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# EFFECT OF SEASON ON BIOCHEMICAL CONSTITUENTS OF SERUM IN COMMERCIAL BROILER CHICKEN

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## ABSTRACT

A study was conducted on broilers in two trials to estimate blood biochemical parameters during summer and winter season. Blood samples (32 nos) were collected from two birds (one male & one female) per replicate, before slaughtering. The result revealed that the glucose concentration was significantly ($p<0.05$) higher in male (191.96±5.14, 197.37±1.90) birds than in female birds in both winter and summer season. Irrespective of sexes, the total proteins concentration (3.15±0.18 & 3.09±0.01) was significantly ($p<0.05$) higher in winter than in summer. The albumin calcium, phosphorus, tri-iodothyronine and alkaline phosphatase did not differ significantly in different seasons. However, concentration differed significantly ($p<0.05$) in females (16.17±0.41 and 9.30±0.48 ng/ml) between the two seasons.

**Key Words** : Biochemical constituent, season, serum, sexes.

The change in environment and season of rearing period influences the growth performance of chickens. Such changes affect the internal environment of the birds including the blood through the nervous and endocrine system. Serum biochemical parameters may provide valuable information for differential diagnosis of nutritional disorders and evaluation of health status of birds [9]. Biochemical values of chicken serum may be influenced by several factors such as poultry diseases, some dietary nutrients and environmental temperature[3,6]. The several systems that participate in thermoregulation are through modulation of heat production and heat loss. It is not clear whether changes in the blood system are part of acclimation to high or low environmental temperatures or are the response to acute perturbation only. Therefore, the present study was undertaken to evaluate some biochemical parameters in broilers reared during summer and winter season.

## MATERIALS AND METHODS

The present study was undertaken at the Department of Livestock Production Management, in the West Bengal University of Animal & Fishery Sciences, Kolkata, West Bengal. In the present study, in each season 650 day old chicks (cobb) were reared. All the birds were maintained under uniform and standard management condition. All the birds were vaccinated as per schedule followed

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at farm. During winter season light intensity was increased especially during first week by using gas lamp. Shed temperature was set at $32^0$ C on the first day, which was reduced daily by $0.4^0$C till a temperature of 22°C ±2. Relative humidity was maintained at 70% during the first week. The temperature and relative humidity inside the experimental unit were recorded using thermometer and hygrometer, respectively. Similarly, the daily environmental temperature and relative humidity were also recorded. 32 nos of blood samples (5 ml) were collected from wing vein of two birds (one male & one female) per replicate using 24 gauge needle on 42nd day of age before slaughter. Serum was separated by centrifugation at 2000 rpm for 20 minutes. Glucose, total proteins, albumin, calcium, phosphorus and alkaline phosphatase activity in serum were determined by commercially available kits. Total triiodothyronine and thyroxin were estimated using enzyme immunoassay kits (Omega diagnostics). The data were analyzed and interpreted by S.P.S.S. version-10[10].

## RESULTS AND DISCUSSION

The inside environmental temperature and humidity were found to be high during the experimental period of summer and winter season. The means of standard errors values of different parameters of broiler chickens are tabulated (Table: 1) of male and female broilers at 6 weeks of age.

**Glucose:** The average glucose concentration was significantly higher (Pd"0.05) in summer season than in winter months. Similar findings were reported[1, 4, 7] at high temperature glucose concentration increased which might be indicative of stimulation of gluconeogenic process. In contrast, [8]earlier workers reported that at high temperature glucose concentration decreased on day 21, which might be due to reduced feed intake and increased water consumption accompanied by haemodilution in response to thermal stress.

**Total proteins:** Irrespective of the sexes the average total protein concentration was significantly (P 0.05) higher in winter than in summer. Similar findings were also reported[4, 5]. Very recently[2] reported that the total protein value had a significant and negative relationship with elevated ambient temperature, indicating that heat stress exerts adverse effects on protein synthesis.

The average albumin concentrations in both male and female birds were higher in winter than in the summer. Further, irrespective of the season the albumin concentration was higher in male than in female birds [1]reported that the plasma levels of albumin increased at 34°C, but no dramatic change in levels occurred. Irrespective of the sexes the average serum calcium concentration was lowest in summer than in winter season. Further in both winter and summer season the concentration of serum calcium was higher in male than in female birds. The result is in accordance with [2, 4]. In both sexes the average phosphorus concentration was lower in summer than in winter season. In both season the concentration was higher in male than in female birds. The small difference in concentration however did not approach statistical significance. Similar findings of the present study were reported[4] were also observed significantly lowest serum phosphorus levels in heat stressed birds. They attributed the reduced level of phosphorus during hot ambience to low thyroid activity and calcium metabolism [4] further reported that at low temperature (13-16°C) phosphorus concentration were higher than at higher ambient temperature. The serum tri-iodothyronine concentration was higher in winter than in summer season in both the sexes. Further irrespective of season the concentration was higher in female than in male birds. The observation that the tri-iodothyronine was lower in summer months than in winter substantiate the findings of [4, 7, 12], which is attributed to lowest metabolic rate for thermoregulation and to prevent hypothermia. However, [11]reported that the level of triiodothyronine in different sexes was independent.

**Thyroxine:** The thyroxine concentration of female chickens during winter was significantly

(P 0.05) higher than summer. Similar findings [4, 11] were reported, that thyroxine concentration lowered when exposed to heat and reduced by 45.6 percent on the last day of heat exposure. However, [11] reported that the level of thyroxine in different sexes was independent.

**Alkaline phosphatase**: The serum alkaline phosphatase was higher in summer than in winter in both the sexes. During the winter and summer season the alkaline phosphatase activity was marginally higher in male birds than in female birds. It was observed that, the serum alkaline phosphatase was higher in summer than in winter and it is in agreement [4]. The higher glucocorticoid secretion may be related with increased in alkaline phosphatase during the summer months.

**Table: 1. Mean ± S.E values of biochemical parameters of serum in commercial broiler chickens during winter and summer season**

| Parameters | Season | Male | Female |
|---|---|---|---|
| Glucose (mg/dL) | Winter | 191.96±5.14* | 190.64±2.23* |
| | Summer | 197.37±1.90* | 196.54±2.31* |
| Total protein (g/L) | Winter | 3.15±0.18* | 3.09±0.01* |
| | Summer | 2.73±0.04* | 2.82±0.07* |
| Albumin (g/L) | Winter | 2.73±0.04 | 1.88±0.07 |
| | Summer | 1.84±0.09 | 1.49±0.06 |
| Calcium (mg/dl) | Winter | 8.29±0.13 | 7.62±0.14 |
| | Summer | 6.03±0.14 | 5.45±0.12 |
| Phosphorus (mg/dl) | Winter | 6.50±0.14 | 6.30±0.12 |
| | Summer | 5.38±0.11 | 4.16±0.13 |
| Triiodothyronine (ng/ml) | Winter | 3.84±0.19 | 3.92±0.24 |
| | Summer | 1.80±0.28 | 1.91±0.39 |
| Thyroxine (ng/ml) | Winter | 14.23±0.65 | 16.17±0.41* |
| | Summer | 8.70±0.52 | 9.30±0.48* |
| Alkaline phosphatase (U/L) | Winter | 3.64±0.61 | 3.63±0.67 |
| | Summer | 4.72±0.24 | 4.09±0.47 |

* Mean with different subscript in a column are significantly different (P<0.05)

## CONCLUSION

The concentration of glucose and total protein in both sexes of broiler chickens differed significantly ($p<0.05$) between summer and winter seasons. The other parameters were not found to be differing significantly between seasons. However, thyroxine level in female differed significantly between seasons. Seasonally, the concentration of total proteins, albumin, calcium, phosphorus concentrations were higher during winter than in summer season, whereas the concentration of glucose and alkaline phosphatase activity was higher during summer season.

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