

Effect of Growell on Performance, Organ Weight and Serum Trace Element Profile of Broilers

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ABSTRACT : Effect of Growell a herbomineral premix was evaluated on performance, organ weight, humoral immune response, tissue and serum trace element profile of broilers. Day old 50 Babcock broiler chicks were randomly divided in two groups (C and T) and reared on deep litter system for 6 weeks of age. Chicks from group C were given basal diet while chicks from T group were fed basal diet supplemented with Growell at the rate 0.35 g/Kg. The chicks were vaccinated with Lasota strain of NCDV at 4th and 28th day of age. The birds receiving Growell treatment had higher body weight with better feed conversion ratio as compare to that of control chicks. Growell treatment had significantly reduced per cent weight of spleen and kidney, whereas that of bursa was increased. There was no effect of treatment on relative weight of thymus. HI antibody titer against NCDV in Growell treated chicks were higher as compare to untreated chicks indicating better humoral immune status. Growell treatment had no effect on serum Fe and Zn concentration. Dietary supplementation of Growell had significantly increased iron content of liver, kidney and muscle; zinc content of kidney and muscle; copper content of kidney and muscle and Mn content of kidney. Growell treatment improved the body weight, FCR and humoral immune status of broilers. Similarly, deposition of trace minerals in various organs was also increased in comparison to control. (*Asian-Aust. J. Anim. Sci.* 2001. Vol. 14, No. 5 : 677-679)

Key Words : Broiler Performance, Trace Element, Organ Weight, Growell, Herbomineral

INTRODUCTION

In recent years the biological significance of trace elements has been well recognised. Iron (Fe), copper (Cu) and zinc (Zn) are the trace elements that have been shown to linked with growth and immuno-competence of livestock. Deficiencies of these elements leads to decreased antibody formation (Chandra and Dayton, 1982) and impaired T-cell responses (Brock and Maninou-Flower, 1986). Tufts and Nockels (1991) observed change in concentration of trace minerals in tissue in response to infection and stress.

Growell is a herbomineral growth promoter containing iron in bhasma form. Recently it has been claimed to be an immunostimulant and reduce severity of pathological effects induced due to of infectious bursal disease virus in cockerels (Borkar, 1998). The purpose of the present investigation was to examine the changes in Fe, Zn, Cu and Mn among serum, liver, kidney, and muscle of broilers fed with Growell. The data generated will also provide information regarding trace minerals profile in relation to growth and immunocompetance of broilers.

MATERIALS AND METHODS

Day old, 50 Babcock broilers chicks were randomly divided in two treatment groups (C and T).

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Chicks from group C were given basal diet while chicks from group T were maintained on basal diet supplemented with Growell at the rate 0.35 g/kg throughout experimental period. Trace mineral analysis of basal feed and Growell is presented in table 1. The chicks were reared on deep litter system for 6 weeks and were provided *ad libitum* access to feed and water. Birds were vaccinated with Lasota strain of New Castle Disease Virus (NCDV) at 4th and 28th day of age. Weekly feed consumption, body weight, mortality was recorded for both the groups and feed conversion ratio was calculated. At the end of experiment i.e. 6th week of age sera samples were collected from 10 birds of each group. Ten birds from each group were weighed and sacrificed at the end of experiment. Liver, bursa, thymus, kidney and spleen were excised blotted and weighed. The per cent organ weights were calculated. Liver, kidney, piece of breast muscle and serum of these birds were further processed for Fe, Cu, Zn and Mn content in it on Atomic Absorption Spectrophotometer (Varian Techran, Australia). Haemagglutination inhibition (HI) titer of serum samples were estimated against NCDV (OIE, 1992). The data generated was analysed statistically using paired t test as per Snedecor and Cochran

Table 1. Concentrations of trace elements (ppm) of basal feed and Growell

Element	Basal Feed	Growell
Fe	730	167250
Zn	144	190
Cu	42.6	85
Mn	137.8	7000

(1967).

RESULTS AND DISCUSSION

Performance of broilers from both experimental groups is presented in table 2. The birds receiving Growell treatment consumed more feed and recorded numerically higher body weight gain. Thus better feed conversion ratio was observed in treated chicks as compare to that of untreated. This indicates better performance of chicks maintained on Growell supplemented feed. These results confirm the earlier findings of Borkar (1998) and Godbole (1998), who also recorded better growth performance and lower mortality in Growell supplemented cockerels. Aoyagi and Baker (1995) also reported dose dependent increase in body weight and feed intake of chicks by addition of Fe in diets.

Per cent weight of various organs observed in experimental chicks are presented in table 3. Growell treatment has significantly reduced per cent weight of spleen and kidneys, whereas that of bursa was increased. There was no effect of treatment on relative weight of thymus. The per cent weight of bursa in Growell treated group was high indicating better growth of bursa. Increase in Bursa : Body weight ratio as well increase in population of bursal lymphocytes in Growell fed cockerels was reported by Borkar (1998). Buncia et al. (1996) also recorded increase Bursa: Body weight ratio by feeding Bis, an immunostimulator to chicks. The literature scanned revealed no report on influence of trace minerals on bursal weight of chicken so present results could not be discussed.

Haemagglutination inhibition (HI) titer against

NCDV in Growell treated chicks were higher (\log_2 5.1) as compare to untreated chicks (\log_2 4.0) indicating better humoral immune status of Growell fed chicks. Borkar (1998) also recorded higher antibody titer against infectious bursal disease virus in cockerels fed Growell as compare to control chicks. Improved immunological status of Growell treated chicks may be attributed to extra supplementation of various trace minerals, which are responsible for mounting immune responses (Chandra and Dayton, 1983). Better humoral immune response by feeding Bis (Buncia et al., 1996) and Stresroak (Younus, 1996) was reported in poultry. Besides optimum supplementation of trace minerals, herbal ingredients of Growell might have contributed towards immunopotentiality in treated chicks. Sadekar et al. (1998) have reported herbs to have immunostimulatory activity.

Concentration of trace minerals (Fe, Zn, Cu, and Mn) in serum, liver, kidney and muscle of birds from both experimental groups are presented in table 4. The results indicate no significant effect of dietary supplementation of Growell on serum trace elements concentration. Iron content of liver, kidney and muscle was increased significantly in Growell treated chicks as compare to untreated chicks. Iron is required for synthesis and activation of several enzymes of metabolism in body (Underwood, 1977). This clearly indicates that more of iron was made available to chicks due to Growell treatment which might have helped birds to perform better. In an experimental study positive correlation between feed and serum iron concentration was recorded by Aoyagi and Baker (1995). The literature scanned on effect of iron on humoral immune response of fowls is scanty. However, vital role of Fe in development of immune

Table 2. Performance of broilers from treatment groups

Age in days	Body weight (g)		No of live bird		Cumulative feed consumed (kg)		Cumulative feed consumed (kg)/bird		FCR*	
	C	T	C	T	C	T	C	T	C	T
0	42.00 ± 0.20	42.10 ± 0.10	25	25	-	-	-	-	-	-
7	97.00 ± 3.39	100.60 ± 2.74	25	25	3.15	3.20	0.125	0.128	1.30	1.28
14	213.6 ± 6.52	226.40 ± 6.07	25	25	7.72	8.24	0.308	0.329	1.45	1.46
21	392.40 ± 10.75	420.80 ± 12.17	25	25	15.48	16.59	0.619	0.663	1.58	1.58
28	815.20 ± 20.69	831.60 ± 22.46	25	25	36.47	36.77	1.458	1.470	1.79	1.77
35	1096.80 ± 21.53	1178.40 ± 23.43	25	25	54.25	57.72	2.170	2.308	1.98	1.96
42	1348.40 ± 25.61	1438.80 ± 23.53	25	25	73.46	75.49	2.938	3.019	2.18	2.10

* FCR is calculated quantity of feed (kg) required to gain one kg body weight.

Table 3. Per cent organ weight of different treatment groups

Group	Liver	Spleen	Bursa	Thymus	Kidney
Control (C)	3.619 ± 0.423	0.199 ± 0.038*	0.096 ± 0.024	0.579 ± 0.115	0.883 ± 0.109*
Treatment Growell (T)	3.037 ± 0.307	0.171 ± 0.047	0.166 ± 0.037**	0.580 ± 0.079	0.675 ± 0.161

* Significant at 5% level; ** Significant at 1% level.

Table 4. Levels of trace minerals in various body tissues and sera samples of experimental birds

Tissue	Iron		Zinc		Copper		Manganese	
	C	T	C	T	C	T	C	T
Serum (ppm)	5.10 ± 0.9	6.30 ± 1.20	6.36 ± 1.16	4.74 ± 0.97	-	-	-	-
Liver (µg/g)	60.10 ± 0.23	69.55 ± 0.27**	11.90 ± 0.02	12.78 ± 0.23	11.69 ± 0.13	12.85 ± 0.19	5.33 ± 0.03*	4.89 ± 0.05
Kidney (µg/g)	52.86 ± 0.45	61.32 ± 0.27**	7.56 ± 0.10	15.96 ± 0.17**	7.42 ± 0.09	16.48 ± 0.08**	5.33 ± 0.07	6.35 ± 0.09**
Muscle (µg/g)	26.86 ± 0.19	39.81 ± 0.27**	6.02 ± 0.07	6.98 ± 0.12	5.65 ± 0.12	7.08 ± 0.07**	3.34 ± 0.07	3.52 ± 0.11

- Not determined; * Significant at 5% level; ** Significant at 1% level.

response have been recorded (Chandra and Dayton, 1982).

Zinc now has emerged as an element with an ability to influence immune function. Fraker et al. (1980) and Shoyinka and Daudu (1987) demonstrated higher antibody titer against komorav vaccine in cockerels given higher zinc in diet than those maintained on lower dietary zinc. Zinc content of kidney and muscle was found to be increased significantly while liver content remained unaffected. Certain natural feed components such as casein and liver extract contain chelates which improve Zn absorption and utilization (Underwood, 1977). Growell may have chelating property resulting in increased absorption and utilization of Zn.

Copper content of kidney, muscle was found to be significantly more in Growell treated birds. In the present experiment, addition of iron in bhasma form have not hampered Cu absorption and utilization. However, Underwood (1977) reported supplementation of Fe, lower down absorption of Cu. Though liver is store house of Cu there was marginal increase in Cu content of liver. The reasons for same deserves further investigation.

Since there is competition between Mn and Fe for binding sites, higher Fe level in liver might have hampered absorption of Mn. However, on same analogy, elevated Mn level in kidney as observed presently can not be explained.

In conclusion, feeding of Growell has resulted in increased body weight of chicks and higher antibody titer indicating its growth promoting and immunostimulatory property. Trace mineral profile studied indicated that high content of iron in Growell was absorbed and utilised in better way along with better utilization of other trace elements like Zn, Cu and Mn. Hence, beneficial effect of Growell treatment was observed.

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