^{bE}±0.07	8.41 ^{bF}±0.07	8.67 ^{bF}±0.07
		S	4.53 ^{aA}±0.07	6.53 ^{aD}±0.07	8.51 ^{bF}±0.08	5.31 ^{aB}±0.08	5.73 ^{aC}±0.08	6.63 ^{aD}±0.08	7.33 ^{aE}±0.08
PCV (%)	6	I	14.28 ^{aA}±0.07	18.68 ^{aB}±0.07	23.45 ^{cC}±0.07	25.35 ^{cD}±0.07	26.45 ^{cE}±0.07	27.58 ^{cF}±0.07	27.63 ^{cF}±0.07
		B	14.27 ^{aA}±0.07	18.66 ^{aB}±0.07	21.63 ^{bC}±0.08	22.58 ^{bD}±0.09	23.31 ^{bE}±0.07	23.58 ^{bF}±0.08	24.60 ^{bG}±0.08
		S	14.25 ^{aA}±0.07	18.65 ^{aB}±0.07	20.35 ^{aC}±0.07	19.35 ^{aD}±0.07	19.65 ^{aE}±0.07	20.65 ^{aF}±0.07	21.58 ^{aG}±0.09
MCV (μ^3)	6	I	82.88 ^{aD}±3.82	76.02 ^{aC}±2.55	64.56 ^{aAB}±1.10	68.04 ^{aB}±1.18	61.01 ^{aA}±0.90	61.99 ^{aA}±1.11	69.40 ^{aB}±1.44
		B	82.88 ^{aAB}±2.82	76.01 ^{aA}±2.55	88.55 ^{cB}±2.65	89.02 ^{bB}±2.80	89.20 ^{bB}±2.61	88.14 ^{bB}±2.98	90.11 ^{bB}±2.52
		S	82.86 ^{aA}±3.82	76.00 ^{aA}±2.55	79.08 ^{bA}±3.21	126.15 ^{cB}±8.49	122.67 ^{cB}±7.65	122.73 ^{cB}±6.68	122.42 ^{cB}±5.14
MCH (pg/cell)	6	I	26.44 ^{aAB}±1.46	26.65 ^{aB}±0.93	23.90 ^{aA}±0.39	25.77 ^{aAB}±0.50	24.33 ^{aAB}±0.37	26.07 ^{aAB}±0.56	26.44 ^{aAB}±0.51
		B	26.43 ^{aA}±1.46	26.64 ^{aA}±0.93	31.33 ^{bB}±1.09	31.36 ^{bB}±1.15	31.32 ^{bB}±1.02	31.46 ^{bB}±1.11	31.54 ^{bB}±0.77
		S	26.42 ^{aA}±1.46	26.62 ^{aA}±0.93	33.08 ^{bB}±1.35	34.64 ^{bBC}±2.35	35.78 ^{cBC}±2.23	39.41 ^{cCD}±2.13	41.57 ^{cD}±1.64
MCHC (g/dl)	6	I	31.84 ^{aA}±0.37	35.05 ^{aB}±0.27	37.02 ^{bC}±0.30	37.87 ^{cCD}±0.31	39.88 ^{cE}±0.30	42.05 ^{cF}±0.25	38.12 ^{cD}±0.33
		B	31.82 ^{aA}±0.37	35.03 ^{aB}±0.27	35.36 ^{aB}±0.40	35.20 ^{bB}±0.32	35.10 ^{bB}±0.42	35.69 ^{bB}±0.43	35.03 ^{bB}±0.37
		S	31.81 ^{aC}±0.37	35.02 ^{aE}±0.27	41.84 ^{cF}±0.33	27.47 ^{aA}±0.37	29.17 ^{aB}±0.35	32.11 ^{aC}±0.33	33.97 ^{aD}±0.28

* I = Intensive system, B = Backyard system and S = Scavenging system.

* Significant difference at ($p<0.05$) a, b, c indicate system wise significant different, A, B, C indicate interval wise significant different.

In the present investigation the value of WBCs along with DLC (%) was significantly higher ($p>0.05$) in scavenging system than backyard and intensive system. In contrast, Nyaulingo (2013) found non-significant difference ($p>0.05$) in WBCs among the three management systems. Heterophils, Eosinophils, Basophils, Monocytes and Lymphocytes were recorded higher in scavenging system followed by backyard and intensive system of rearing which indicated more chances of subclinical infections in scavenging system followed by backyard and intensive system. The findings were consistent with the findings of Ikegwuonu and Bassir (1977), who attributed the production of granulocytes to stimulation of reticulo-endothelial system by dietary substances. These granulocytes are involved in providing the body with a defense against invading microorganisms.

Mean value of MCV (122.42 ± 5.14 μ^3) and MCH (41.57 ± 1.64 pg/cell) were significantly higher ($p>0.05$) in scavenging system in comparison to backyard and intensive system, whereas MCHC (38.12 ± 0.33 g/dl) was found significantly higher ($p>0.05$) in intensive system as compared to other two systems. MCV, MCH and MCHC picture can give significant hints for the avian practitioner about anemia, dehydration, infection and aspergillosis etc. (Cambell, 1995).

Heamatological parameters in growing chicks have been shown to be influenced by various factors such as age, sex, diet, climatic condition and the methods of rearing system (Nazifi *et al*., 2012). The enhanced heamatological profile in intensive rearing system may be due to consumption of some bioactive nutrients in the feed supplements.

Biochemical parameters

Serum biochemical parameters of Kadaknath birds in different rearing systems are presented in Table 2. In our investigation the mean value of blood glucose and total protein were significantly ($p<0.05$) higher in intensive system followed by backyard and scavenging system. The present findings were in agreement with results of Kaneko (2008) who reported glucose in chicken to 167.8 mg/dl in intensive condition. Similarly, Abdi-hachesoo *et al*. (2013) also studied the blood biochemical parameters of indigenous local scavenging type breed of Iran. However they found higher level of glucose (mg/dl) 245.60 ± 28.11 in hen and 260.60 ± 35.68 in cock. This might be due to difference in species and local environmental conditions. Significantly lower ($p<0.05$) level of glucose and total protein under scavenging rearing system might be due to more exercise in scavenging birds which leads to hypoglycemia. Since during exercise activity of insulin is greater, that accelerate blood glucose metabolism.

The total protein and albumin were influenced by rearing system and significantly differ among rearing systems. There were no significant difference in globulin and A:G ratio. However, globulin level was higher in scavenging system as compare to backyard followed by intensive system. The lower serum total protein and albumin in scavenging system appears to be attributable to the less protein utilization by birds, as Kakade (1966) reported that reduced serum total protein level manifest as an alteration in normal systemic protein utilization. The improvement in serum protein in intensive birds indicates a rise in amino acids absorption and their utilization. On the contrary, our observation disagrees with the finding of Alabi *et al*. (2015) who reported parameters such as serum total protein, albumin and globulin were not significantly different in alternative housing systems namely Partitioned conventional cage, Extended conventional cage and Deep litter system. Present study suggested that systemic protein utilization of the bird was altered by different housing systems. We found higher globulin value (2.54±0.04) in scavenging system as compare with backyard (2.40 ± 0.09) and intensive system (2.39±0.05) at age 84 days but it was not significantly different that might be attributed to unhygienic conditions prevalent in scavenging system. The value of albumin and A:G ratio in our investigation was significantly higher ($p<0.05$) in intensive system as compared with other two systems of rearing; whereas, Barik *et al*. (2018) reported significantly higher ($p<0.05$) albumin and A:G ratio in scavenging system at 56 days. Our results were also supported by the findings of Panigrahy *et al*. (2017) who reported similar trends on glucose, total protein, albumin, globulin, cholesterol on Vanraja birds in intensive rearing system.

In the present findings, SGOT/AST, SGPT/ALT and Bilirubin were significantly differing among different rearing systems. We found value of SGOT/AST, SGPT/ALT and Bilirubin were 260.67, 7.85 and 23.5, respectively which were higher than that of reported by Bora *et al*. (2017) at 21 week of age. The value of cholesterol found significantly lower ($p<0.05$) in scavenging and backyard

Table 2: Biochemical parameters of Kadaknath in different rearing system at biweekly interval

Parameter	n	System	Before Grouping (Mean±SE)		After grouping (Mean±SE)				
			Day old	14 Day	28 Day	42 Day	56 Day	70 Day	84 Day
Blood Glucose (mg/dl)	6	I	118.75^{aA}±0.01	125.43 ^{aB}±0.06	136.49 ^{cC}±0.09	143.60 ^{cD}±0.28	147.78 ^{cE}±0.47	150.90^{cF}±0.28	156.26^{cG}±0.42
		B	118.05 ^{aA}±0.01	125.23 ^{aB}±0.06	129.50^{bC}±0.14	136.14 ^{bD}±0.15	146.84 ^{bE}±0.20	147.40 ^{bE}±0.30	149.32 ^{bF}±0.57
		S	117.15 ^{aA}±0.01	125.33 ^{aF}±0.06	124.63 ^{aE}±0.33	122.14 ^{aD}±0.26	121.79 ^{aC}±0.49	120.09 ^{aB}±0.29	123.07 ^{aD}±0.17
Total protein (g/dl)	6	I	3.14 ^{aA}±0.01	3.78 ^{aB}±0.02	4.47 ^{cC}±0.07	4.66 ^{cD}±0.03	4.86 ^{cE}±0.01	5.18 ^{cG}±0.03	4.99 ^{cF}±0.05
		B	3.13 ^{aA}±0.01	3.77 ^{aB}±0.02	4.07 ^{bC}±0.13	4.44 ^{bD}±0.02	4.51^{bE}±0.01	4.72 ^{bF}±0.06	4.86 ^{bG}±0.10
		S	3.11 ^{aA}±0.01	3.76 ^{aE}±0.02	3.10 ^{aA}±0.03	3.28 ^{aB}±0.01	3.57 ^{aC}±0.02	3.70 ^{aD}±0.01	3.89 ^{aF}±0.03
Albumin (g/dl)	6	I	1.55 ^{aA}±0.01	2.10 ^{aB}±0.09	2.62 ^{cD}±0.02	2.55 ^{cC}±0.02	2.69 ^{cD}±0.06	2.84 ^{cE}±0.03	2.60^{cD}±0.02
		B	1.54 ^{aA}±0.01	2.09 ^{aB}±0.09	2.16 ^{bC}±0.01	2.32 ^{bD}±0.01	2.31 ^{bD}±0.01	2.38 ^{bD}±0.02	2.46 ^{bE}±0.02
		S	1.52 ^{aD}±0.01	2.08 ^{Ae}±0.09	1.11 ^{aA}±0.02	1.15 ^{aA}±0.01	1.23 ^{aB}±0.01	1.27 ^{aB}±0.01	1.35 ^{aC}±0.01
Globulin (g/dl)	6	I	1.59 ^{aA}±0.01	1.67 ^{aAB}±0.10	1.85 ^{aB}±0.08	2.11 ^{aC}±0.02	2.17 ^{aC}±0.06	2.34 ^{aD}±0.04	2.39 ^{aD}±0.05
		B	1.57 ^{aA}±0.01	1.65 ^{aA}±0.05	1.91 ^{aB}±0.12	2.12 ^{aC}±0.02	2.20 ^{aC}±0.01	2.34 ^{aD}±0.08	2.40 ^{aD}±0.09
		S	1.56 ^{aA}±0.01	1.63 ^{aA}±0.10	1.98 ^{aB}±0.05	2.13 ^{aB}±0.03	2.34 ^{bC}±0.03	2.42 ^{bCD}±0.01	2.54 ^{aD}±0.04
A:G Ratio	6	I	0.97 ^{aA}±0.01	1.30 ^{aBCD}±0.13	1.43 ^{cD}±0.09	1.20 ^{cBC}±0.01	1.23 ^{cBC}±0.06	1.21 ^{cBC}±0.03	1.09 ^{bAB}±0.03
		B	0.96 ^{aA}±0.01	1.30 ^{aB}±0.07	1.15 ^{bAB}±0.09	1.09 ^{bA}±0.01	1.05 ^{bA}±0.01	1.02 ^{bA}±0.04	1.03 ^{bA}±0.04
		S	0.94 ^{aB}±0.01	1.29 ^{aC}±0.13	0.56 ^{aA}±0.02	0.53 ^{aA}±0.01	0.52 ^{aA}±0.01	0.52 ^{aA}±0.01	0.53 ^{aA}±0.01
SGOT (IU/L)	6	I	212.06 ^{aA}±0.37	213.14 ^{aB}±0.18	229.78 ^{cC}±0.41	234.65 ^{bD}±0.83	251.44 ^{bE}±0.50	274.77 ^{cF}±0.59	291.50 ^{cG}±1.31
		B	211.06 ^{aA}±0.37	213.11 ^{aB}±0.18	226.96 ^{bC}±0.69	228.64 ^{aC}±0.54	240.19 ^{aD}±0.34	245.68 ^{bE}±0.40	256.71 ^{bF}±4.57
		S	211.06 ^{aA}±0.25	213.05 ^{aC}±0.18	214.39 ^{aB}±0.89	226.76 ^{aD}±1.19	240.55 ^{aE}±0.22	240.75 ^{aE}±0.13	242.25 ^{aE}±0.39
SGPT (IU/L)	6	I	6.86 ^{aA} ± 0.13	7.23 ^{aB}±0.04	7.83 ^{cC}±0.01	7.89 ^{bC}±0.21	8.73 ^{cD}±0.06	9.74 ^{cE}±0.02	11.39 ^{cF}±0.03
		B	6.86 ^{aA}±0.13	7.22 ^{aB}±0.04	7.44 ^{bBC}±0.01	7.67 ^{bCD}±0.02	7.77 ^{bD}±0.03	8.30 ^{bE}±0.09	9.00 ^{bF}±0.17
		S	6.85 ^{aA}±0.13	7.22 ^{aA}±0.01	7.14 ^{aA}±0.11	7.04 ^{aA}±0.13	6.89 ^{aA}±0.21	6.86 ^{aA}±0.02	7.21 ^{aA}±0.03
Creatinine (mg/dl)	6	I	0.15 ^{aA}±0.01	0.22 ^{aB}±0.01	0.46 ^{cC}±0.01	0.52 ^{bD}±0.01	0.55 ^{bE}±0.01	0.63 ^{bF}±0.01	0.67 ^{cG}±0.01
		B	0.14 ^{aA}±0.05	0.21 ^{aB}±0.01	0.30 ^{bC}±0.01	0.34 ^{aC}±0.01	0.36 ^{aC}±0.01	0.44 ^{aD}±0.04	0.63 ^{bE}±0.01
		S	0.14 ^{aA}±0.01	0.21 ^{aB}±0.04	0.20 ^{aB}±0.01	0.32 ^{aC}±0.02	0.34 ^{aC}±0.01	0.43 ^{aD}±0.01	0.54 ^{aE}±0.01
BUN (mg/dl)	6	I	4.83 ^{aA}±0.07	5.10 ^{aA}±0.05	6.10 ^{cB}±0.22	7.22 ^{cC}±0.06	7.68 ^{cD}±0.14	9.78 ^{bE}±0.08	10.54 ^{cF}±0.11
		B	4.82 ^{aA}±0.07	5.09 ^{aA}±0.05	5.69 ^{bB}±0.06	6.27 ^{bC}±0.12	6.60 ^{bC}±0.06	7.42 ^{aD}±0.11	8.65 ^{bE}±0.23
		S	4.81 ^{aA}±0.07	5.08 ^{aB}±0.05	5.01 ^{aB}±0.02	5.43 ^{aC}±0.04	5.86 ^{aD}±0.05	7.37 ^{aE}±0.05	7.70 ^{aF}±0.05
Cholesterol (mg/dl)	6	I	47.51 ^{aA}±0.09	83.73 ^{aB}±0.58	87.84 ^{aC}±0.40	93.30 ^{cD} ±0.48	102.60 ^{bE}±0.41	104.86 ^{cF}±0.31	108.41 ^{bG}±0.11
		B	47.50 ^{aA}±0.09	83.72 ^{aB}±0.58	85.27 ^{aC}±0.19	85.99 ^{bC}±0.60	89.50 ^{aD}±0.56	95.67 ^{bE}±0.25	101.18 ^{aF}±0.29
		S	47.50 ^{aA}±0.02	83.72 ^{aC}±0.50	84.26 ^{bC}±0.15	78.44 ^{aB}±0.14	88.42 ^{aD}±0.13	89.03 ^{aD}±0.04	101.60 ^{aE}±0.19
Bilirubin (mg/dl)	6	I	15.41 ^{aA}±0.09	19.74 ^{aB}±0.03	22.05 ^{cC}±0.19	23.51 ^{cD}±0.05	24.03 ^{cE}±0.01	25.54 ^{cF}±0.08	27.33 ^{cG}±0.02
		B	15.40 ^{aA}±0.09	19.73 ^{aB}±0.03	20.29 ^{bC}±0.02	21.20 ^{bD}±0.02	23.66 ^{bE}±0.07	24.03 ^{bF}±0.01	25.31 ^{bG}±0.05
		S	15.40 ^{aA}±0.02	19.72 ^{aC}±0.03	19.17 ^{aB}±0.01	20.05 ^{aC}±0.01	21.55 ^{aD}±0.01	22.53 ^{aE}±0.10	23.22 ^{aF}±0.28

* I = Intensive system, B = Backyard system and S = Scavenging system.

* Significant difference at ($p<0.05$) a, b, c indicate system wise significant different, A, B, C indicate interval wise significant different.

system in comparison to intensive system. Panigrahy *et al*. (2017) was also reported significantly higher values of cholesterol in intensive system. Lower content of cholesterol in indigenous poultry may be due to high body activity and natural feed ingredient (Almeida *et al*., 2006).

Creatinine and BUN levels were not influenced by rearing systems in the early phase of rearing. However, in later phase these values differ significantly ($p<0.05$) among different rearing systems. Although, in present study the value of creatinine and BUN of Kadaknath was significantly higher ($p<0.05$) in intensive system as compare with other systems, which was not agreed with Rehman *et al*. (2017) who reported cholesterol and BUN changed independently with rearing system.

CONCLUSION

From the present experiment it can be concluded that intensive systems of rearing have upper hand over backyard and scavenging. There was significantly higher immune response of birds reared in scavenging system as compared to backyard followed by intensive systems of rearing. All these variations in heamatological and biochemical parameters in Kadaknath birds may be due to the effect of different rearing systems and their feed habits.

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