



## EFFECT OF GERMINATED SORGHUM BASED DIET AT DIFFERENT LEVELS ON BIOCHEMICAL PARAMETERS IN BROILERS

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### ABSTRACT

Today poultry farming is one of the profits making agro-based sector that provides continuous flow of income round the year by the sale of meat/ eggs. The magnificent expansion of poultry industry is also due to the fact that it provides the main source of animal protein through meat at cheaper rate as compared to other sources of animal protein. The nutritive value of maize seed depends on the technological processes used, such as milling, oil extraction, starch separation and germination. The experiment was conducted on 200 broiler day old chicks, which are randomly divided into five groups of 40 chicks each. Group 1 is kept as control, in group 2 the multienzyme complex was added with broiler ration, in group 3 the germinated sorghum was added at 50% level, in group 4 at 75% level and in group 5 at 100% level. The significant increase in serum calcium and phosphorus along with significant decrease in alkaline phosphatase and acid phosphatase revealed that the use of germinated maize increase of availability of calcium and phosphorus for better production. There were non significant increase in serum glucose, total cholesterol and total protein in all treated group as compare to control.

**KEYWORDS** : Germination, Sorghum, broiler, Multienzyme complex, Biochemical.

### INTRODUCTION

Poultry industry is one of the most dynamic and rapidly expanding segments of our livestock economy. The broiler chicken industry has now occupied the second place in volume in the world just after pork (Yang and Jiang, 2005). India is now the world's fourth largest egg producer and the fifth largest producer of broilers. Sorghum is one of the staple cereals in several regions in India. It is a drought resistant cereal that is produced worldwide. Sorghum is the fifth most important crop after wheat, rice, corn, and barley (Bryden *et al.*, 2009). Sprouting has been used to improve the nutritional value of the grains. The nutritional value of sprouted grains is improved due to the conversion of complex compounds into relatively simpler compounds that are nutritionally more valuable. Sprouting of grains has resulted in increased protein quantity and quality. Sprouting also increases the concentration of certain nutrients including sugars, minerals and vitamin contents. However, sprouting has resulted in decreased starch contents and dry matter content of grains. It also increases the plant enzyme contents.

### MATERIAL & METHODS

The present experiment was conducted on 200 day old Vencobb broiler chicks randomly divided into five treatment groups of 40 chicks each viz., G0, G1, G2, G3 and G4. Each group was further divided into four replications of 10 birds each. Control group (G0) was given commercial sorghum - DOC soya based diet. The treatment Group G1 was given

diet containing sorghum as cereal grain along with multienzyme complex. The Group G2 was given diet containing germinated sorghum at 50% level of the cereal component. Group G3 was given diet containing germinated sorghum at 75% level of the cereal component. Group G4 was given diet containing germinated sorghum at 100% level of the cereal component, respectively. The experimental birds were vaccinated against Ranikhet disease and Gumboro disease/IBD at appropriate time. The birds were housed in deep litter system in the well ventilated and lighted rooms and the feed was given *ad.lib.* with plenty of fresh water. The body weights of day old chicks were recorded on arrival and thereafter on weekly intervals. Five birds were separated from each group on day 43 and from each separated bird about 5ml of blood collected in EDTA and non EDTA vials for biochemical analysis. All observations were analyzed by using ANOVA to compare different treatment group.

### RESULT

#### (1) Calcium (mg/dl)

The mean values of serum calcium level for G0, G1, G2, G3 and G4 were  $6.82 \pm 0.14$ ,  $7.47 \pm 0.20$ ,  $8.92 \pm 0.22$ ,  $8.96 \pm 0.57$  and  $8.22 \pm 0.73$ , respectively. There was significant increase ( $P < 0.01$ ) in the serum calcium levels as compared to control.

#### (2) Phosphorus (mg/dl)

The mean values of serum phosphorus level for G0, G1, G2, G3 and G4 were  $8.44 \pm 0.19$ ,  $8.22 \pm 0.38$ ,  $10.09 \pm 0.87$ ,  $9.17 \pm 0.21$  and  $10.38 \pm 0.58$ , respectively and there was

significant ( $P < 0.01$ ) increase in the serum phosphorus concentration as compared to control group.

### (3) Alkaline phosphatase (IU/L)

The mean values of serum alkaline phosphatase level for G0, G1, G2, G3 and G4 were  $173.19 \pm 1.66$ ,  $144.92 \pm 3.33$ ,  $143.02 \pm 2.30$ ,  $140.39 \pm 1.97$  and  $141.22 \pm 1.61$ , respectively and there was significant ( $p < 0.01$ ) decreases in alkaline phosphatase concentration in all treated groups as compared to control.

### (4) Acid phosphatase (IU/L)

The mean values of serum acid phosphatase level for G0, G1, G2, G3 and G4 were  $7.47 \pm 0.05$ ,  $6.32 \pm 0.07$ ,  $3.70 \pm 0.03$ ,  $3.43 \pm 0.05$  and  $3.33 \pm 0.06$ , respectively and there was significant ( $P < 0.01$ ) decrease in the acid phosphatase concentration in all treated groups as compared to control group.

### (5) Total protein (g/dl)

The mean values of total protein level for G0, G1, G2, G3 and G4 were  $6.94 \pm 0.20$ ,  $7.46 \pm 0.19$ ,  $7.84 \pm 0.30$ ,  $8.19 \pm 0.34$  and  $8.39 \pm 0.45$ , respectively and there was significant differences ( $P < 0.01$ ) in the total protein concentration in treated groups as compared to control.

### (6) Total cholesterol (mg/dl)

The mean values of total cholesterol level for G0, G1, G2, G3 and G4 were  $122.56 \pm 4.57$ ,  $137.08 \pm 4.95$ ,  $138.24 \pm 5.40$ ,  $136.42 \pm 3.87$  and  $136.60 \pm 4.64$ , respectively and there was no significant difference in total cholesterol concentration in all treated groups as compared to control group.

### (7) Glucose (mg/dl)

The mean values of serum glucose level for G0, G1, G2, G3 and G4 were  $174.68 \pm 8.02$ ,  $175.16 \pm 2.61$ ,  $167.85 \pm 8.78$ ,  $172.35 \pm 4.22$  and  $172.40 \pm 3.43$ , respectively and there was no significant difference in glucose concentration in treated groups as compared to control.

**TABLE 1:** Effect of germinated sorghum and multienzyme complex on biochemical parameters in broilers (Mean  $\pm$  SE)

Parameters	GROUPS				
	G0 (control)	G1	G2	G3	G4
Calcium (mg/dl)	$6.82^c$ $\pm 0.14$	$7.47^{bc}$ $\pm 0.20$	$8.92^a$ $\pm 0.22$	$8.96^a$ $\pm 0.57$	$8.22^{ab}$ $\pm 0.73$
Phosphorus (mg/dl)	$8.44^b$ $\pm 0.19$	$8.22^b$ $\pm 0.38$	$10.09^a$ $\pm 0.87$	$9.17^{ab}$ $\pm 0.21$	$10.38^a$ $\pm 0.58$
Alkaline phosphatase (IU/l)	$173.19^a$ $\pm 1.66$	$144.92^b$ $\pm 3.33$	$143.02^b$ $\pm 2.30$	$140.39^b$ $\pm 1.97$	$141.22^b$ $\pm 1.61$
Acid phosphatase (IU/l)	$7.47^a$ $\pm 0.05$	$6.32^b$ $\pm 0.07$	$3.70^c$ $\pm 0.03$	$3.43^d$ $\pm 0.05$	$3.33^d$ $\pm 0.06$
Total protein (g/dl)	$6.94^c$ $\pm 0.20$	$7.46^{bc}$ $\pm 0.19$	$7.84^{abc}$ $\pm 0.30$	$8.19^{ab}$ $\pm 0.34$	$8.39^a$ $\pm 0.45$
Total cholesterol (mg/dl)	$122.56$ $\pm 4.57$	$137.08$ $\pm 4.95$	$138.24$ $\pm 5.40$	$136.42$ $\pm 3.87$	$136.60$ $\pm 4.64$
Glucose (mg/dl)	$174.68$ $\pm 8.02$	$175.16$ $\pm 2.61$	$167.85$ $\pm 8.78$	$172.35$ $\pm 4.22$	$172.40$ $\pm 3.43$

\*\*Shows Significance at 1% level as compared to control group ( $P < 0.01$ )

The value with the different superscripts in a row is different significantly between groups

The value with the no superscripts in a row are having no significant relationship

## DISCUSSION

### (1) Calcium and phosphorus

The present study revealed that there was a significant increase in the serum calcium and phosphorus level in the all the treated groups as compared to control groups. This indicates that use of multienzyme complex and germinated sorghum in feed is capable of release calcium and inorganic phosphorus from the feed. So this inorganic phosphorus readily available for utilization by the body along with increased availability of bivalent ions like calcium, magnesium, iron and zinc etc. for growth and other metabolic activities. Similar observations were also reported by Jain (2008), Osman (2009), and Prajapati (2010). Kwari *et al.* (2012) found that there was no effect on biochemical parameters after treatments.

### (2) Glucose, total cholesterol and total protein

The present study revealed non significant decrease in the level of serum glucose, total cholesterol and a significant increase in total proteins in all treated diets as compared to

control. Similar observation also reported by El-deek *et al.* (2009) and Osman (2009). On the contrary, Jain (2008), Manwar and mandal (2009) and Prajapati (2010) found no significant effect in treated groups as compare to control.

### (3) Acid phosphatase and alkaline phosphatase

The present study showed a significant ( $p < 0.01$ ) decrease in plasma alkaline phosphatase and acid phosphatase in all treated groups. This indicated that sprouted grain given to broilers may had some enzymes like phytase with increased activity, causes increased plasma concentration of phosphorus and calcium through liberation of phytate phosphorus, through decreased plasma alkaline phosphatase and acid phosphatase activity. Similar observation also reported by Viveros *et al.* (2002), Famino and Akinola (2006), Jain (2008), and Prajapati (2010). In contrast non significant effect was noted by Onifade *et al.* (1999) and Kannan *et al.* (2008).

**CONCLUSION**

The significant increase in serum calcium and phosphorus, along with significant decreases in alkaline phosphatase and acid phosphatase revealed that the use of germinated sorghum increase the availability of calcium and phosphorus for better production. The serum protein showed significant differences in treated groups but blood glucose level and total cholesterol level were non-significant.

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